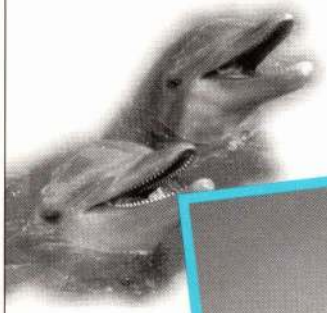
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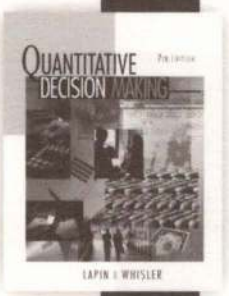


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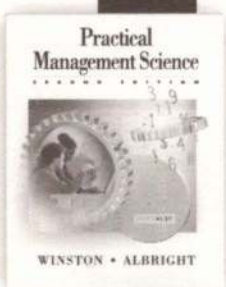
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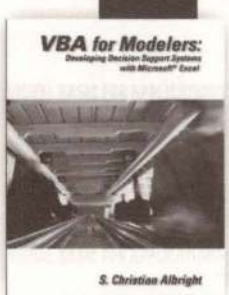


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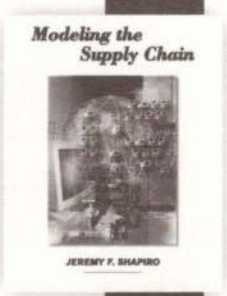


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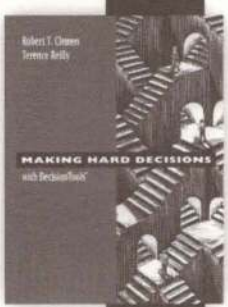


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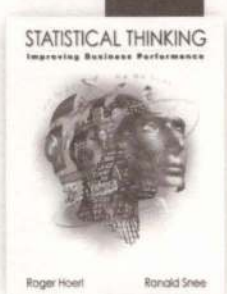


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Message from the General Chair

As our tag line boldly proclaimed "CONNECT WITH The BEST Minds, The BEST Research, and The BEST Applications in the Field." Welcome to Miami Beach, 2001!

Although clouded by the tragedy of 9/11, this meeting offers a chance to renew old friendships, to share recent research, to broaden our perspective by learning what others are doing, and, frankly, to relax in the sun and fun of Florida.

The scientific program is the largest ever. Tom Magnanti (MIT) will deliver the Omega Rho Plenary session talk, and the team from Merrill Lynch will reprise the 2001 winning Edelman Award presentation. Bill Cook (Princeton), Marshall Fisher (Wharton), George Surdu (Ford Motor Company) and Michael Murray (ExxonMobil) will deliver keynote talks. Invited sessions and tutorials cover all our traditional areas plus many additional areas of interest such as Auctions, Enterprise Resource Planning, Supply Chain Management, Open Source Software, and OR/MS and the Internet. The sixth annual Conference on Information Systems and Technology will be hosting a conference within a conference. There will be a Combined Colloquium, poster sessions, teacher's workshop, plant tours, sight-seeing tours, recruiting and much more.

Three social events will balance the intellectual content of the days. Sunday's welcome reception will set a tone for collegiality and renewed acquaintances. Monday's reception at the Seaquarium on Key Biscayne will highlight some of the best of the Miami area. A special reception on Tuesday at the University of Miami will be a motivator for Wednesday speakers and attendees.

This meeting is the result of two years of work by a large number of individuals. The INFORMS Meetings staff deserves special recognition – Terry Cryan, Ginni McGee, Cheryl Clark, Sandy Owens, Tanya Skorohod and Lynn Murray. Past and current Meetings Committee Liaisons have been very helpful - Paul Jensen, Jeff Arthur, Jeff Camm, Tom Gulledge, and Don Rosenfield.

The local committee was crafted from a number of Florida universities including: Florida International University, University of Miami, the University of Central Florida, the University of Florida, and the University of South Florida. The committee members are listed separately on another page. We all acknowledge the hard work of cluster chairs of sponsored sessions and invited sessions and all the others who organized special activities. We also appreciate the support provided by our Leadership sponsors ExxonMobil, Ford Motor Company, SAP, and Bacardi—as well as generous contributions from our Corporate and University Sponsors.

Most importantly, we appreciate your participation in this event. Welcome and enjoy.

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MIAMI BEACH, FLORIDA 33139

NEISEN O. KASDIN
MAYOR

Greetings,

As Mayor of the City of Miami Beach it is my pleasure to welcome The INFORMS 2001 annual conference to our City. By focusing on supply chain management, optimization and information systems the conference is the perfect meeting ground for management science professionals from all over the world. As the City of Miami Beach quickly becomes a center for international trade, information technology and cyber business I am proud of the appropriateness of hosting this wonderful and exciting event.

For your free time enjoyment, while in our City, I invite you to sample the celebrated international cuisine, exciting nightlife, people watching and unparalleled assortment of sports, water activities, shopping and entertainment. We would like for you to experience Lincoln Road in the heart of the City and get a taste of a unique blend of cafes, shops, galleries and arts organizations. Visit world-famous South Beach, the internationally acclaimed beach area packed with sidewalk cafes, restaurants and nightclubs. All of this is located in the Art Deco Historic District, which contains the largest collection of Art Deco architecture in the world. Please also explore the rest of our City, the grand hotels of mid-Beach and the undiscovered charm of North Beach.

On behalf of the City of Miami Beach, I wish you a rewarding experience in the midst our unique thriving City.

Best wishes,

Neisen Kasdin

PROGRAM AT A GLANCE

Note: Technical sessions are held at the Fontainebleau, Wyndham and Four Points hotels. Check the Master Track Schedule (inside back cover) for specific room locations.

Friday, November 2

6:00pm-9:00pm	2001 Combined Colloquia	F - Lobby Lev., Fontaine

Saturday, November 3

8:00am-5:30pm	2001 Combined Colloquia	F - Level 2, Fontainebleau A-D
9:00am-5:00pm	Organization Science Dissertation Proposal Competition	F - Level 1, Brittany
1:00pm-5:30pm	6th CIST Conference	F - Level 4, Imperial Rooms
3:00pm-7:00pm	Registration	F - Level 2
5:00pm-6:00pm	INFORMS Membership Meeting	F - Lobby Level, Fleur de Lis

Sunday, November 4

7:30am-5:00pm	Registration	F - Level 2
8:30am-6:45pm	6th CIST Conference	F - Level 4, Imperial Rooms
8:30am-10:00am	Technical Sessions (SA)	Fontainebleau-Wyndham-Four Pts
10:15am-11:45am	Technical Sessions (SB)	Fontainebleau-Wyndham-Four Pts
12:00pm-5:00pm	Exhibits, Job Placement, Email Center	F - Level 2
1:00pm-2:30pm	Technical Sessions (SC)	Fontainebleau-Wyndham-Four Pts
2:45pm-3:45pm	Plenary Presentation: Omega Rho Distinguished Lecture, Thomas Magnanti	F - Level 2, East Ballroom
4:00pm-5:30pm	Technical Sessions (SD)	Fontainebleau-Wyndham-Four Pts
5:45pm-6:45pm	Subdivision Business Meetings	Fontainebleau-Wyndham (see pg. 8)
7:00pm-8:30pm	Welcome Reception in Exhibit Hall	F - Level 2

Monday, November 5

7:30am-4:00pm	Registration	F - Level 2
8:00am-5:00pm	Teacher Program	F - Level 4, Voltaire
8:15am-9:45am	Technical Sessions (MA)	Fontainebleau-Wyndham-Four Pts
9:00am-5:00pm	Exhibits, Job Placement, Email Center	F - Level 2
10:00am-11:30am	Technical Sessions (MB)	Fontainebleau-Wyndham-Four Pts
12:00pm-1:00pm	Plenary: Welcome & Awards Ceremony	F - Level 2, East Ballroom
1:15pm-2:15pm	Keynote Presentations:	
	Michael Ali, Ford Motor Company	F-Level 2, Fontainebleau A
	William Cook, Princeton University	F - Level 2, Fontainebleau D
2:30pm-4:00pm	Technical Sessions (MC)	Fontainebleau-Wyndham-Four Pts
4:15pm-5:45pm	Technical Sessions (MD)	Fontainebleau-Wyndham-Four Pts
6:00pm-7:00pm	Subdivision Business Meetings	Fontainebleau-Wyndham-Four Pts (see pg. 8)
7:30pm-9:30pm	General Reception at Miami Seaquarium *(buses leave from hotels beginning at 7:00pm; return by 10:00pm)*	

Tuesday, November 6

8:00am-4:00pm	Registration	F - Level 2
8:15am-9:45am	Technical Sessions (TA)	Fontainebleau-Wyndham-Four Pts
9:00am-5:00pm	Exhibits, Job Placement, Email Center	F - Level 2
10:00am-11:30am	Technical Sessions (TB)	Fontainebleau-Wyndham-Four Pts
11:45pm-12:45pm	Plenary Presentation: Edelman Award Reprise	F - Level 2, East Ballroom
1:00pm-2:00pm	Keynote Presentations:	
	Marshall Fisher, Wharton, Univ. of Pennsylvania	F - Level 2, Fontainebleau A
	Michael Murray, ExxonMobil	F - Level 2, Fontainebleau D
2:15pm-3:45pm	Technical Sessions (TC)	Fontainebleau-Wyndham-Four Pts
4:00pm-5:30pm	Technical Sessions (TD)	Fontainebleau-Wyndham-Four Pts
5:45pm-6:45pm	Subdivision Business Meetings	Fontainebleau-Wyndham (see pg. 8)

Wednesday, November 7

8:00am-10:00pm	Registration	F – Level 2
8:30am-10:00am	Technical Sessions (WA)	Fontainebleau-Wyndham-Four Pts
10:15am-11:45am	Technical Sessions (WB)	Fontainebleau-Wyndham-Four Pts

Legend: F-Fontainebleau W-Wyndham Four Pts-Four Points

SCHEDULE OF SPECIAL EVENTS

	Location	From	To
Friday, November 2			
Colloquia Registration	F - Lobby Level, Fontaine	6:00p	6:30p
Colloquia Dinner Meeting	F - Lobby Level, Fontaine	6:30p	9:00p
Saturday, November 3			
Meetings Committee Meeting	F - Meetings Suite	8:30a	5:00p
Colloquia Breakfast	F - Level 2, Fontainebleau D	8:00a	8:30a
Colloquia Breakouts	F - Level 2, Fontainebleau A, B & C	8:30a	5:30p
Organization Dissertation Proposal Competition	F - Level 1, Brittany	9:00a	5:00p
Colloquia Luncheon	F - Level 2, Fontainebleau D	11:25a	1:00p
CIST Keynote	F - Level 4, Imperial II	1:00p	2:00p
INFORMS Executive Committee Meeting	F - Level 4, Imperial V	1:00p	6:00p
CIST Breakouts	F - Level 4, Imperial III & IV	2:00p	3:45p
CIST Panel	F - Level 4, Imperial II	4:00p	5:30p
Meeting Registration	F - Level 2, Grand Gallerie	3:00p	7:00p
INFORMS Membership Meeting	F - Lobby Level, Fleur de Lis	5:00p	6:00p
Sunday, November 4			
New Member/First-Time Attendee Breakfast	F - Lobby Level, Fontaine	7:00a	8:00a
Meeting Registration	F - Level 2, Grand Gallerie	7:30a	5:00p
IEEE Editors Meeting	F - Level 4, Conference Room 4	8:00a	4:00p
College on Organization Science Conference	F - Level 1, Brittany	8:00a	5:00p
INFORMS Board Meeting	F - Level 2, Fontainebleau B	8:00a	6:00p
CIST Breakouts	F - Level 4, Imperial III & IV	8:30a	5:30p
Guest Breakfast	F - Lower Level, Trop Art Café	9:00a	10:00a
OR in Practice Poster Display	F - Level 2, Grand Gallerie	9:00a	5:00p
Colloquia Committee Meeting	F - Level 4, Conference Room 7	11:30a	12:30p
Exhibits/Job Placement/Email	F - Level 2	12noon	5:00p
Section/Society/Fora Lunch	W - Lower Lobby, Oceanview Lounge	12noon	1:00p
Job Fair	F - Level 2	12noon	2:00p
Omega Rho Distinguished Lecture - Thomas L. Magnanti	F - Level 2, Ballroom East	2:45p	3:45p
MSOM Reception	F - Level 2, Fontainebleau C	5:45p	6:45p
Roundtable Reception	W - Level 3, Castilian	6:00p	6:30p
Roundtable Dinner	W - Level 3, Miramar North	6:30p	8:00p
Roundtable Meeting	W - Lobby Level, Mediterranean Center	8:00p	11:00p
Military Applications Society Council Meeting	F - Level 4, Conference Room 4	5:30p	6:30p
Welcome Reception	F - Level 2, Exhibit Hall	7:00p	8:30p
Minority Forum Reception	F - Level 1, Monaco	7:30p	9:30p
Student Reception	F - Level 1, Lemans/Bordeaux	7:30p	9:30p
Women in OR/MS Reception	F - Level 1, Burgundy	7:30p	9:30p

Legend: F - Fontainebleau Hotel W - Wyndham Hotel 4 Pts. - Four Points Sheraton Hotel

Monday, November 5

Board/Editors/Committee Chairs Breakfast	F - Level 2, Fontainebleau B	7:00a	8:00a
Meeting Registration	F - Level 2, Grand Gallerie	7:30a	4:00p
Roundtable Meeting	W - Lobby Level, Mediterranean Center	8:00a	3:00p
Teacher Program	F - Level 4, Voltaire	8:00a	5:00p
Guest Breakfast	F - Lower Level, Trop Art Café	8:30a	9:30a
OR in Practice Poster Display	F - Level 2, Grand Gallerie	9:00a	5:00p
Exhibits/Job Placement/Email	F - Level 2	9:00a	5:00p
Section/Society Subcommittee Meeting	F - Level 4, Conference Room 4	10:30a	12noon
Welcome & Awards Plenary Session	F - Level 2, East Ballroom	12noon	1:00p
Junior Faculty Interaction Group	F - Level 4, Imperial II	12noon	1:00p
Management Science Editors Meeting	F - Lower Level, Trop Art Café	12noon	1:00p
OR Editors Meeting/Luncheon	F - Level 4, Conference Room 7	12noon	1:00p
ACORD Luncheon	F - Level 4, Conference Room 1	12noon	1:00p
Social Sciences Luncheon	F - Level 1, Brittany	12noon	2:00p
Subdivision Committee Meeting	F - Level 4, Conference Room 4	12noon	2:30p
Invited Keynote: Michael Ali	F - Level 2, Fontainebleau A	1:15p	2:15p
Invited Keynote: William Cook	F - Level 2, Fontainebleau D	1:15p	2:15p
INFORMS Board & Roundtable Meeting	W - Lobby Level, Mediterranean Center	3:00p	4:30p
Presidents Reception for the Roundtable	W - Lobby Level, Mediterranean Center	4:30p	6:00p
IOL Meeting/Reception	W - Lobby Level, Regency Ballroom	6:00p	7:00p
CPMS Isolated Practitioners Workshop	F - Level 4, Voltaire	6:00p	7:00p
General Reception	Miami Seaquarium	7:30p	9:30p

Tuesday, November 6

Education Committee Meeting	F - Level 4, Conference Room 4	7:00a	8:00a
Chapter/Student Chapter/Omega Rho Breakfast	F - Level 1, Brittany	7:00a	8:00a
Consulting Forum Organizational Meeting	F - Level 1, Monaco	7:00a	8:00a
Roundtable Continental Breakfast	W - Roundtable Suite	7:00a	10:00a
Meeting Registration	F - Level 2, Grand Gallerie	8:00a	4:00p
OR in Practice Poster Display	F - Level 2, Grand Gallerie	9:00a	5:00p
Chapter Subcommittee Meeting	F - Level 1, Brittany	8:00a	9:30a
Student Chapter Subcommittee Meeting	F - Level 1, Monaco	8:00a	9:00a
CPMS Council Meeting	F - Level 4, Voltaire	8:00a	10:00a
Future Organizing Committee Meeting	F - Meetings Suite	8:00a	1:00p
Guest Breakfast	F - Lower Level, Trop Art Café	9:00a	10:00a
Marketing Strategy Committee	F - Level 4, Conference Room 4	10:00a	11:30a
CPMS Congress	F - Level 4, Voltaire	10:00a	12noon
Plenary: 2001 Edelman Reprise	F - Level 2, East Ballroom	11:45a	12:45p
Forum on Women in OR/MS Meeting & Bag Lunch	F - Level 4, Imperial II	12:00p	1:00p
Minority Forum Roundtable & Bag Lunch	F - Level 4, Imperial III	12noon	1:00p
Editors-in-Chief & Publications Committee Meeting	F - Level 4, Conference Room 4	12noon	3:00p
Invited Keynote: Marshall L. Fisher	F - Level 2, Fontainebleau A	1:00p	2:00p
Invited Keynote: Michael P. Murray	F - Level 2, Fontainebleau D	1:00p	2:00p
University of Miami Reception	University of Miami	7:30p	9:30p

Wednesday, November 7

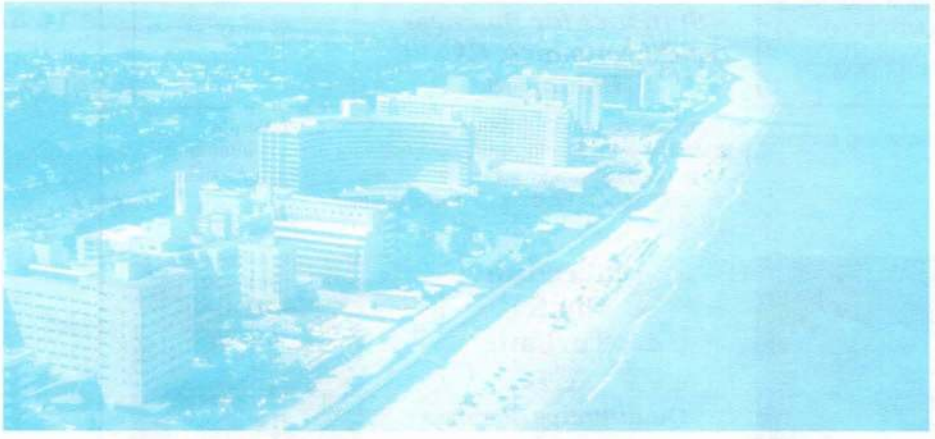
Meeting Registration	F - Level 2	8:00a	10:00a

SCHEDULE OF SUBDIVISION BUSINESS MEETINGS

	Location	From	To
Sunday, November 4			
Omega Rho Executive Committee & Annual Meetings	F - Lower Level, Trop Art Café	11:45a	1:00p
Organization Science	F - Level 1, Brittany	12noon	1:00p
E-Business	F - Level 4, Voltaire	5:45p	6:45p
Group Decision & Negotiation	F - Level 4, Imperial I	5:45p	6:45p
Information Systems	F - Level 4, Imperial II	5:45p	6:45p
Location Analysis	F - Level 4, Pasteur	5:45p	6:45p
Management Control Systems	F - Level 1, Brittany	5:45p	6:45p
QSR, Joint QSR & IIE Reception	F - Level 1, Champagne	5:45p	6:45p
Railroad Applications	F - Lobby Level, Fontaine	5:45p	6:45p
Revenue Management	W - Lobby Level, Regency Ballroom	5:45p	6:45p
Simulation	F - Level 4, Lafayette	5:45p	6:45p
Monday, November 5			
Applied Probability	F - Level 4, Imperial II	6:00p	7:00p
Aviation Applications	F - Lobby Level, Fleur de Lis	6:00p	7:00p
Computing	W - Lobby Level, Mediterranean East	6:00p	7:00p
Decision Analysis	F - Level 4, Club Atlantic C	6:00p	7:00p
ENRE	W - Lobby Level, Regency Conference	6:00p	7:00p
Health Applications	4 Pts. - Level 4, Niarhos II	6:00p	7:00p
MSOM	F - Level 2, Fontainebleau C	6:00p	7:00p
Technology Management & Management of Productivity & Technology	W - Level 3, Miramar South	6:00p	7:00p
Telecommunications	F - Level 4, Pasteur	6:00p	7:00p
Transportation Science	F - Level 1, LeMans	6:00p	7:00p
Tuesday, November 6			
Forum on Women in OR/MS	F - Level 4, Imperial II	12noon	1:00p
Artificial Intelligence	F - Level 4, Imperial II	5:45p	6:45p
INFORM-ED	F - Level 4, Club Atlantic C	5:45p	6:45p
Logistics	F - Level 4, Pasteur	5:45p	6:45p
Military Applications	F - Level 1, Burgundy	5:45p	6:45p
Optimization	W - Level 3, Madrid	5:45p	6:45p
Public Programs & Processes	F - Level 4, Imperial IV	5:45p	6:45p

Legend: F - Fontainebleau Hotel W - Wyndham Hotel 4 Pts. - Four Points Sheraton Hotel

GENERAL INFORMATION



Audio/Visual Equipment

An overhead projector and screen will be provided at no cost in each room for all technical sessions. Use simple transparencies with large print and bring blank transparencies for revisions and answers to questions. Speakers were encouraged to order any special equipment, such as computer projectors, before the meeting. Special AV orders are charged directly to the speaker. If you did not place an AV order and want to order equipment on-site, please be aware that supplies of some equipment are limited and the equipment you require may not be available. On-site requests for equipment cannot be honored at the discounted prices; speakers will be asked to pay full price.

Email Center

Bring your own laptop to the Email Center to access your email and the Web. Other computers are also available if you don't have a laptop. Name badges must be worn for admittance. The center will be open in the Exhibit Hall during the following hours:

Sunday, Nov. 4	12:00noon - 5:00pm
Monday, Nov. 5	9:00am - 5:00pm
Tuesday, Nov. 6	9:00am - 5:00pm

Exhibit Hall

Name badges must be worn for admittance to the Exhibit Hall, located in the Fontainebleau Hotel during the following hours:

Sunday, Nov. 4	12:00noon - 5:00pm & 7:00 - 8:30pm*
Monday, Nov. 5	9:00am - 5:00pm
Tuesday, Nov. 6	9:00am - 5:00pm

**The Exhibit Hall will reopen Sunday evening for the Welcome Reception. Everyone is invited to the reception for the chance to meet colleagues and renew acquaintances.*

Guidelines for Session Chairs

Each session will last 90 minutes. The chair is responsible for starting and ending the session on time, letting speakers know when time is running short and for filling out and returning the Session Attendance Forms. Equal time should be given to each presentation and speakers should adhere to the allotted time. Presentations should be made in the order shown in the program.

Guidelines for Speakers

The room and location of your session are listed in the Master Track Schedule (inside back cover). Be on time for your session and check in with the session chair. Presentations should be limited to key issues with a brief summary. Time your presentation to fit within your designated time span and leave an opportunity for questions and audience participation. Bring copies of your paper to distribute or provide a handout with written information relating to your oral presentation. INFORMS does not produce proceedings with complete papers. To obtain complete copies of any papers abstracted in the program, please contact the authors directly at the addresses supplied online.

Book Display

Don't miss the book and literature display in the Exhibit Hall at Booth 40 with titles from CRC Press and EDP Sciences.

GUEST PROGRAM & TOURS

The Guest Program includes a continental breakfast for registered guests on Sunday, Monday and Tuesday mornings. Registered guests are also welcome to attend the Welcome Reception on Sunday evening and the General Reception on Monday evening. Guests will receive a colored name badge that must be worn for admittance to these events and will also receive tickets with their registration materials. They are not eligible to attend the technical sessions.

A limited number of places may still be available for the Guest Tours. Check at the INFORMS registration desk.

Art Deco District Tour

Sunday, November 4

10:00am - 2:00pm *$28 per person*

Tour the art deco district and see pastel-coated buildings, alfresco cafes and palm tree-studded sidewalks. The neighborhood has become very popular with international jet setters, fashion models, celebrities, locals and tourists alike - the place to see and be

Coffee Breaks

Sunday

10:00-10:15am
F - Grand Gallerie
W - Mediterranean Ballroom Foyer
4Pts - Meeting Room Foyer

2:30-2:45pm
F- Exhibit Hall

Monday

9:45-10:00am
F - Exhibit Hall
W - Lobby Lounge
4Pts - Meeting Room Foyer

2:15-2:30pm
F - Exhibit Hall
W - Lobby Lounge
4Pts - Meeting Room Foyer

Tuesday

9:45-10:00am
F - Exhibit Hall
W - Lobby Lounge
4Pts - Meeting Room Foyer

2:00-2:15pm
F - Exhibit Hall
W - Lobby Lounge
4Pts - Meeting Room Foyer

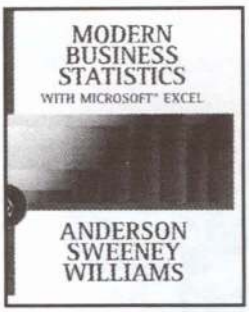
Wednesday

10:00-10:15am
F - Grand Gallerie
W - Lobby Lounge
4Pts - Meeting Room Foyer

Anderson Sweeney Williams

2002

Modern Business Statistics



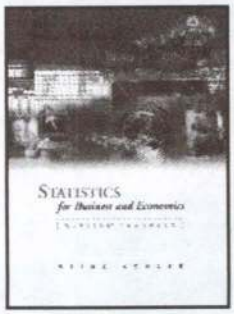
A new 2-term text that thoroughly integrates Excel while maintaining the excellence in writing style and problem selection that has made them the best selling statistics author team of all time.

Kohler

2002

Statistics for Business and Economics, MINITAB Enhanced

Statistics for Business and Economics, EXCEL Enhanced



Two versions provide a thorough use of the computer for statistical work by integrating both software and the Internet. Strong pedagogy and self contained, modular chapters allow greater flexibility for designing your course.

Black Eldredge

2002

Business and Economics Statistics Using Microsoft® Excel®

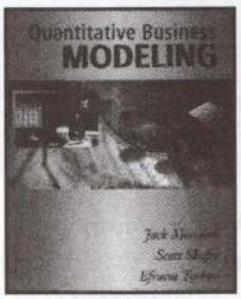


This one-term book offers the integration of Excel and focuses on those processes handled by the software. An Excel Add-In package is included with the accompanying CD-ROM.

Meredith Shafer Turban

2002

Quantitative Business Modeling



This outstanding new offering focuses on the process of modeling and the use of models in business decision making. The book addresses what modeling entails, how to do it and why it is useful.

Also from South-Western...

BUSINESS STATISTICS

Anderson/Sweeney/Williams

2002 *Statistics for Business and Economics, 8e*
- Contemporary Business Statistics with Microsoft® Excel®
- Essentials of Statistics for Business and Economics, 2e

Black
Business Statistics: Contemporary Decision Making, 3e

Eldredge

2002 A Microsoft® Excel® Companion for Business Statistics with CD-ROM, 2e

Gerbin
Relevant Business Statistics Using Microsoft® Excel®

Getz
e.stat for business and economics

Kvanli/Pavur/Guynes
Introduction to Business Statistics: A Computer Integrated, Data Analysis Approach, 5e

Minieka/Kurzeja
Statistics for Business with Computer Applications

Ovedovitz
Business Statistics in Brief

Tabbush/Trueman/Levine/Opler
The MBA Primer Online Version for Business Statistics

MANAGEMENT SCIENCE

Anderson/Sweeney/Williams
- An Introduction to Management Science: Quantitative Approaches to Decision Making, 9e
- Contemporary Management Science with Spreadsheets
- The Management Scientist: Version 5.0 for Windows 95 and Windows 98
- Quantitative Methods for Business, 8e

Bell
Management Science/Operations Research: A Strategic Approach

Bertsimas/Freund
Data Models and Decisions: The Fundamentals of Management Science

Camm/Evans
Management Science and Decision Technology

Ragsdale
Spreadsheet Modeling and Decision Analysis, 3e

PRODUCTION/OPERATIONS MANAGEMENT

Fogarty/Blackstone/Hoffmann
Production and Inventory Management, 2e

Gaither/Frazier

2002 Operations Management with Operations Management Software CD-ROM, 9e

Morton
- Production Operations Management Forecasting Software Manual: A POMQuest Module
- Inventory Management Software Manual: A POMQuest Module
- Project Management Software Manual: A POMQuest Module
- Scheduling Software Manual: A POMQuest Module

OTHER DECISION SCIENCE TEXTS

Chan
Location Theory and Decision Analysis with Facility-Location and Land-Use Models CD-ROM

Evans/Lindsay

2002 Management and the Control of Quality with Student CD-ROM, 5e

Evans/Dean, Jr.
Total Quality: Management, Organization and Strategy, 2e

Gido/Clements
Successful Project Management

Heizer/Nathan
Cases in Total Quality Management: Manufacturing and Services

Monzczka/Trent/Handfield

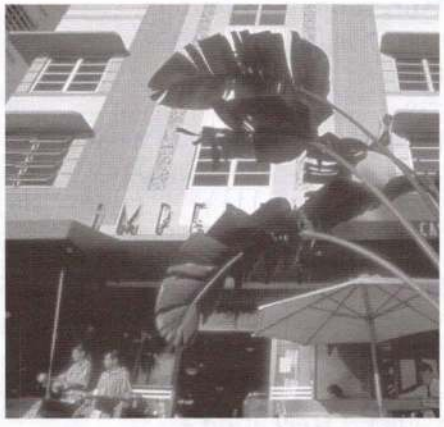
2002 Purchasing and Supply Chain Management, 2e

PHONE:
1.800.423.0563
FAX:
1.859.647.5020

SOUTH-WESTERN
THOMSON LEARNING

EMAIL:
EXAMCPOY.COM
ONLINE:
WWW.SWCOLLEGE.COM

seen in South Florida! This is America's only 20th century history district listed in the US National Register of Historic Places. This tour offers a unique opportunity to explore deco-age arts and architecture, examine historic preservation efforts and experience the excitement of this trendy area. A certified guide will lead you on a 90-minute walking tour. Following the architectural tour, you may enjoy lunch at a sidewalk cafe at your own expense. Buses leave from the front entrance of the Fontainebleau Hotel at the beginning time listed for each tour.



Monday, November 5

Villa Vizcaya Museum & Gardens Tour

9:30am - 3:00pm *$38 per person*

Vizcaya Museum and Gardens, the finest example of Italian Renaissance architecture in America, has more than 24 lavishly decorated rooms restored to their original splendor. Nestled on 10 acres of beautifully manicured gardens directly on Biscayne Bay, it features fine period furniture, textiles, sculpture and architectural elements from the 15th through the early 19th centuries. You will receive a 45-minute guided tour of the mansion and will have time to explore the superb formal gardens that feature many grottos, pools, fountains and sculptures. The tour offers a window to both the history of Miami and the Italian Renaissance. You may also dine in the gift shop café at your own expense.

Registration

The registration fee includes admittance to all technical sessions, the Welcome Reception on Sunday evening, the General Reception on Monday evening at the Seaquariam and the Exhibit Hall. Name badges must be worn to all INFORMS sessions and events. Go to the INFORMS registration desk to replace lost badges. Meals are not included in the registration fee. There is an additional fee for all special paid events listed on the registration form. *All attendees, including speakers and session and cluster chairs, must register and pay the appropriate registration fee.*

Refund & Cancellation Policy: Registration payments will be refunded only if a written cancellation is received no later than November 3, 2001. Cancellations may be sent via email to meetings@informs.org or faxed to 401-274-3189.

PLANT TOURS

A limited number of openings may be available for these tours. Check at the INFORMS registration desk. Cost for each tour is $15. Busing is provided; buses leave from the front entrance of the Fontainebleau Hotel at the beginning time listed for each tour.

Monday, November 5

Motorola Radio & Pager Division

9:00am - 12noon

Motorola is known worldwide for its production of high quality communications equipment and for their development and implementation of statistical process control techniques. Visitors will have an opportunity to see the production and assembly of Nextel phones or the accelerated life cycle testing process. The iDEN Factory has 3 lines that manufacture iDEN/Nextel phones. These phones have wireless and 2-way radio capabilities. There is a front-end and back-end process and the factory uses surface mount technology. In the Accelerated Life Testing/Product Quality Engineering department, the visitor can observe the phones being tested to assure that specifications and quality are built into the product. Many different types of testing are performed in this area, including response to temperature, humidity, drop testing, vibration and repetitive motion.

Tuesday, November 6

RTM Star Center

10:45am - 1:45pm

The RTM Simulation, Training, Assessment & Research (STAR) Center is the premier maritime training and research center in the Americas and an ISO 9001 Quality Certified Training Center. With centers in Dania Beach, Florida and Toledo, Ohio, STAR Center annually provides training, simulation and research and modeling services to thousands of students worldwide. STAR Center is the leader in STCW '95 training, having more US Coast Guard and other international flag administration approved courses than any other facility worldwide.

Fontainebleau-Wyndham Shuttle Bus

A shuttle bus will run continually between the Fontainebleau and Wyndham Hotels during the following times.

Sunday	6:30am-9:00pm
Monday	7:00am-7:30pm
Tuesday	7:30am-9:30pm
Wednesday	7:30am-12:00noon

NETWORKING & SOCIAL EVENTS

At the heart of the INFORMS Annual Meeting is exchange - the sharing of knowledge, ideas and perspectives that takes place not just during the formal technical program, but informally in hallways, over cups of coffee and at these special events.

Saturday, November 3

INFORMS Membership Meeting
5:00 - 6:00pm
F - Lobby Level, Fleur de Lis

The INFORMS Board of Directors encourages all members to bring their ideas, opinions and suggestions to this annual membership meeting. Current business and future directions for the Institute are on the agenda, including a financial report, final plan for Board restructuring and an introduction to 2002 - The Year of the Member. Wine and cheese will be served.

Sunday, November 4

NEW! Breakfast for New Members & First-Time Attendees
7:00 - 8:00am *(ticket required)*
F - Lobby Level, Fontaine

The INFORMS Board and Miami Organizing Committee will host this breakfast to welcome and orient people who are new to INFORMS and the annual meeting. Continental breakfast will be served. New members and first-time attendees received a ticket for the breakfast with their registration materials.

Welcome Reception
Sponsored by ExxonMobil
7:00 - 8:30pm
(wear badge for admission)
F - Level 2, Exhibit Hall

Here's your opportunity to re-connect with colleagues you may not have seen since the last INFORMS meeting! Enjoy the camaraderie, the good food and visit the exhibits at the same time. Your meeting registration fee covers admission to this reception. If your guest would like to accompany you, a guest registration must be purchased. The $40 guest fee includes the Welcome Reception, General Reception and guest continental breakfasts on Sunday, Monday and Tuesday.

Forum on Women in OR/MS Reception
7:30 - 9:30pm
F – Level 1, Burgundy

Everyone who supports encouraging women and diversity in the OR/MS profession is invited to this reception. Light hors d'oeuves and wine will be served. Sponsored by the Mathematical Science Dept. of IBM Research; the INFORMS Roundtable; and University Sponsors of Miami 2001.

Student Reception
7:30 - 9:30pm
F – Level 1, LeMans/Bordeaux

All registered students are encouraged to attend this special reception for an opportunity to socialize and network with other students in your own field as well as those with different specialties and interests.

Minority Forum Reception
7:30 - 9:30pm
F – Level 1, Monaco

In an attempt to foster discussion and encourage close ties among those interested in issues of particular relevance to under-represented minorities, the Minority Forum invites all conference participants to a reception sponsored by IBM, the INFORMS Roundtable, the Industrial and Operations Research Department of the University of Michigan, and the University Sponsors of Miami 2001. Light hors d'oeuvres will be served.

Monday, November 5

Welcome & Awards Ceremony
12noon - 1:00pm
F - Level 2, East Ballroom

Join the INFORMS Board and Miami Organizing Committee to honor and celebrate the achievements of our colleagues and all they have contributed to the field of OR/MS. The following awards will be presented: the Dantzig Dissertation Prize, the Expository Writing Award, the President's Award, the INFORMS Award for Teaching OR/MS Practice, the Kimball Medal, the Lanchester Prize, the Morse Lectureship, the Nicholson Prize and the von Neumann Prize.

Junior Faculty Interaction Group
12noon - 1:00pm
F- Level 4, Imperial II

All junior faculty are invited to participate in a networking and social event on Monday. The purposes of the event include career development and the exchange of ideas among junior faculty in engineering and business schools. We will also consider establishing an INFORMS forum. Bring along a bag lunch. For more details, please contact Julie Swann, jswann@northwestern.edu.

CPMS Isolated Practitioner Workshop & Reception
6:00 - 7:00pm
F - Level 4, Voltaire

CPMS, the Practice Section of INFORMS, sponsors workshops on topics of interest to isolated practitioners, the "Lone Rangers" of OR/MS. The 18th workshop in this series will address timely issues that affect the isolated practitioner community. All are welcome to participate in the workshop, discussion and reception. Wine and cheese will be served.

General Reception - Miami Seaquarium
Buses leave from hotels beginning at 7:00 and return by 10:00pm

WEAR BADGE FOR ADMISSION.

Reception sponsored by Ford Motor Company

Tropical beverages sponsored by Bacardi, Inc.

7:30 - 9:30pm

Our exclusive party at the Miami Seaquarium features a special show with Lolita the Whale and rare white-sided Pacific dolphins, a manatee exhibit and access to 38 acres of aquatic displays. The menu features tropical food with a Cuban flavor. You can sample such dishes as grilled mahi and chicken, shredded Cuban pork served with mojo criollo, conch fritters and your choice of pasta – plus bananas foster, key lime tarts and coconut bars. There will also be complimentary mojitos, the latest "in vogue" Miami cocktail! You will be able to purchase other beverages. Bus transportation will be provided between the Fontainebleau and Wyndham Hotels and the Seaquarium.
Your meeting registration fee covers

admission to this reception. If your guest would like to accompany you, a guest registration must be purchased. The $40 guest fee includes the Welcome Reception, General Reception and guest continental breakfasts on Sunday, Monday and Tuesday

Tuesday, November 6

Forum on Women in OR/MS Business Meeting & Bag Lunch

12noon - 1:00pm

F- Level 4, Imperial II

Interested in issues related to women professionals in OR/MS? Come join us for lively conversation at our business meeting. Bring along a bag lunch.

Minority Forum Roundtable & Bag Lunch

12noon - 1:00pm

F- Level 4, Imperial III

Please join the members of the Minority Forum for a "bring your own lunch" roundtable discussion of methods for increasing participation of under-represented minorities in the OR/MS community. Discussants include a member of the technical staff of ExxonMobil and professors from the University of Cincinnati, Georgia Institute of Technology and Princeton University.

Special Tuesday Evening Reception

Sponsored by the University of Miami, School of Business Administration

7:30 - 9:30pm *(ticket required)*

University of Miami

Buses leave from hotels at 7:00 and return by 10:00pm.

Speakers who are making their presentations on Wednesday received an invitation to this special reception. The School of Business at the University of Miami will host an evening of great food, wine and beer and guided tours of the school complex. Bus transportation will be provided between the Fontainebleau and Wyndham Hotels and the University.

RESOURCES FOR PRACTITIONERS

Whether you work in industry, government or consulting, you'll find the best applications resources at the Annual Meeting, including these special events:

OR in Practice Poster Session

Open Sunday – Tuesday

Poster presenters will be available to discuss their projects on Monday, 4:00 - 5:00pm

F - Level 2, Grand Gallerie

For the second year, professionals from both the practice and academic arenas will display their work in this poster session on implemented projects. This year's posters cover a broad range of projects in production planning, dynamic pricing, health care, transportation and many other areas. The Poster Session was initiated by the INFORMS Academic-Practitioner Interface Committee.

Isolated Practitioners Workshop & Reception

Monday, 6:00 - 7:00pm

F - Level 4, Voltaire

Sponsored by CPMS, The Practice Section of INFORMS, this workshop and reception are designed especially for practitioners who work independently. You'll learn about the strategies necessary to succeed as an OR/MS "Lone Ranger."

Unsolved OR Problems in Industry

Sunday, Tuesday, Wednesday, Track 41

W - Mediterranean Center

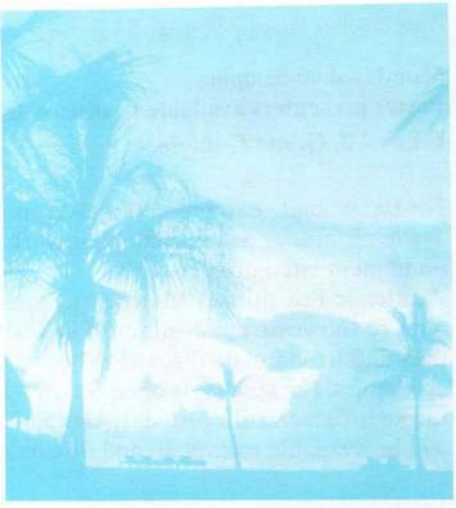
This special technical session cluster, of interest to both academics and practitioners, will explore "open" problems in industry. During each 90-minute session, several companies will discuss their business, current use of OR and those unsolved problems on their "wish list" for solutions. These interactive sessions will allow for extensive Q&A.

Franz Edelman Award Reprise

Tuesday, 11:45am - 12:45pm

F - Level 2, East Ballroom

The $15,000 Edelman Award, sponsored by CPMS, the Practice Section of



INFORMS, recognizes outstanding applications of OR/MS. In a plenary session, the 2001 winning team from Merrill Lynch US Private Client Group will reprise their presentation on pricing analysis for Merrill Lynch Integrated Choice.

Tutorials and Software Demonstrations

These 90-minute sessions offer an in-depth look at current methodologies and software. More than 20 tutorials cover financial engineering, interacting with e-business, introduction to stochastic programming, knowledge management, global optimization and other key topics. Software demonstrations, presented by leading solutions companies, offer introductions and updates on current products. Tutorials are dispersed throughout the program; software demonstrations are in Track 39 (F-Level 4, Imperial V Boardroom).

Search the Technical Sessions

Be sure to check out the 46 technical session tracks, particularly those sponsored by INFORMS subdivisions, which offer many applications papers and sessions. You'll see practice-oriented presentations in tracks on health applications, global optimization, computing, railroad applications, revenue management, transportation sciences and many more.

OR IN PRACTICE POSTER SESSION

Open Viewing: Sunday through Tuesday

Monday, 4:00-5:00pm
Poster presenters available to discuss their projects
F-Level 2, Grand Gallerie

For the second year, professionals from both the practice and academic arenas will display their work in this poster session on implemented projects. Initiated by the INFORMS Academic-Practitioner Interface Committee, the session aims to showcase applications of OR/MS in different industries and to stimulate discussion between practitioners and academics. The session is open for viewing from Sunday through Tuesday. On Monday, 4:00-5:00pm, poster presenters will be available to explain and discuss their projects.

Poster Projects

Model to Support Hanford Tank Replacement Decision
Alan Brothers, Pacific Northwest National Laboratory; *Ramamohan P. Anantatmula,* CH2MHILL Hanford Group, Inc.

Product Location in Two-Carousel Storage Systems
Elkafi Hassini, Raymond G. Vickson, University of Waterloo

Dynamic Pricing in Reverse Logistics
Markus Ettl, JP Fasano, Rick Lawrence, Grace Lin, Yingdong Lu, IBM TJ Watson Research Center; *David Yao,* Columbia University

Optimal Design of Production Lines
Horst Tempelmeier, University of Cologne

Production Planning at Chevron Phillips Specialty Chemicals
Jennifer Rich Captain, Aspen Technology, Inc.; *G.R. Sampat,* Chevron Phillips Specialty Chemicals; *Brian Downs,* Aspen Technology, Inc.

ORBIT: Price Optimization for RFQ Response
Heng Cao, Roger Gung, Yunhee Jang, Rick Lawrence, Grace Lin, Yingdong Lu, IBM TJ Watson Research Center

Capacitated Plant and Warehouse Location Model: Results of a Case Study
Rao Panchalavarapu, Schneider Logistics, Inc.

Business Optimization for Optical Networks
Daniel Furman, Ajay Kakade, Debasis Mitra, Iraj Saniee, Qiong Wang, Bell Labs Research-Lucent Technologies; *Daniel Bienstock, Olga Raskina,* Columbia University

Optimization Applications and Challenges in the Credit Card Industry
Shane Pederson, Ed Lau, Lizhi Ma, Stephanie Wang, Brian Bournival, First USA Bank; *Suresh Nair,* University of Connecticut

Supply Chain Risk Management
William Grey, Dailun Shi, IBM TJ Watson Research Center

Reduction of Environmental Nutrient Pollution Using Chance-Constrained Programming for Animal Feed Formulation
William B. Roush, Terri L. Cravener, Pennsylvania State University

Development of the Algacea Algorithm for the Logistic Optimization of Supply Routes: Application to the Logistic Carrier DISAYT
Javier Faulin, Public University of Navarre; *Israel Gil Ramirez,* Sigma Brakes Company

Optimization of Needle Biopsy Strategies for Detection of Prostate Cancer
Ariela Sofer, George Mason University; *Jianchao Zeng,* Georgetown University Medical Center

Common Optimization INterface for Operations Research
JP Fasano, John J. Forrest, Laszlo Ladanyi, Robin Lougee-Heimer, Katya Scheinberg, IBM TJ Watson Research Center; *Robert Harder,* USAF, AFPOA/DPY; *Tobias Pfender,* Konrad-Zuse-Zentrum fur Informationstechnik Berlin; *Ted Ralphs,* Lehigh University; *Matthew J. Saltzman,* Clemson University

InSight: Overview of a General Motors Business Decision Modeling Tool
Daniel J. Reaume, Jeffrey M. Alden, General Motors Research & Development Center

Advanced Inventory Management
Richard Boedi, Peter Korevaar, IBM TJ Watson Research Center; *Maike Schwarz,* University of Hamburg

Production Scheduling at International Specialty Products
Russell Otter, Aspen Technology, Inc.; *Kenneth W. Johnson,* International Specialty Products

Punch and Die Optimization
Gregory Sorkin, IBM TJ Watson Research Center

Poster Session Committee
Kenneth Murphy, Florida International University
Grace Lin, IBM TJ Watson Research Center
R. Jean Ruth, General Motors Research & Development Center
Joyce Elam, Florida International University

SPECIAL PROGRAMS

INFORMS Conference on Information Systems & Technology-2001

November 3 - 4

Organized by the INFORMS Information Systems Society in cooperation with the INFORMS College on Artificial Intelligence and the INFORMS Computing Society. The 6th INFORMS Conference on Information Systems and Technology (CIST- 2001) will be held on November 3-4 in Miami Beach. The theme is "IT Challenges in the E-Commerce Era." Emphasis will be placed on research contributions that deal with technical, behavioral as well as economic issues encountered while developing IT solutions for e-commerce applications. Selected papers have been invited for a separate fast-track review process for possible publication in the Information *Technology & Management Journal.*



INFORMS 2001 Combined Colloquia: Doctoral Student, Industry & Teaching Effectiveness Colloquia

November 2 - 3

INFORMS has a tradition of offering enriching and stimulating special interest colloquia in conjunction with its regular conferences. In response to INFORMS' new annual conference schedule, the Doctoral Student, Teaching Effectiveness, and Industry Colloquia will be combined in Miami Beach. Under the new structure, all 3 colloquia will meet together on Friday evening for dinner, welcoming remarks and a presentation by INFORMS' President, James L. Bean. After a continental breakfast on Saturday morning, registrants of the 3 colloquia will attend separate narrowly focused sessions. A common lunch follows, after which 2 tracks of sessions will run throughout the remainder of Saturday. One of these tracks will be pedagogically-oriented and will be offered for registrants of the Teaching Effectiveness Colloquium; the other track will be directed toward industry and government employment and will be offered for registrants of the Industry Colloquium.

Teacher Program

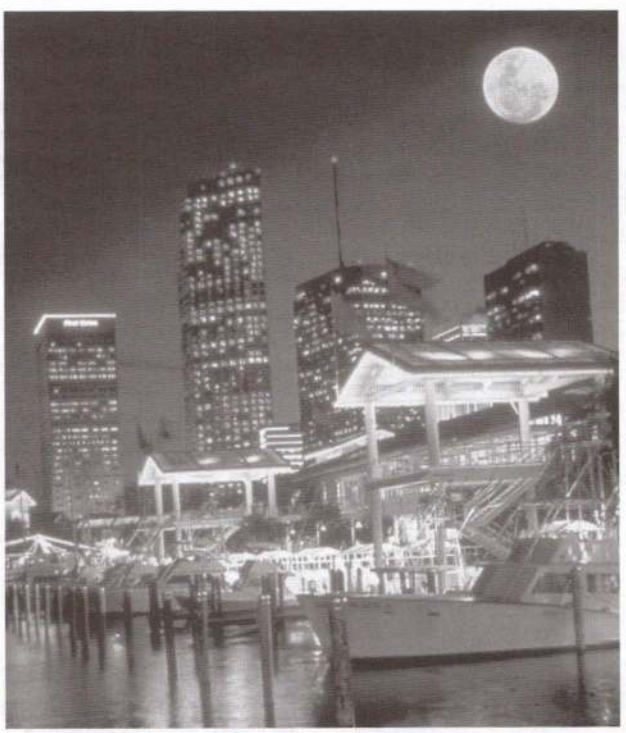
November 5

The middle/high school/community college math and science teachers program will be composed of introductory OR and computer application presentations, followed by teacher hands-on participation. Probability modeling, computer simulations, queueing (waiting line) models and linear programming models will follow an introduction to OR/MS. Attendees, who are also welcome to attend the general conference, will each receive copies of all program materials: videos, software packages with instructions and teacher/student activity guides and Teacher Introduction Modules.

Organization Science Dissertation Proposal Competition

November 3

The Organization Science Dissertation Proposal Competition, now in its 11th year, is one of the most prestigious competitions of its kind available to doctoral students studying organizational issues. In addition to the career advantages (past winners are now on the faculties at Harvard, Stanford, Wharton and UCLA), and the research advantages (detailed feedback on your work from 8 leading scholars), the all-day workshop is a really nice opportunity to interact with a small group of future colleagues.



The RIGHT Decision: McGraw-Hill/Irwin

Operations and Decision Sciences—McGraw-Hill/Irwin 2002 Titles

From technology integration to coverage of the very latest developments in the discipline, McGraw-Hill/Irwin's ODS titles offer everything your students need to succeed. Visit us at our booth to learn how McGraw-Hill can make your ODS course more current, more comprehensive, and more effective.



Operations Management, 7/e
William J. Stevenson
ISBN 007476702

The most widely adopted introductory OM text returns in a thoroughly revised **Seventh Edition**. Stevenson's **Operations Management** now focuses more extensively on services than before, drawing on new developments within the fields of technology and e-business to illustrate key concepts.

- Revised Supply Chain Management chapter
- Coverage of recent topics like the Kano model, GIS, B2B, SCOR, ERP, EPQ, ergonomics, and many more
- New activity-on-node option in the Project Management chapter
- Redesigned and enhanced Excel templates help solve most of the text problems
- New Technology: Scheduling software and OM Java Simulations show results through animations and graphics



Supply Chain Logistics Management
Donald Bowersox, David Closs, and M. Bixby Cooper
ISBN 0072527137

This text invigorates the supply chain management course by examining traditional logistics issues within the context of the supply chain. **Supply Chain Logistics Management** provides a complete view of the subject and goes farther than other texts in demonstrating how all the pieces fit together.

- Vast technology coverage includes information networks, enterprise resource planning and decision support systems
- The MSU Loga simulation stresses a complete range of supply chain decisions
- All three authors are well-known writers and researchers within the discipline



Technology Management: Text and International Cases
Norma Harrison and Danny Samson
ISBN 0072383550

This text presents a broad and diverse perspective on technology management, showcasing various industries throughout the world. Students examine the processes, organization, and cultural and leadership factors relevant to implementing new technology.

- Twenty-two cases range in setting from manufacturing to services, including internet-based technologies
- Book is an extension of a study conducted by the government of Australia, and draws on the finest experts from many countries, insuring a well-informed, international perspective



Value-Driven Operations Management: An Integrated, Modular Approach
Steven Melnyk and Morgan Swink
ISBN 0072533838

This modular series is ideal for professors looking for uniformly-conceived, customizable content that allows them to cover only those topics they choose, and in the order they prefer. The modules are tied together by the value theme, which teaches students how to define, create, measure and sustain value.

- Modular format allows instructors to choose topics relevant to their course and teaching style
- Each module written by a prominent expert on the subject
- Modules are updated more rapidly than a traditional textbook



Business Forecasting with accompanying Excel-based Forecast X Software
J. Holt Wilson, Barry Keating and John Galt Solutions, Inc.
ISBN 0072312661

A broad-based survey of business forecasting methods, including subjective and objective approaches. The most comprehensive forecasting software tool on the market, Forecast X, is integrated throughout the text.

- Forecast X software bundled free with the text. All text applications are built around this software
- Data used in the text consists almost entirely of real-world examples
- Student CD-ROM includes additional cases, questions, videos and animations



Complete Business Statistics, 5/e
Amir D. Aczel and Jayavel Sounderpandian
ISBN 0072524855

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PLENARY PRESENTATIONS

Omega Rho Distinguished Lecture

Sunday, November 4
2:45 - 3:45pm
F - Level 2, East Ballroom

Omega Rho, the official Honor Society of INFORMS, was founded in 1976 to recognize superior scholarship and encourage leadership in operations research, management science and related disciplines. The society has 34 active collegiate chapters and more than 4800 student and faculty members. It is a member of the Association of College Honor Societies. In addition to sponsoring Omega Rho Distinguished Lectures at INFORMS national meetings, Omega Rho provides financial support to the annual INFORMS Doctoral Colloquium and to its local chapters.

Honorary Membership in Omega Rho is bestowed upon individuals who provide leadership and extraordinary support for the encouragement of operations research and management science through their professional activities. Prior to delivering the Omega Rho International Distinguished Lecture, Thomas L. Magnanti will be inducted as the 33rd Honorary Member of Omega Rho.

Engineering Frontiers & the New Engineering Leader: Opportunities & Challenges for the OR/MS Profession

Thomas L. Magnanti, MIT; magnanti@mit.edu

In the last hundred years, engineers conceived, designed and implemented major scientific and technological innovations that transformed our lives. They will do so again in the next hundred years. But the context of engineering differs today from the past with emerging opportunities in fields such as bioengineering, engineering systems, tiny technologies, information, computation and communication and new educational technologies. These opportunities create needs for new knowledge and for a new breed of engineer/leader and the engineer/entrepreneur. This presentation will summarize some of these emerging themes and their potential implications for engineering education, research, and practice and for the OR/MS profession.

Biography: Thomas L. Magnanti currently serves as Dean of Engineering and as one of 14 Institute Professors at MIT, where he has been a faculty member since 1971. He has devoted much of his professional career to education that combines engineering and management and to teaching and research in applied and theoretical aspects of large-scale optimization, particularly in the areas of network flows, nonlinear programming and combinatorial optimization.

Professor Magnanti has conducted research on such topics as production planning and scheduling, transportation planning, facility location, logistics, and communication systems design. His publications include co-authorship of 2 textbooks, *Applied Mathematical Programming* and *Network Flows: Theory, Algorithms and Applications* and the co-editorship of 2 other books.

Professor Magnanti was a founding co-director of MIT's Leaders for Manufacturing Program and of the Institute's System Design and Management Program. He has previously served as co-director of MIT's interdepartmental Operations Research Center and as head of the Management Science Area (about 1/3) of the Sloan School. He is a past President of the Operations Research Society of America (ORSA) and of the Institute for Operations Research and the Management Sciences (INFORMS) and has been Editor-in-Chief of the journal *Operations Research.* Professor Magnanti has received ORSA's Lanchester Prize for best publication, ORSA's Kimball Medal, the MIT Billard Award for distinguished service and the Irwin Sizer Award for significant innovations in MIT education. He holds honorary degrees from Linköping University, the University of Montreal and the Université Catholique de Louvain and is a member of the National Academy of Engineering and the American Academy of Arts and Sciences.

Edelman Competition 2001 Award Winning Reprise

Pricing Analysis for Merrill Lynch Integrated Choice

Tuesday, November 6
11:45am - 12:45pm
F - Level 2, East Ballroom

Stuart Altschuler, Donna Batavia, Jeff Bennett, Russell Labe, Bonnie Liao, Raj Nigam, Je Oh, Merrill Lynch

In early 1999, Merrill Lynch and other full-service financial service firms were under relentless assault. The advent of electronic trading and the commoditization of trading threatened the very core of Merrill Lynch's value proposition - to provide advice and guidance through a financial consultant. In response, management decided to create a new offering to provide investors with more choices. A cross-functional team developed two models to evaluate different combinations of product structures and prices. The models showed that revenue at risk to Merrill Lynch ranged from $200 million to $1 billion. The resulting Integrated Choice strategy enabled Merrill Lynch to seize the marketplace initiative, changed the financial services landscape and mitigated the revenue risk. As of September 2000, client assets reached $93 billion in the new offer. During the first 9 months of 2000, net new assets totaled $11 billion and the number of accounts increased 72%.

KEYNOTE PRESENTATIONS

Visual Collaboration at Ford: Perspectives and Shared Learnings

Michael Ali, Ford Motor Company

mali16@ford.com

Monday, November 5
1:15 - 2:15pm
F - Level 2, Fontainebleau A

Product design, manufacturing, sales, and service teams are under intense pressure to deliver high value, high quality products and services at low cost in a short amount of time. The need for effective collaboration between these groups has therefore never been greater. At the same time, the globalization and outsourcing have made collaboration more difficult. Ford Motor Company has developed a strategic vision around Visual Collaboration aimed at addressing these needs. Visual Collaboration encompasses new processes as well as new software tools. This presentation discusses the vision and some lessons learned from our early attempts at implementing it. The most important lesson is that tools alone are not sufficient; people and process support are necessary for success.

Biography: Michael Ali is the Manager of Product and Manufacturing Design Systems at Ford Motor Company. This organization, which is part of Information Technology, handles the development and deployment of Ford's CAD software worldwide. This group also maintains the Digital Buck software, the computer-generated car created by the vehicle development teams. The Digital Buck is the foundation of Ford's Visual Collaboration initiative. Dr. Ali joined Ford in October of 2000. Prior to joining Ford he worked in a number of management and engineering positions at General Electric, Rensselaer Polytechnic Institute, NASA, and NIST. He received his PhD in Computer and Systems Engineering from Rensselaer Polytechnic in 1999, his Master's in Mechanical Engineering from Stanford in 1986, and his Bachelors of Science in Mechanical Engineering from Princeton in 1983.

The Traveling Salesman Problem

William Cook, Princeton University

bico@math.princeton.edu

Monday, November 5
1:15 - 2:15pm
F - Level 2, Fontainebleau D

The TSP is one of the most widely studied and most often cited problems in OR. Over the past 50 years, the study of the TSP has led the way to improved solution methods in both discrete optimization and integer programming in general. I will present some highlights from the TSP literature, focusing on results that have had an impact on other areas of optimization. I will then discuss areas of current TSP research, including joint work with D. Applegate, R. Bixby and V. Chvatal on the solution of a 15,112-city instance.

Biography: William Cook is currently a Visiting Professor in Applied and Computational Mathematics at Princeton University. He received his PhD in Combinatorics and Optimization from the University of Waterloo in 1983. He spent two years as an Alexander von Humboldt Research Fellow at the University of Bonn and has held positions at Cornell, Columbia and Bellcore. Prior to coming to Princeton, he was Noah Harding Professor of Computational and Applied Mathematics at Rice University. Cook is the Editor-in-Chief of *Mathematical Programming, Series B* and a member of the Editorial Boards of *Mathematics of Operations Research, INFORMS Journal on Computing, SIAM Journal of Discrete Mathematics and Mathematical Programming, Series A*. Together with David Applegate, Robert Bixby and Vasek Chvatal, he was awarded the 2000 Beale-Orchard-Hayes Prize by the Mathematical Programming Society for joint work on the TSP; at an earlier stage, their TSP work was named one of the Top 50 Science Stories of 1992 by Discover Magazine.

Rocket Science Retailing: What Research Opportunities Does it Create for Us?

Marshall L. Fisher, University of Pennsylvania

fisher@wharton.upenn.edu

Tuesday, November 6
1:00 - 2:00pm
F – Level 2, Fontainebleau A

Retailing is a big industry. In the US, retail business represents 40% of the economy and is the largest employer. Retail supply chain management is still more art than science, but this is changing rapidly as retailers begin to apply analytic models to the huge volume of data they are collecting on consumer purchases and preferences. This industry-wide movement resembles the transformation of Wall Street that occurred in the 1970s when physicists and other "rocket scientists" applied their analysis skills to investment decisions. The rocket science retailing movement will create enormous opportunities for our profession. To better understand these opportunities, Ananth Raman and I have been working with 32 leading retailers to assess their progress towards rocket science retailing and to accelerate that progress through selected research projects with the retailers. We will describe findings from this work, including: how do retail supply chains function; what decisions arise in retail supply chain management that lend themselves to analysis; a synopsis of prior research on selected topics including managing short life cycle products to manage life cycle profits, merchandise testing and store level assortment planning and what are the exciting future research frontiers.

Biography: Marshall Fisher is the Stephen J. Heyman Professor of Operations and Information Management at the Wharton School of the University of Pennsylvania and co-director of the Fishman-Davidson Center for Service and Operations Management.

In 1965, he earned an SB in electrical engineering from MIT and joined the Boston Manufacturing and Distribution Sales office of IBM where he worked until returning to MIT for an MBA and a PhD in OR.

After teaching assignments at the University of Chicago and Cornell University, Dr. Fisher joined the faculty of the Wharton School in 1975. His pioneering research in logistics and supply chain coordination in the 23 years he has been at the Wharton School has been implemented by many companies and recognized by numerous awards.
In the late 1970s, Dr. Fisher began to address the problems faced by private truck fleet operators as they endeavored to deliver their products with increased efficiency and a high level of service. This research led to both theoretical breakthroughs and successful implementations at several companies. In 1981, he co-founded Distribution Analysis, Research & Technology, Inc., a consulting company that provided optimization software and strategy consulting, based on this research, to major clients such as Frito Lay, Exxon and Anheuser Busch. He served as chairman of the board of directors of this company until 1990, at which point the company had grown to 35 people and was merged with Manugistics Inc.

In 1990, Dr. Fisher turned his attention to supply chain coordination, focusing particularly on environments with rapid introduction of new products and a high degree of demand uncertainty. With various co-workers, he developed Accurate Response, an integrated framework linking operational changes and planning approaches to improve a firm's ability to match supply with the demand for new products. Accurate Response was initially implemented at Sport Obermeyer, a leading fashion skiwear firm which credits the approach with doubling profits and significantly improving customer service.

He is currently engaged in a multi-year study funded by the Sloan Foundation to investigate how retailers can exploit information technology and flexible manufacturing to improve the merchandising of fashion products.

In 1994, Dr. Fisher was elected a member of the National Academy of Engineering in recognition of his contributions to the use of mathematical analysis to improve supply chain performance in companies. He also served as president of The Institute of Management Sciences (TIMS) during 1988-89 and as departmental editor of Management Science from 1979 to 1983. He is a recipient of the 1977 Lanchester Prize for the best paper in OR in that year, the 1983 Edelman Prize from The Institute of Management Sciences for development of a large-scale logistics planning model for a major industrial gas firm, the E. Grosvenor Plowman Award from the Council of Logistics Management for contributions to logistics and the 1995, 1996, 1997, 1998 and 1999 Wharton School MBA Core Curriculum Cluster Award for teaching excellence. He has been a consultant to many Fortune 500 companies including Ahold, Air Products and Chemicals, BMG, Campbell Soup, Dupont, Exxon, Frito Lay, IBM, Scott Paper and Spiegel, Inc.
Dr. Fisher is a founder and Chairman of 4R Systems, Inc., a company that provides supply chain planning software to retailers of short lifecycle products.

The Role of Project Management Processes as a Corporate Risk Mitigation tool at ExxonMobil

Michael P. Murray, ExxonMobil

mike.p.murray@exxonmobil.com

Tuesday, November 6
1:00 - 2:00pm
F – Level 2, Fontainebleau D

Each year, nearly every large corporation invests hundreds of millions of dollars in information systems to improve their operations and competitive position in the global marketplace. As with any other capital investment, IS projects must deliver a product or service that meets requirements within a defined time period at a specified cost. Failure to deliver on any of the 3 performance dimensions increases the risk that a corporation will fall behind competition from a capability, revenue or cost perspective.

The primary risk mitigation approach for corporate IS investments at ExxonMobil relies on a management process for projects that reduces performance risk to acceptable levels. ExxonMobil's project life cycle (PLC) process for IS projects includes many elements that mitigate the most prominent project risks, i.e. scope, scale, management support, technology, cost, schedule and organizational change management.

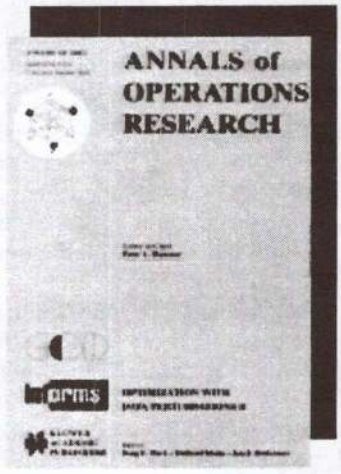
The presentation will review ExxonMobil's experience and lessons learned using its PLC process to manage the delivery of IS projects, particularly in the very challenging enterprise resource program (ERP) category of applications such as those provided by SAP and other similar suppliers. PLC has been used to effectively risk mitigate SAP-ERP projects for ExxonMobil that support some of the largest businesses in the world.

Biography: Michael P. Murray has more than 20 years experience with ExxonMobil and since the merger of Exxon and Mobil in 1999, has served as Manager of the Americas Program, Enterprise Business Systems, Global Information Services. The Americas Program organization is responsible for the support and development of enterprise resource systems in the US and consists of more than 500 staff members with an annual budget of >$100M.

Murray holds a BS degree in General Engineering from the US Military Academy (1972) and an MS in Business Administration from Boston University (1975). He joined Exxon Corporation's Communications and Computer Sciences Department in 1981 as a Systems Analyst.

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RUTCOR, Rutgers University, Piscataway, NJ, USA



Vol. 102, Issue 1/4, Feb. 2001

Preface; *Gündüz Ulusoy, Willy Herroelen,* **Criticality Analysis in Activity-on-Node Networks with Minimal Time Lags;** *Vicente Valls, Pilar Lino,* **Due Date-Based Metrics for Activity Importance in Stochastic Activity Networks;** *R.A. Bowman,* **A Computational Study on Bounding the Makespan Distribution in Stochastic Project Networks;** *Arfst Ludwig, Rolf H. Möhring, Frederik Stork,* **A Competitive Heuristic Solution Technique for Resource-Constrained Project Scheduling;** *Pilar Tormos, Antonio Lova,* **A Robust Genetic Algorithm for Resource Allocation in Project Scheduling;** *J. Alcaraz, C. Maroto,* **Project Scheduling with Multiple Modes: A Genetic Algorithm; Sönke Hartmann, Simulated Annealing for Multi-Mode Resource-Constrained Project Scheduling;** *Joanna Józefowska, Marek Mika, Rafal Rózycki, Grzegorz Waligóra, Jan Weglarz,* **Uncertainty Modelling in Software Development Projects (With Case Study);** *Linet Özdamar, Ebru Alanya,* **An Exact Procedure for the Resource-Constrained Weighted Earliness–Tardiness Project Scheduling Problem;** *Mario Vanhoucke, Erik Demeulemeester, Willy Herroelen,* **A Two Stage Search Heuristic for Scheduling Payments in Projects;** *Nalini Dayanand, Rema Padman,* **Maximizing the Net Present Value of a Project Under Resource Constraints Using a Lagrangian Relaxation Based Heuristic with Tight Upper Bounds;** *A. Kimms,* **Four Payment Models for the Multi-Mode Resource Constrained Project Scheduling Problem with Discounted Cash Flows;** *Gündüz Ulusoy, Funda Sivrikaya-Serifoglu, Sule Sahin,* **Analysis of Scheduling Schemes and Heuristic Rules Performance in Resource-Constrained Multiproject Scheduling;** *Antonio Lova, Pilar Tormos,* **Multiple-Project Scheduling with Controllable Project Duration and Hard Resource Constraint: Some Solvable Cases;** *Chung-Yee Lee, Lei Lei*

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After holding a variety of analyst and supervisory positions in the Communications and Computer Sciences Department, Murray moved to the Information Systems Department of Exxon Company USA, in Houston, in 1984.

In 1985, Murray moved to the Business Development Group of Exxon USA's Natural Gas Department (Marketing) as a business analyst. In 1987, he moved to the Marketing Department, Lubricants & Petroleum Specialties, managing the asphalt product line. In 1988, he moved to Lubricants Sales as the Western US Manager. In 1990, Murray became the Planning & Analysis Manager for Lubricants & Petroleum Specialties. After a business reorganization, Murray became the Marketing Technical Services Manager for L&PS in 1992. Murray transferred to Exxon Company USA's Supply Department as Operations Support Manager in 1994. In 1995, Murray returned to the Information Systems Department, Exxon USA, as Downstream Information Systems Manager. He moved to the Downstream & Chemicals SAP Project as project executive in 1997. Murray was named Mechanical Manager at the Baytown Refinery in 1998.

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TUTORIALS

Sunday, November 4

SA14

Interior-Point Methods & Semi-Definite Programming

Yin Zhang, Rice University
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Research on interior-point methods has been one of the most active and fruitful areas in optimization and interior-point methods have proven to be a powerful approach for solving problems with many inequality constraints. In theory, strong complexity and convergence results exist for interior-point methods when applied to convex optimization problems. In practice, they have found great success in solving linear and semi-definite programming problems, as well as other convex optimization problems. A strong influence of interior-point methodology is also evident in many recently proposed algorithms for nonconvex optimization problems. We will give an overview of interior-point methodology from an algorithmic viewpoint and use semi-definite programming to demonstrate the elegance, power and applicability, as well as the limitations of interior-point methods.

SA29

Data Mining through Activity Monitoring & Forecasting

Tom Au, Data Mining Group/AT&T Labs

Kwok Tsui, Georgia Institute of Technology
ktsui@isye.gatech.edu

This tutorial discusses data mining methods on activity monitoring and forecasting. Activity monitoring refers to detection of interesting events that require actions, such as detection of customer churn, credit card or insurance fraud and computer intrusion. Forecasting refers to predicting future activities based on historical data on sales orders, monthly revenue and daily transactions, etc. Effective monitoring and accurate forecasting help managers make planning and decisions timely and correctly and thus improve company's revenue. We will cover various topics in market segmentation, customer profiling, customer retention, activity detection, forecasting strategy and time series modeling.

SB05

An Introduction to Analyses of Adaptive Stochastic Search Methods for Global Optimization

Zelda B. Zabinsky, University of Washington
zelda@u.washington.edu

Stochastic methods, including simulated annealing, genetic algorithms and evolutionary programs are being used for many types of practical global optimization problems. These problems include discrete and continuous variables and the functions have many local optima. Yet, the performance of these adaptive stochastic search methods is difficult to analyze. This tutorial will present theoretical results on a family of stochastic search methods, including pure random search, pure adaptive search, hesitant adaptive search, adaptive search and most recently, backtracking adaptive search to gain understanding of the convergence of adaptive random search.

SB16

Operations Management in Financial Services

Michael Pinedo, NYU
mpinedo@stern.nyu.edu

This tutorial gives an overview of the applications of operations management techniques in financial services. These applications include productivity measurement and quality control, design and analysis of front offices (distribution channels) as well as of back offices and the analysis of operational risk.

SC10

Complementarity Problems: Applications & Algorithms

Stephen C. Billups, University of Colorado
sbillups@carbon.cudenver.edu

Complementarity problems have proven to be a valuable framework for modeling numerous problems. These problems are distinguished by a set of complementarity conditions, which require that at least 1 of 2 or more related quantities must be 0. Such conditions appear prominently in the study of equilibria problems and arise naturally in numerous applications from economics, engineering and the sciences. Some applications include economic equilibria, traffic flow, contact mechanics and American options pricing. We will introduce the complementarity framework, describe several applications and give a survey of algorithms for solving these problems.

SC13

A New Look at Linear Programming

Robert J. Vanderbei, Princeton University
rvdb@princeton.edu

In the early days of linear programming, A. W. Tucker advocated using a primal-dual symmetric approach to the study of linear programming. However, the practical demands imposed by computational efficiency has led to an abandonment of symmetry both in practice and at the pedagogical level. We will take a fresh look at linear programming in its symmetric form and discover some interesting new things such as a variant of the simplex method that never takes a degenerate pivot and a meta-theorem that says that the expected number of simplex pivots is (n+m)/2 rather than the oft-quoted 3m.

SD19

Emerging Developments in Adaptive Dynamic Programming for Stochastic Resource Management

Warren B. Powell & Huseyin Topaloglu
Princeton University
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topaloglu@princeton.edu

Approximation methods in dynamic programming are emerging as a powerful, problem-solving tool, but they have seen little application to multistage stochastic programs that arise in resource management. In this setting, there is not 1 curse of dimensionality but 3. We introduce methods to solve all 3 curses, producing very practical algorithms for solving large-scale, multi-stage stochastic optimization problems. We use a nonstandard form of the optimality equations and special classes of continuous functional approximations for the value function. The technique is illustrated using applications drawn from multi-product distribution problems, fleet management, multi-product dynamic lot sizing and vehicle routing and scheduling.

SD32

An Introduction to OR/MS & Financial Engineering

John R. Birge, Northwestern University
jrbirge@northwestern.edu

Financial engineering has grown rapidly as a profession, encompassing the application of mathematical and computational methods and technology to financial markets and management. OR/MS plays a prominent role in these methods and technology. We will focus on OR/MS applications in key areas such as pricing of contingent claims (options), portfolio theory and asset allocation, risk management and evaluation, security structuring and arbitrage identification.

Monday, November 5

MA09

Constraint Programming & its Relationship to Mathematical Programming

Irv Lustig, ILOG
ilustig@ilog.com

Arising from research in the computer science community, constraint programming is a relatively new technique for solving optimization problems. For those familiar with mathematical programming, there are a number of language barriers that exist that make it difficult to understand the concepts of constraint programming. This presentation, which assumes a minimal background in linear and integer programming, is a short tutorial on constraint programming and explains how it relates to familiar mathematical programming concepts. We also indicate how constraint programming and mathematical programming technologies are complementary.

MA18

Coordinating Production, Inventory & Transportation Decisions in the Supply Chain: From Theory to Practice

David Simchi-Levi, MIT
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We look at problems faced by shippers that rely on truckload (TL) and less-than-truckload (LTL) carriers for the distribution of products across their supply chain. In this case, the goal is to design a production/inventory policy and a transportation strategy so as to minimize system-wide cost by taking advantage of the transportation cost structure. We demonstrate how theoretical analysis can be applied in the development of effective and robust algorithms.

MA 19

Beyond Sensitivity Analysis: An Introduction to Stochastic Programming

Julia Higle, University of Arizona
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LP problems that arise in practice are often based on numerical data that represent rough approximations of quantities that are inherently difficult to estimate. Because of this, LP-based studies routinely include a sensitivity analysis (SA) to determine the manner in which a change in the data might result in a change in the solution. We will use a simple example to illustrate the shortcomings of SA that run contrary to conventional wisdom and introduce alternate models that address these shortcomings. Computational approaches and emerging trends in stochastic programming will be discussed.

MA22

Performance Measurement

Yasemin Aksoy, Tulane University
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Hakan Aksoy, Honeywell
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Elvan E. Ozlu, American Express
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We present a tutorial on the performance measurement of supply chains, individual links on supply chains and processes. We include discussions of applications of the balanced scorecard, 6 sigma, management perception assessment in case of no tangible data and supply chain integration through performance measurement.

MB02

Accelerating E-Business Infrastructure

Anindya Datta, Georgia Institute of Technology
adatta@gatech.edu

The factors that impact the performance and scalability of e-business infrastructure can be classified into 2 broad categories: network delays and server delays. Network delays have received significant attention in recent years. Server delays, on the other hand, have received far less attention, yet are becoming increasingly important as the proliferation of dynamic page generation technologies has resulted in significant server side bottlenecks. This tutorial will discuss both network and server delays. In addition, existing strategies for optimizing the performance and scalability of e-business sites will be presented, with an emphasis on server side acceleration solutions.

MC31

A Brief Introduction to Dempster-Shafer Theory

Arthur P. Dempster, Harvard University
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Paul-Andre Monney, University of Fribourg
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In DS theory, a body of evidence is represented by a formal structure called a "belief function" (Shafer) or a "hint" (Kohlas & Monney). Because probabilities are assigned to subsets of an overarching state space, we find the theory is a natural extension of both propositional logic (where probabilities are 0 or 1) and Bayesian reasoning (where the subsets are single points) and conclusions about arbitrary propositions are represented by "support" (probability fully committed) and "plausibility" (probability at least partially committed). We plan to use varied but simple examples to exhibit mathematical and computational aspects, along with a sense of wide flexibility of applications.

MD07

Configuration as a Key Problem for E-Commerce Success

Daniel Mailharro & Ulrich Junker, ILOG SA
dmailharro@ilog.fr & ujunker@ilog.fr

Rapidly becoming a key part of e-commerce solutions, configuration applications let users customize more and more complex products or services through the Web. Computing and optimizing such user-defined configuration now becomes critical for the success of an enterprise. This tutorial is an opportunity to understand what are configuration problems and how they can be solved with state-of-the-art constraint programming technology. It is also a meeting place between OR and AI communities to elaborate collaborative approaches.

MD18

Location Modeling

Mark Daskin, Northwestern University
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John Current & David Schilling, Ohio State University
current.1@osu.edu & schilling.1@osu.edu

We survey the formulation of classic network and discrete location problems and review heuristic, Lagrangian relaxation and dual ascent algorithms for solving such problems. We highlight applications of the models in facility location contexts as well as flexible manufacturing tool selection, product positioning, product procurement and vehicle routing.

Tuesday, November 6

TA15

Using VBA in the Classroom to Develop Decision Support Systems

Christian Albright, Indiana University
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Spreadsheet modeling is now commonly taught in MS courses. We describe how VBA can be employed in courses to develop DSSs. It draws from my recent Duxbury book, VBA for Modelers, which is intended as either a supplement to existing MS courses or as a textbook for a stand-alone course in modeling with VBA. I will discuss different approaches to incorporating this material into existing courses, based on my own experiences at Indiana. I will argue that for many students, the skills acquired from learning VBA are nearly as valuable as the modeling skills themselves.

TB01

Knowledge & Knowledge Management

Milan Zeleny, Fordham University
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Introduction to knowledge (source of competitive advantage) and knowledge management (KM), an enabling tool. State-of-the-art review for management/decision/organizational sciences professionals/academics. KM is not just data/information processing and sharing via intranets. We explore and define operationally data, information, knowledge and wisdom for modeling and research in knowledge production, measurement, capitalization and transfer via organizational embedding in corporate processes, communities and networks. INFORMS-community benefits from the <shift information->knowledge->action->wisdom>, opening new areas of research and applications: from operations to process-oriented, from symbolic descriptions to purposeful action coordination. Knowledge and action are but one, as is decision and implementation.

TC01

Component-Based System Development: Technologies & Implications on System Development

Hemant Jain, University of Wisconsin
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Component-based software development presents a novel approach to developing software – building an integrated whole from independent parts. A component is an executable unit of code that offers a set of services through a specified interface. We will provide a review of various technologies such as Microsoft's COM/DCOM, CORBA and Enterprise Java Beans for implementing business components. The role of XML in describing component interface will also be discussed. A design tool developed for identifying components form domain model and prototype implementation of the components and application assembly from components will be demonstrated.

TC28

Decision Making with Dependence & Feedback: The Analytic Network Process

Thomas L. Saaty, University of Pittsburgh
saaty@katz.pitt.edu

The ANP for decision making with dependence and feedback and its software, Super Decisions, are a new and general way to make complex decisions. The ratio scale measurement used in the ANP and the AHP will be shown to well validated in several examples of estimating the market share of well-known products. The central topic of the tutorial will be how to make more complex decisions in economic, social and political areas, along with examples. These types of decisions often involve a framework including all 4 aspects of any real decision: benefits, opportunities, costs and risks. An evaluation copy of the software will be provided to each tutorial participant.

TD09

Fuzzy Dynamic Programming

Augustine Esobgue, Georgia Institute of Technology
aesogbue@isye.gatech.edu

No abstract supplied.

INFORMS Future Meetings Calendar 2002

March 10 - 13

INFORMS 6th Telecommunications Conference

Hilton Deerfield Beach, Boca Raton FL

Chair: Iraj Saniee, Bell Labs/Lucent Technologies,
600 Mountain Ave., Rm. 2C-300, Murray Hill, NJ 07974
iis@research.bell-labs.com

June 27 - 30

INFORMS Marketing Science Conference

Edmonton, Alberta, Canada

Chair: Peter T.L. Popkowski Leszczyc
University of Alberta,4-30F Faculty of Business Bldg.
Edmonton, Alberta, Canada T6G 2R6
ppopkows@pop.srv.ualberta.ca

May 19 - 21

INFORMS Conference on Practice

Analyzing & Enhancing the Extended Enterprise

Montreal, Quebec, Canada

terry.cryan@informs.org

November 17 - 20

INFORMS Annual Meeting 2002 San Jose

San Jose McEnery Convention Center

General Co-Chairs: David Conrath
San Jose State University, College of Business
San Jose, CA 95192-0070;
conrath_d@cob.sjsu.edu

Burton V. Dean
San Jose State University, College of Business
San Jose, CA 95192-0070
dean_b@cob.sjsu.edu

For updates and further information, go to: **www.informs.org/Conf**

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The Institute for Operations Research and the Management Sciences

SOFTWARE DEMONSTRATIONS

Monday, November 5

MA39

8:15 - 9:45am

Decisioneering
Simulation & Modeling Using Crystal Ball Professional

David Fredericks
1515 Arapahoe St., Ste. 1311, Denver CO 80202
dfredericks@decisioneering.com

John M. Charnes
University of Kansas, School of Business
345 Summerfield Hall, Lawrence KS 66045
jmc@ku.edu

Crystal Ball software is one of the most recognized and popular software tools for introducing the concepts of simulation and risk analysis to students. We will introduce the fundamentals of uncertainty analysis, Monte Carlo Simulation and optimization modeling techniques using Crystal Ball 2000. Practical applications will include stochastic project modeling and the pricing of exotic options using Crystal Ball and OptQuest.

AutoSimulations Division of Brooks Automation, Inc.
AutoMod

John Carson
655 Medical Dr., Bountiful UT 84010
john.carson@brooks.com

We will demonstrate the AutoMod family of products, the leading discrete-event simulation package for manufacturing, material handling and logistics applications. AutoMod is object-based, with templates for all the most common material handling components, including conveyor, transport and kinematic devices and equipment. AutoStat for AutoMod offers complete run control and statistical analysis.

MB39

10:00 - 10:45am

ILOG, Inc.
Methods for Embedding CPLEX Algorithms

Irv Lustig
25 Sylvan Way, Short Hills NJ 07078-1379
ilustig@ilog.com

Learn which approach for embedding CPLEX algorithms is best suited for your specific software development needs: ILOG CPLEX Callable Library, ILOG Concert Technology (C++), ILOG OPL Studio and ILOG Concert Technology (Java), the new Java interface for CPLEX. Provides a comparative overview of each method with benefits, tradeoffs, examples and recommendations.

MC39

2:30 - 4:00pm

LINDO Systems, Inc.
Optimization Modeling with LINDO, LINGO & What's Best

Mark Wiley
1415 North Dayton St., Chicago IL 60622
mwiley@lindo.com

Build models quickly, access data easily and integrate optimization into your applications. Come see how easy it is with the new LINDO API - powerful linear, quadratic and integer solver engine, LINGO - integrated modeling language with linear/nonlinear solvers and a new What'sBest - large scale linear/nonlinear spreadsheet solver.

Maximal Software, Inc.
Using the MPL OptiMax 2000 Component Library with VBA for Excel & Visual Basic

Bjarni Kristjansson
2111 Wilson Blvd., #700, Arlington VA 22201
info@maximal-usa.com

The OptiMax 2000 is a highly anticipated Component Library (API) designed to take full advantage of the ActiveX Automation component software technologies from Microsoft. Using step-by-step examples, we will demonstrate how to use the OptiMax 2000 to seamlessly integrate MPL into VBA for Excel/Access, Visual Basic, Visual C++, Delphi, Java and the Web, thus easily creating customized end-user applications to solve real-world optimization problems.

MD39

4:15 - 5:45pm

Wolfram Research
Mathematica in OR & MS

Silve Parviainen
100 Trade Center Dr., Champaign IL 61820
silvep@wolfram.com

Anton Rowe
Episoft, Inc., 8049 Calle De La Plata, La Jolla CA 92037
anton@episoft.com

Mathematica is a fully integrated technical computing system that combines fast, high-precision numerical and symbolic computation with data visualization and programming capabilities. We will cover the basic principles of Mathematica, tour our latest features and explore ways of applying Mathematica to problems in operations and management. Using application examples, we will illustrate how Mathematica seamlessly connects to environments such as Microsoft Excel, ODBC databases, custom interfaces and legacy problems.

Tuesday, November 6

TA39

8:15 - 9:45am

Rockwell Software
ARENA Applications in the Commercial Enterprise

Ted Matwijec
504 Beaver St., Sewickley PA 15143
tfmatwijec@software.rockwell.com

We will offer a basic overview of the Arena simulation software and the many applications at an enterprise, specifically focusing on the supply chain, warehouse, contact center and manufacturing applications. A short demo will be provided and an emphasis on real-world case studies, data integration, reporting and benefits of simulation will be discussed.

IBM
Visualization Tools & Techniques

Ken Buckingham
155 South Rd., Poughkeepsie NY 12601
kenbuck@us.ibm.com

IBM will be demonstrating work to use visualization techniques as a method to refine and more completely understand the impacts of optimization scenarios. Not only will the visualization tools be used to represent the output of the model, but they will also serve to refine the input to the models. This work is a continuing effort to link related technologies for enhanced modeling.

TB39

10:00 – 11:30am

Frontline Systems, Inc.
Nonlinear & Global Optimization in Microsoft Excel

Daniel H. Fylstra
PO Box 4288, Incline Village NV 89450
dfylstra@frontsys.com

Frontline Systems' Premium Solver products are compatible upgrades to the Excel Solver featuring linear, integer and nonlinear programming, global optimization, constraint programming and genetic and evolutionary algorithms. Our Solver DLL products make optimization easy to use in any Windows application program. At INFORMS Miami, we'll demonstrate our most powerful nonlinear optimizers ever.

Standard & Poor's Applied Decision Analysis

Lubna Chunawala & Pavel Mizenin
Standard & Poor's Applied Decision Analysis
lubna_chunawala@standardandpoors.com

No abstract supplied.

TC39

2:15 - 3:45pm

SchedulExpert, Inc.
Optimizing University & Corporate Training Course Schedules

Gary M. Thompson
117 Oak Hill Rd., Ithaca NY 14850
gmt1@schedulexpert.com

SchedulExpert, Inc. sells software for optimizing course schedules in post-secondary and large-scale corporate training environments. Both products generate conflict-free schedules, have user-friendly GUIs, incorporate numerous constraints and preferences and allow users to set the relative priority of 10+ objectives. Details and trial software are available at schedulexpert.com.

McGraw-Hill/Irwin
New Interactive Operations Management Modules

Dick Hercher
1333 Burr Ridge Pkwy., Burr Ridge IL 60521
dick_hercher@mcgraw-hill.com

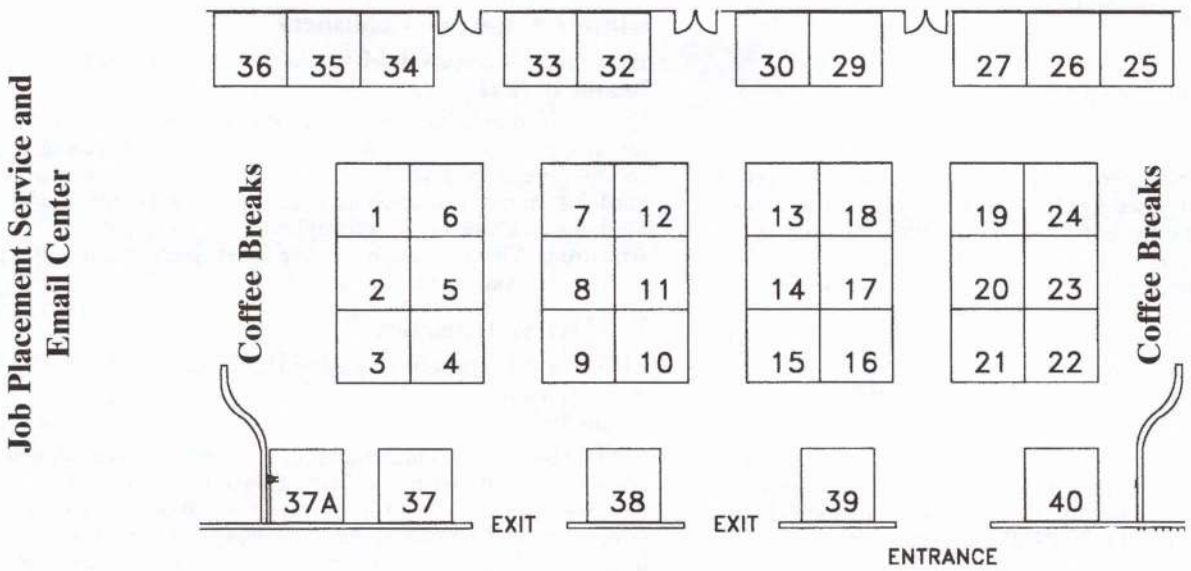
McGraw-Hill is including Java applet modules on selected operations management and OR text CDs and web sites. Developed by Accelet Corp. and McGraw-Hill, the new Interactive Operations Management modules are of 3 types: interactive graphs, model simulations and interactive algorithms. Samples of applets for transportation, forecasting, linear programming and other topics will be demonstrated.



EXHIBITORS

The following companies and organizations will be exhibiting. All attendees are encouraged to visit the exhibit area.

FONTAINEBLEAU HILTON



Applied Decision Analysis

68 Willow Rd., Menlo Park CA 94025; www.adainc.com

Booth 8

DPL (Decision Programming Language) is decision analysis software developed to meet the requirements of decision-makers in business and government. DPL offers an advanced synthesis of the two major decision-making tools, influence diagrams and decision trees, which assist in structuring complete and focused analyses. DPL's powerful solution algorithms and many graphical outputs provide comprehensive and insightful results.

AutoSimulations Div. of Brooks Automation

655 Medical Dr., Bountiful UT 84010; www.autosim.com

Booth 19

AutoMod™ allows you to experiment in the virtual world to save time and money in the real world. AutoMod, an easy to use, true-scale 3D simulation tool combines the ease of a simulator with the power of a simulation language and includes templates for material handling, manufacturing and continuous flow. Come see why AutoMod is the simulation software of choice.

Decisioneering, Inc.

1515 Arapahoe St., Ste. 1311, Denver CO 80202; www.decisioneering.com

Booth 12

Decisioneering, Inc. is the leading provider of risk management software and solutions that simplify analysis and improve decision-making. We provide a comprehensive suite of tools for desktop and Web-based risk analysis, optimization and forecasting. Decisioneering users are found in more than 85% of Fortune 1000 companies, with a significant presence in the finance, petroleum, pharmaceutical and manufacturing industries.

Duxbury/Thomson Learning

10 Davis Dr., Belmont CA 94002; www.duxbury.com

Booths 25 & 26

Celebrating our 30th year, Duxbury, a division of Thomson Learning, publishes exclusively in the field of statistics and quantitative methods, in all areas of application and for all levels of learning. Duxbury is dedicated to publishing the very best and innovative ideas while crafting the highest quality products.

Elsevier Science

PO Box 1991, 1000 BZ, Amsterdam, The Netherlands

Booth 16

All Elsevier journals are on ScienceDirect, www.sciencedirect.com, the world's largest database of scientific articles. If your institution does not have access to ScienceDirect, check with your librarian or see a more limited service for the OR/MS community at www.elsevier.com/locate/dsw, which also features the Handbooks of OR/MS.

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PO Box 4288, Incline Village NV 89450; www.frontsys.com

Booth 30

Frontline Systems' Premium Solver products are compatible upgrades to the Excel Solver featuring linear, integer and nonlinear programming, global optimization, constraint programming and genetic and evolutionary algorithms. Our Solver DLL products make optimization easy to use in any Windows application program. At INFORMS Miami, we'll demonstrate our most powerful nonlinear optimizers ever.

GAMS Development Corp.

1217 Potomac St. NW, Washington DC 20007; www.gams.com
Booth 2

GAMS is the leading tool to develop models for mathematical programming problems. It is currently used in nearly every country in the world for modeling large, complex optimization problems in academia, industry and government. GAMS allows the flexibility to develop several model types and has excellent documentation and debugging features.

IBM

4255 South Rd., Poughkeepsie NY 12601;
jlange@us.ibm.com
Booths 34 & 35

IBM's Optimization Solutions - Version 3: IBM's Optimization Solutions products are used by OR, MS and mathematics professionals worldwide to solve large, complex problems in finance, insurance, transportation, process and manufacturing industries and are used extensively in business intelligence and supply chain applications.

ILOG, Inc.

1080 Linda Vista Ave., Mountain View CA 94043;
www.ilog.com
Booth 9

Providing leading mathematical programming, constraint programming and hybrid optimization products, technology and professional services. ILOG at INFORMS 2001: unveiling exciting new technology and product releases for CPLEX, OPL Studio and other products in the ILOG Optimization Suite. Stop by our booth or attend our software demo session to learn more. Trial CD giveaway!

INFORMS

901 Elkridge Landing Rd., Ste. 400, Linthicum MD 21090;
informs@informs.org
Booths 20 & 21

Have a membership question? Want to know what's going on at the Institute? Need to know the most current benefits and services or the hottest industry trends? Stop by the INFORMS booths to talk to the staff. We have the latest information on networking, meetings, publications, industry happenings and benefits and services. We look forward to seeing you!

INFORMS Annual Meeting San Jose 2002

One Richmond Square, Ste. 215, Providence, RI 02906;
meetings@informs.org
Booth 5

San Jose, the Capital of Silicon Valley and the crossroads of high-tech movers and shakers, is the site of the INFORMS Annual Meeting, November 17 - 20, 2002. Meet with organizing committee representatives. Get your free Official Visitor's Guide and learn more about San Jose attractions.

INFORMS - Future Meetings

One Richmond Square, Ste. 215, Providence, RI 02906
meetings@informs.org

Stop by the booth for all the exciting details on future meetings on the INFORMS calendar, including the next INFORMS practice conference: May 19-21, 2002, Analyzing and Enhancing the Extended Enterprise, in Montreal. This conference will highlight real-world applications, best practices and professional development tutorials.

John Wiley & Sons, Inc.

605 Third Ave., New York NY 10158; www.wiley.com/college
Booths 22 & 23

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Kluwer Academic Publishers

101 Philip Dr., Norwell MA 02061; www.wkap.com
Booths 10 & 11

Kluwer Academic Publishers will have sample copies of our research journals on display as well as new titles, including: the 6-volume Encyclopedia of Optimization edited by Floudas and Pardalos, Transportation Systems Engineering: Theory and Methods by Cascetta and Principles of Forecasting by Armstrong. Visit our booths for the latest research publications offered at a conference discount.

LINDO Systems, Inc.

1415 North Dayton St., Chicago IL 60622;
www.lindo.com
Booth 39

LINDO Systems will highlight recent software enhancements and demonstrate our new callable LINDO API. We will also demonstrate LINDO, our powerful solver engine, LINGO, our integrated modeling language and solvers and What'sBest!, our large-scale Excel solver. Stop by our booth and pick up a free trial CD.

Maximal Software, Inc.

2111 Wilson Blvd., Ste. 700, Arlington VA 22201;
www.maximal-usa.com
Booth 33

We will demonstrate the OptiMax 2000, an extensive Component Library (API) designed to take full advantage of the ActiveX Automation component software technologies from Microsoft. OptiMax 2000 allows the model developer to seamlessly integrate MPL into VBA for Excel/Access, Visual Basic and Visual C++, thus easily creating customized end-user applications to solve real-world optimization problems. We will also demonstrate MPL for Windows 5.0.

McGraw-Hill/Irwin

Two Penn Plaza, 20th Floor, New York NY 10121;
www.mhhe.com/irwin
Booths 14 & 15

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OR/MS Today

Cumberland Pkwy. Ste. 299, Atlanta, GA 30339; www.lionhrtpub.com

Booth 18

OR/MS Today is the official membership magazine for INFORMS. Produced by Lionheart Publishing since 1988, OR/MS Today continues to provide the membership and other readers with timely information and opinions about the applications of operations research and the management sciences.

Palgrave

Houndmills, Basingstoke, Hampshire RG21 6XS, UK; www.palgrave.com

Booth 13

Palgrave – global academic publishing from St. Martin's Press. We publish leading OR and MS journals and books, including Journal of the Operational Research Society, the longest established OR journal in the world. Visit us at the INFORMS Miami Beach meeting or at our website.

Palisade Corp.

31 Decker Rd., Newfield NY 14867; www.palisade.com

Booth 4

Palisade Corporation is the industry leader in analytical software for risk and decision analysis. Our products enhance any serious decision maker's toolkit. The Palisade product line features the DecisionTools Suite: @RISK, TopRank, PrecisionTree, BestFit and RISKview as well as Evolver, RISKOptimizer, @RISK for Project and @RISK Developer's Kit. These tools perform risk and decision analysis in Excel.

River Logic, Inc.

800 Cummings Center, Ste. 355W Beverly, MA 01915; www.riverlogic.com

Booth 3

River Logic, Inc. is the leading provider of profit optimization solutions. The Enterprise Optimizer® (EO) tool suite and methodology provide a structured process for modeling an enterprise, identifying material relationships and measuring the impact of strategic decisions and relationships as they relate to the bottom-line profit of an entire organization.

Rockwell Software

504 Beaver St., Sewickley PA 15143; www.rockwell.com

Booth 24

Arena® simulation software from Rockwell Software offers the unparalleled ease-of-use, flexibility and domain expertise required for modeling any aspect of a business enterprise. The Arena product family supports both in-depth analyses of a particular functional area, e.g., manufacturing, logistics, customer service, etc., and analysis of processes that span several functional areas.

Sage Publications

2455 Teller Rd., Thousand Oaks CA 91320; www.sagepub.com

Booth 17

Sage Publications, a leading international publisher of journals, books and electronic media, celebrated 35 years of global publishing excellence in 2000. We provide researchers, professionals, scholars, policymakers and students with the tools and information they need to succeed. Please stop by our booth or visit our website to review our publications and/or discuss your publishing ideas.

SAS

SAS Campus Dr., Cary NC 27513; www.sas.com

Booth 7

Tackle today's complex strategic and tactical planning problems with integrated, customizable MS and supply chain solutions from SAS. Stop by our booth to see why decision makers around the world rely on SAS solutions to turn data into information, uncover the best options and provide critical decision support reporting.

SchedulExpert, Inc.

117 Oak Hill Rd., Ithaca NY 14850; www.schedulexpert.com

Booth 32

SchedulExpert, Inc. sells software for optimizing course schedules in post-secondary and large-scale corporate training environments. Both products generate conflict-free schedules, have user-friendly GUIs, incorporate numerous constraints and preferences and allow users to set the relative priority of 10+ objectives. Details and trial software are available at our website.

South-Western/Thomson Learning

10 Davis Dr., Belmont CA 94002; www.swcollege.com

Booth 27

South-Western, a division of Thomson Learning, is an industry-leading provider of business and economics educational materials worldwide. South-Western develops innovative resources for the higher education, secondary education, professional, corporate and retail markets. Our history of innovative success began more than a century ago and continues today with diversified product lines that meet the emerging needs of our learning markets and integrate the latest digital technologies for more flexible, comprehensive solutions.

Springer-Verlag New York, Inc.

175 Fifth Ave., New York NY 10010; www.springer-ny.com

Booth 38

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Wolfram Research, Inc.

100 Trade Center Dr., Champaign IL 61820; www.wolfram.com

Booth 6

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DAILY PLANNER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY
SA **8:30 - 10:00**	**MA** **8:15 - 9:45**	**TA** **8:15 - 9:45**	**WA** **8:30 - 10:00**
SB **10:15 - 11:45**	**MB** **10:00 - 11:30**	**TB** **10:00 - 11:30**	**WB** **10:15 - 11:45**
SC **1:00 - 2:30**	**Welcome & Awards** **12:00 - 1:00** *East Ballroom*	**Edelman Reprise Plenary** **11:45 - 12:45** *East Ballroom*	
Omega Rho Plenary *Thomas L. Magnanti* *East Ballroom* **2:45-3:45**	**Keynote Speakers** *Michael Ali* *Fontainebleau A* *Thomas Cook* *Fontainebleau D* **1:15 - 2:15**	**Keynote Speakers** *Marshall Fisher* *Fontainebleau A* *Michael Murray* *Fontainebleau D* **1:00 - 2:00**	
SD **4:00 - 5:30**	**MC** **2:30 - 4:00**	**TC** **2:15 - 3:45**	
	MD **4:15 - 5:45**	**TD** **4:00 - 5:30**	

Sunday 08:30-10:00

SA03 E-Commerce I

Contributed Session

Chair: Chi J. Oh, Youngsan University, 150 Junam-ri, Ungsang-up, Yangsansi Kyoungnam, 626-847, Korea, cjoh@mail.ysu.ac.kr

1) A Framework to Measure Electronic Commerce, ***Chi J. Oh***, Youngsan University, 150 Junam-ri, Ungsang-up, Yangsansi Kyoungnam, 626-847, Korea, cjoh@mail.ysu.ac.kr

We propose a framework to measure EC followed by dealing with some issues related to EC measurement, data requirements and primary metrics of EC transactions. We also present a case study to demonstrate that the proposed framework could be effectively applied to Korean firms.

2) An Identification Framework of Transaction Types in Business-to- Business Electric Commerce, ***Chang Sup Sung***, KAIST, 373-1 Gusong Dong, Yusong Gu, Taejon, 305-701, South Korea, cssung@sorak.kaist.ac.kr, ***Sang Hwa Song***, ***Ik Sun Lee***

We consider the problem of how to identify transaction types in B2B EC. During the evolution process of B2B EC, some types of transactions still remain to be handled in the conventional way, which provides the motivation of this study to derive any associated identification framework.

3) withdrawn 10/2: An Economics Model for a Business-to-Business Exchange, ***Suzhou Huang***, Ford Motor Company, SRL 2125, PO Box 2053, MD 2122, Dearborn, MI 48121, shuang10@ford.com, ***Nikolay A. Zenkevich***

4) A Production Planning Optimization Model on the Web, ***Young M. Lee***, BASF Corporation, 3000 Continental Dr. North, Mt. Olive, NJ 07828-1234, leey@basf.com, ***E. Jack Chen***

A computational framework of delivering a practical optimization tool on the Web has been developed. We present a MILP production planning optimization model for a chemical manufacturing plant and a generic infrastructure of integrating optimization engine and Internet using a server-side Java programming.

5) Governance & Innovation Speed in High Technology Start-Up Firms, ***Susanna Khavul***, London Business School, Regent's Park, London, NW1 4SA, UK, skhavul@london.edu, www.london.edu

How do the sources (institutional/non-institutional) and structures (exclusive/mixed) of equity ownership control affect the innovation speed in knowledge intensive high technology start-up firms? Longitudinal data indicates that it is the structure rather than the source of ownership control that impacts the likelihood of completing product development and doing so faster.

SA05 Heuristics Programming I

Contributed Session

Chair: Srinivas Bollapragada, General Electric Corporate R&D Center, 1 Research Circle, K1-5C22A, Schenectady, NY 12309, bollapragada@crd.ge.com

1) withdrawn 10/15: Adaptive Memory Programming: The Use of Pools, ***Peter Greistorfer***, Karl-Kranzens Universitat, Dept. of IM, ReSoWi-Zentrum, Universitatsstrabe 15/G2, Graz, 8010, Austria, peter.greistorfer@kfunigraz.ac.at

2) The Ordered Open-End Bin Packing Problem, ***Jian Yang***, NJIT, Dept. of IME, Newark, NJ 07102, yang@adm.njit.edu, http://www-ec.njit.edu/~yang, ***Joseph Y. Leung***

We conduct worst-case and average-case analyses of heuristics for a variant of the classic bin packing problem where the capacity of a bin can be exceeded by the last piece with the constraint that the last piece must be of the largest index among all pieces in the bin.

3) Bringing Genetic Algorithms into the Management Science Classroom, ***Sanford K. Cohn***, Richard Stockton College, Jimmie Leeds Rd., Pomona, NJ 08240, cohns@stockton.edu

The topics taught in the traditional, required MS course must be selected based on their robustness, simplicity and ability to promote modeling skills. In my classes, one of the topics I cover that accomplish these goals is GAs. I will show self-developed materials that are easy yet powerful.

4) A Math Programming-Based Approach to Scheduling Commercials in Broadcast Television, ***Srinivas Bollapragada***, General Electric Corporate R&D Center, 1 Research Circle, K1-5C22A, Schenectady, NY 12309, bollapragada@crd.ge.com, ***Suman Mallik***

Motivated by the experiences of a major US-based broadcast television network, we present a mathematical programming-based approach to schedule commercials. We study the problem of scheduling commercials on available slots when the same commercial is to be aired multiple times during the day. In this situation, advertisers typically want to air the commercial equally spaced as possible...

5) A Genetic Algorithm with an Internal Penalty Function for the Team Orienteering Problem, ***Alice E. Smith***, Auburn University, Dept. of IE, 207 Dunstan Hall, Auburn, AL 36849-5346, aesmith@eng.auburn.edu, ***Fatih M. Tasgetiren***, ***Zuriel Correa***

A GA with an internal penalty function is presented to solve the team orienteering problem where a team with a given time budget for each member aims at maximizing the total score to determine the path for each member from the start to end point through a subset of points to be visited. Test problems from the literature are solved and compared to well-known heuristics.

SA06 Telecommunications

Contributed Session

Chair: Laura Wynter, PRISM Universite de Versailles/INRIA, Domaine de Voluceau, BP 105 Rocquencourt, Le Chesnay, 78053, France, laura.wynter@inria.fr, www.prism.uvsq.fr/~wynter

1) A New Fair Pricing Model for Telecommunications & the Internet, ***Laura Wynter***, PRISM Universite de Versailles/INRIA, Domaine de Voluceau, BP 105 Rocquencourt, Le Chesnay, 78053, France, laura.wynter@inria.fr, www.prism.uvsq.fr/~wynter, ***Madiagne Diallo***

We develop a new model of telecommunications and the Internet that contains proportional fairness pricing as a special case. It includes profit optimization and other system objectives along with general forms of user utility functions and constraints.

2) Optimizing Internet Networks, ***Eric Gourdin***, France Telecom R&D, 38-40 rue du General Leclerc, Issy les Moulineaux, 92794, France, eric.gourdin@francetelecom.com, ***Walid Ben-Ameur***, ***Nawal Bourquia***

In Internet networks, the routing decisions are essentially based on shortest-path arguments. We consider network optimization problems where the routing path must be defined as shortest-paths according to edge weights and where the weights are also variables. Several approaches are proposed to handle this family of difficult combinatorial problems.

3) Test Bed Development for Third-Party Testing of the Ameritech-Ohio Operational Support Systems, ***Hisham M. Choueiki***, PUCO, 180 East Broad St., 3rd Floor, Columbus, OH 43215-3793, hisham.choueiki@puc.state.oh.us, www.puc.state.oh.us

We rely on design of experiment methods to develop the test bed that will be used by Ameritech-Ohio under general direction from the third-party test manager to generate the customer service transaction records for OSS testing in Ohio. The methodology, our conclusions and remarks will be presented.

SA07 Parallel & Serial Heuristics for Combinatorial Optimization Problems in Industry

Sponsor: Computing

Sponsored Session

Chair: Manuel Laguna, University of Colorado, Grad. School of Bus., Boulder, CO 80309-0419, laguna@colorado.edu

1) Cost Reduction & Survivability in Placement & Sizing of Wave Division Multiplexing & Optical Cross-Connect Equipment, ***Belen Melian-Batista***, Universidad de la Laguna, La Laguna, Tenerife, 38271, Spain, mbmelian@ull.es

We consider the joint problem of placing OXCs and WDM links in an existing SONET fiber network, routing traffic within the resultant new network and restoring the traffic in the event of any single-link failure. The goal is to minimize the costs of carrying all demands.

2) withdrawn 10/15: A Variable Neighborhood Tabu Search for Solving the Linear Ordering Problem, ***Dionisio Perez Brito***, Universidad de la Laguna, Estad., Investigacaio Op., Fac. de Matematicas, La Laguna Tenerife, 38271, Spain, dperez@ull.es, ***Carlos G. G. Gonzalez***

3) Ejection Chain Neighborhoods for the Period Routing Problem, ***Joaquin Pacheco***, University of Burgos, Spain, jpacheco@ubu.es, ***Manuel Laguna***

We describe a heuristic for the period routing problem that employs neighborhoods based on the notion of ejection chains. We present results with real-world instances from an auto part manufacturer in the north of Spain. We also test the procedure against others reported in the literature using synthetic problem instances.

SA08 DO-01

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Gerard Cornuejols, Carnegie Mellon University, GSIA, Rm. 232A, Pittsburgh, PA 15213-3890, gc0v@andrew.cmu.edu

1) Convex Hull Representations of Models for Computing Collisions between Multiple Bodies, ***Cole Smith***, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, cole@sie.arizona.edu, ***Hanif D. Sherali, Shokri Z. Selim***

We consider a collision detection problem arising in robotics applications. Given a set of bodies with initial positions and trajectories, we identify the first collision that occurs. We construct convex hull representations of these models, and demonstrate the computational savings achieved by utilizing a linear programming approach over integer programming.

2) Semi-Continuous Cuts for Mixed Integer Programming, ***Ismael Regis de Farias, Jr.***, CORE, UCL, Voie du Roman Pays 32, Louvain la Nueve, 1348, Belgium, defarias@core.ucl.ac.be

A semi-continuous variable is one that belongs to the union of 2 closed intervals. Besides being interesting in their own right, they are a relaxation of general integer variables. We derive strong cuts for general MIP by considering semi-continuous knapsack relaxations of MIPs. We report computational results. semi-continuous knapsack relaxations of MIPs. We report computational results.

3) K-Cuts: A Variation of Gomory Mixed Integer Cuts from the LP Tableau, ***Yanjun Li***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, yanjun@andrew.cmu.edu, ***Gerard Cornuejols, Dieter Vandenbussche***

A k-cut is a cutting plane generated by the Gomory mixed integer procedure from a row of the LP tableau after multiplying by an integer k. We compare the strength of k-cuts ($k>1$) with that of regular Gomory mixed integer cuts ($k=1$).

SA09 DO-03

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: David B. Hartvigsen, University of Notre Dame, 354 Mendoza Coll. of Bus., Notre Dame, IN 46556-5646, dhartvig@wood.helios.nd.edu

1) Solving the Inverse Spanning Tree Problem with Parametric Min-Cut, ***Dorit S. Hochbaum***, University of California, Haas Sch. of Bus., Dept. of IEOR, Berkeley, CA 94720-1777, dorit@hochbaum.ieor.berkeley.edu

In the inverse spanning tree problem a spanning tree T is given in an edge weighted graph. The problem is to modify edge weights so that T is minimum spanning tree and the costs of the deviation is minimum. We show an algorithm that solves the problem with convex deviation functions considerably faster than known algorithms.

2) Alternating Search over Different Neighborhoods, ***Egon Balas***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, eb17@andrew.cmu.edu, ***Neil Simonetti***

Our linear-time dynamic programming algorithm finds a local TSP optimum over an exponential size neighborhood having little overlap with the Lin-Kernighan neighborhood. Combining the 2 approaches yields surprising results.

3) Sensitivity Analysis for the Shortest Path Problem in Undirected Graphs, ***James B. Orlin***, MIT, Sloan Sch. of Mgmt., 77 Mass Ave., Bldg. E40-147, Cambridge, MA 02139, jorlin@mit.edu, http://web.mit.edu/jorlin/www/, ***Ramkumar Ramaswamy, Nilopal Chakravarti***

Suppose P is a shortest path from an origin node to a destination node in a graph G., how much can each arc length change while keeping P a shortest path? We give a very efficient algorithm for solving this sensitivity analysis problem for the min-sum and bottleneck cases.

SA10 Queueing

Contributed Session
Chair: James R. Bradley, Cornell University, Johnson Grad. Sch. of Mgmt., 321 Sage Hall, Ithaca, NY 14853-6201, jrb28@cornell.edu

1) Mean Waiting Time Approximations in the G/G/1 Queue, ***Baris Balcioglu***, Rutgers University, Dept. of IE, 96 Frelinghuysen Rd., Piscataway, NJ 08854, bbalciog@rci.rutgers.edu, ***David L. Jagerman, Tayfur Altiok, Benjamin Melamed***

We construct GI/G/1 models to create viable approximations for queues with correlated arrivals. The approximating renewal arrival process preserves the peakedness of the original stream. The efficacy of the approximation is tested using a TES+ process, and simulating the corresponding TES+/G/1 queue for several service distributions and traffic intensities.

2) Improved Base-Stock Policies when Order Crossover Occurs, ***James R. Bradley***, Cornell University, Johnson Grad. Sch. of Mgmt., 321 Sage Hall, Ithaca, NY 14853-6201, jrb28@cornell.edu, ***Lawrence W. Robinson***

When order crossover occurs, we describe how using the shortfall distribution to set base-stock policies improves upon the commonly used normal approximation of the lead-time demand distribution. We compute upper bounds on the variance of the number of outstanding orders that are used to approximate the shortfall distribution.

3) Approximations for Queue Design under Arrival Rate Uncertainty, ***Andrew M. Ross***, University of California, Dept. of IE/OR, 4135 Etcheverry Hall, Berkeley, CA 94720, aross@ieor.berkeley.edu, http://ieor.berkeley.edu/~aross/, ***J. George Shanthikumar***

We consider designing a call center system under uncertainty in the Poisson arrival rate. Given a prior distribution on traffic, we determine the number of servers and buffer spaces needed to satisfy upper bounds on the probabilities of blocking or delay. For infinite-buffer systems, previous heuristics under-estimate the needed servers.

4) Supplier-Buyer Inventory Systems with Supplier Owned Inventory, ***S. Viswanathan***, Nanyang Technological University, Nanyang Bus. Sch., Singapore, 639798, Singapore, asviswa@ntu.edu.sg, ***Rajesh Piplani***

SOI is an arrangement where the supplier is responsible for owning and controlling the inventory at the buyer's premises. We consider a supplier-buyer inventory system with SOI adopted by one of the buyers. We analyze the impact of SOI on the supplier as well as the whole system.

5) Modeling & Analysis of Flexible Queueing Systems, ***Suryanrayanan Gurumurthi***, University of Minnesota, Dept. of Mech. Eng., Minneapolis, MN 55455, suryan@me.umn.edu, ***Saif Benjaafar***

We provide models for the analysis of queueing systems with multiple classes of arrivals and heterogeneous servers, where customers have the flexibility of being routed to more than one server and servers possess the capability of processing more than one customer class. We consider a range of control policies that include customer-specific routing priority schemes.

SA11 Networks & Graphs I

Contributed Session
Chair: Venkat Venkateswaran, AT&T Labs., 200 Laurel Ave., Rm. D5-3D38, Middletown, NJ 07748, vvenkateswaran@att.com

1) The Two-Edge-Connected Subgraph Polyhedron, ***Dieter Vandenbussche***, Georgia Institute of Technology, 329427 GT Station, Atlanta, GA 30332, dieter@isye.gatech.edu, ***George L. Nemhauser***

We study the polyhedron P(G) defined as the convex hull of 2-edge-connected subgraphs of a graph G where multiple copies of an edge are allowed. We show that several classes of facet-defining inequalities for TSP are also valid and facet-defining for P(G).

2) On Improved Generalized Subtour Elimination Constraints, ***Maria Joao Lopes***, ISCTE-CIO, Av. Forcas Armadas, Lisbon, 1649-026, Portugal, mjfl@iscte.pt, ***Luis Gouveia***

We show how to strengthen the well-known generalized subtour elimination constraints. The improvement is based on solving adequate subset problems. Results are presented for the capacitated minimum spanning tree problem with non-unit demands.

3) Minimizing Maximum Indegree, ***Venkat Venkateswaran***, AT&T Labs., 200 Laurel Ave., Rm. D5-3D38, Middletown, NJ

07748, vvenkateswaran@att.com

We study the problem of orienting the edges of a given simple graph so that the maximum indegree of vertices is minimized. We also develop an algorithm to produce such an extreme orientation on the given graph.

4) withdrawn 10/10: Spanning Trees & Threshold Graphs, ***Manoj K. Chari***, Louisiana State University, Dept. of Math., 256 Lockett Hall, Baton Rouge, LA 70803, chari@math.lsu.edu

SA12 Heuristics for Some classes of Partitioning & Scheduling Problems

Cluster: Combinatorial Optimization
Invited Session

Chair: Said Hanafi, Universite de Valenciennes LAMIH, Lab. LAMIH CNRS, Recherche Op. & Info., Valenciennes Cedex, 59313, France, said.hanafi@univ-valenciennes.fr

1) Convergent Tabu Search for Optimal Partitioning, ***Said Hanafi***, Universite de Valenciennes LAMIH, Lab. LAMIH CNRS, Recherche Op. & Info., Valenciennes Cedex, 59313, France, said.hanafi@univ-valenciennes.fr, ***Fred W. Glover***

We consider a new specialization of tabu search for optimal partitioning problems which include 0-1 IP problems. The method constitutes a novel form of tree search, more general than standard tree search approaches, that allows combinations of problem restriction and relaxation strategies not available in ordinary B&B.

2) A Hybrid Heuristic for the Multi-Terminal Full Load Pickup & Delivery Problem with Time Windows, ***Robert Currie***, University of Birmingham, Mgmt. Maths Group, Sch. of Maths & Stats., UK, currier@for.mat.bham.ac.uk, ***Said Salhi***

The problem considered is the full-load pickup and delivery problem with time windows, where pickup points are chosen from a set of candidates. The problem is formulated as a 0-1 LP, then a hybrid algorithm is developed which chooses dynamically between heuristics based on insertion and regret costs. Post-optimizers are introduced to improve the solutions.

3) withdrawn 10/11: An Integrated Model for Production Planning in a Two-Stage Process & Job-Shop Production System, ***El-Houssaine Aghezzaf***, Ghent University, Dept. of Ind. Mgmt. TW18V, Technologiepark, Gent-Zwijnaarde, 9 B-9052, Belgium

SA13 Combinatorics of the Simplex Method I

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Walter Morris, George Mason University, Dept. of Math. Sci., Fairfax, VA 22030, wmorris@gmu.edu

1) A Class of Strictly Semi-Monotone Matrices & Polynomially Solvable LCPs, ***Teresa H. Chu***, University of Michigan, Dept. of IOE, 2200 Fuller Ct., Apt. 814B, Ann Arbor, MI 48105, tchu@umich.edu, ***Katta G. Murty***

It is known that the LCP(q,M) can be solved in polynomial time for any vector q if the matrix M is nondegenerate and possesses the n-step property. We consider an extension of the property to the degenerate case and show that the defining matrix is completely Q as well. Matrix-theoretic properties of these matrices are also presented.

2) withdrawn 9/25: Randomized Simplex Algorithms on Combinatorial Cubes, ***Bernd Gaertner***, ETH Zurich, Dept. of CS, Zurich, Switzerland, gaertner@inf.ethz.ch

3) A Simplex Type Algorithm for Separated Continuous Linear Programs, ***Gideon Weiss***, University of Haifa, Dept. of Statistics, Haifa, 31905, Israel, gweiss@stat.haifa.ac.il, http://rstat.haifa.ac.il/~gweiss

We consider separated continuous linear programming problems with linear data. We derive some new properties of the solution. We present the first simplex type algorithm for these problems.

4) Distinguishing Cube Orientations Corresponding to LPs & P-Matrix LCPs, ***Walter Morris***, George Mason University, Dept. of Math. Sci., Fairfax, VA 22030, wmorris@gmu.edu

LPs over regions combinatorially equivalent to the cube and P-matrix LCPs define orientations of the edges of a cube. We consider a variety of combinatorial criteria to distinguish these from each other and from general orientations of the cube that have unique sinks on the faces.

SA14 Green Logistics & Manufacturing

Cluster: Queueing/Transportation Models in Logistics
Invited Session

Chair: Chialin Chen, Wilfrid Laurier University, Sch. of Bus. & Economics, Waterloo, Ontario, N2L 3C5, Canada, cchen@wlu.ca

1) Achieving Environmental & Productivity Improvements through Model-Based Process Redesign, ***Kumar Rajaram***, UCLA, Anderson Sch., 110 Westwood Plaza, Box 951481, Los Angeles, CA 90095-1481, jumar.rajaram@anderson.ucla.edu, ***Charles J. Corbett***

We describe an iterative process improvement procedure, using successive convex approximations of the process performance model where product flows and process settings are optimized for a given configuration and the solution and dual variables are used to update the process configuration. This was implemented in a major European wheat starch extraction process.

2) Designing Production Planning & Control Systems for Product Reuse, ***V. Daniel R. Guide, Jr.***, Duquesne University, Sch. of Bus. Admin., Pittsburgh, PA 15282, guide@duq.edu, ***Vaidy Jayaraman***

Through a series of case studies, we show that while there are common processes for product reuse, not all production planning and control systems are alike. Each structure has different characteristics and management concerns. Several formulations are developed for structuring the problems and providing a foundation for further development.

3) Integration of TQEM Systems & SCM Systems, ***Mitali De***, Wilfred Laurier University, Sch. of Bus. & Econ., Waterloo, Ontario, N2L 3C5, Canada, mde@wlu.ca

While environmentally conscious manufacturing and TQEM framework have one basic tenet (minimization of waste), a strong component of SCM is the end product quality that depends on manufacturing quality, environmentally conscious parts. A DSS is suggested that facilitates coordinated efforts across the supply chain for manufacturing within TQEM guidelines.

4) A Model of Competition with Logistics & Environmental Performances, ***Chialin Chen***, Wilfrid Laurier University, Sch. of Bus. & Economics, Waterloo, Ontario, N2L 3C5, Canada, cchen@wlu.ca, ***George E. Monahan***

Based on a stochastic inventory model with both demand and environmental uncertainties, we analyze the competition between firms that differ in their capability of demand fulfillment and environmental performance. The analytical results provide important insights to incorporating environmental considerations into production and logistics decisions.

SA15 Scheduling IV

Contributed Session

Chair: Barry A. Pasternack, California State University, Dept. of IS/DS, Fullerton, CA 92834, bpasternack@fullerton.edu

1) Forecasting in a Real-World Business Environment is More an Art than Science: The Story of a Telecom Business Organization, ***Deb Bhattacharjee***, Cap Gemini Ernst & Young, 20425 Stevens Creek Blvd., Cupertino, CA 95014, deb.bhattacharjee@us.cgeyc.com, www.cgey.com, ***Antoinette Lagerwij***

Accurate forecast is a key element in building an effective and efficient supply chain. Most organizations depend on popular statistical models or use software tools to create the best future estimate based on past sales history. However, in business forecasting, the life of a forecaster is far from being so simple. We will elaborate on our experiences in setting up a forecasting tool in a distribution intensive organization...

2) withdrawn 9/20: Tabu Search for Minimzing Total Tardiness on Parallel Machines with Sequence Dependent Setup Times, ***Vinicius A. Armentano***, Universidade Estadual de Campinas, FEEC, CP 6101, Campinas Sao Paulo, 13083-970, Brazil, vinicius@densis.fee.unicamp.br, ***Denise S. Yamashita, Moacir F. Franca***

3) Aggregate Capacity of Stochastic Operation's Lead Times in a Batch Chemical Plant, ***Jan C. Fransoo***, Eindhoven University of Technology, PO Box 513, Pav. F12, Eindhoven, NL 5600 MB, The Netherlands, j.c.fransoo@tm.tue.nl, www.tm.tue.nl/vakgr/lbs/fransoo.htm

We apply a regression approach to estimate the make span of a set of jobs in a complex production department, using a limited set of operational characteristics of the job a regressor variables

4) Determining the Optimal Allocation of Servers to a Tandem Queue using a Greedy Algorithm, ***Barry A. Pasternack***, California

State University, Dept. of IS/DS, Fullerton, CA 92834, bpasternack@fullerton.edu, ***Zvi Drezner***

We show how a greedy algorithm can be used to determine the optimal allocation of servers to the stations of a tandem M/M/k queueing. We also demonstrate sufficient conditions for a greedy approach to solving any dynamic programming problem. A simple Excel solution to the problem is presented.

5) Preemption in Single Machine Earliness/Tardiness Scheduling, ***Kerem Bulbul***, University of California, IEOR Dept., 4135 Etcheverry Hall, Berkeley, CA 94720, bulbul@ieor.berkeley.edu, www.ieor.berkeley.edu/~bulbul, ***Philip M. Kaminsky***, ***Candace A. Yano***

We consider a non-preemptive single machine earliness/tardiness scheduling model with general weights, ready times and due dates. Using completion time information obtained from the optimal solution to a preemptive relaxation, we generate feasible solutions to the original problem. We report extensive computational results demonstrating the speed and effectiveness of this approach.

SA16 Inventory Pooling

Sponsor: MSOM
Sponsored Session
Chair: Saif Benjaafar, University of Minnesota, Dept. of Mech. Eng., Minneapolis, MN 55455, saif@me.umn.edu

1) The Value of Pooling Inventories under Non-Normal Dependent Demand, ***Charles J. Corbett***, UCLA, Anderson Sch. of Mgmt., 110 Westwood Plaza, Box 951481, Los Angeles, CA 90095-1481, charles.corbett@anderson.ucla.edu, ***Kumar Rajaram***

We use copulas and multivariate stochastic orders to show how Eppen's (1979) result on the value of demand pooling can be generalized to arbitrary multivariate distributions with arbitrary dependence. The framework allows us to study multivariate dependence without having to assume normality, as is commonly done.

2) The Multi-Location Transshipment Problem, ***Yale T. Herer***, Technion, Fac. of IEM, Haifa, 32000, Israel, ***Michal Tzur***, ***Enver Yucesan***

We consider a supply chain that consists of several retailers and one supplier. The retailers, that may differ in their cost and demand parameters, may be coordinated through replenishment strategies that may include transshipments. We show that the optimal policy for this system is for each retailer to follow an order-up-to-S policy...

3) Integrating Indirect & Direct Sales Channels under Decentralized Decision Making, ***Ulrich W. Thonemann***, Universitat Munster, Inst. fur Supply Chain Mgmt., Universitatsstrabe 14-16, Munster, 48143, Germany, ***Ralf W. Seifert***

Many manufacturers have started to use virtual stores in addition to their existing indirect channels. These companies must decide how to integrate these 2 channels and how to design supply contracts, such that overall supply chain performance is optimized. We present a mathematical model that helps determining the best integration strategy...

4) Inventory Pooling in Production-Inventory Systems, ***Saif Benjaafar***, University of Minnesota, Dept. of Mech. Eng., Minneapolis, MN 55455, saif@me.umn.edu, ***William L. Cooper***, ***Joon-Seok Kim***

We examine the benefit of inventory pooling in systems where supply lead times are endogenously generated by a production system with finite capacity. Counter to intuition, we show that the value of pooling is generally decreasing in demand and production time variability. For systems with asymmetric cost structures, we show that pooling can lead to higher costs.

SA17 Product Variety & Demand Substitution

Sponsor: MSOM
Sponsored Session
Chair: Beril L. Toktay, INSEAD, Blvd. de Constance, Fontainebleau Cedex, 77305, France, beril.toktay@insead.fr

1) Dynamic Competition for Customers, ***Serguei Netessine***, University of Pennsylvania, Wharton Sch., OPIM Dept., 1300 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104-6366, netessinse@simon.rochester.edu, ***Nils Rudi***, ***Yunzeng Wang***

In case a product is out of stock, the customer faces a choice of placing a backorder or turning to another retailer selling a similar product. We consider dynamic competition between 2 retailers where customers may switch between retailers (substitute) in case of a stock-out at one of the retailers.

2) Expanding a Product Line with Remanufactured Products, ***Laurens G. Debo***, INSEAD, Blvd. de Constance, Fontainebleau, 77300, France, laurens.debo@insead.fr, ***Beril L. Toktay***, ***Luk N. van Wassenhove***

We analyze the consequences of a monopolist manufacturer expanding its product line by introducing remanufactured products, substitutes that are less costly to produce, but are supply-constrained by the remanufacturability level and past sales volumes of new products. We focus on the impact of production costs and consumers' preference heterogeneity.

3) A Coordinated Production Planning Model with Capacity Expansion & Inventory Management, ***Sampath Rajagopalan***, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089-1421, srajagopalan@sba.usc.edu, raj@marshall.usc.edu, ***Jayashankar Swaminathan***

We study a firm producing multiple items in a multi-period environment where demand for items is known but varies over time with long-term growth and possible short-term fluctuations. While demand growth is gradual, capacity additions are discrete. Therefore, periods immediately following a machine purchase are characterized by excess machine capacity.

4) Coordinating Contracts for Decentralized Supply Chains with Promotional Effort, ***Harish Krishnan***, University of Michigan Business School, Ann Arbor, MI 48109-1234, harishk@bus.umich.edu, ***Roman Kapuscinski***, ***David Butz***

Manufacturers and retailers facing uncertain demand often share responsibility for unsold inventory using various mechanisms. By dulling retailer incentive to exert promotional effort, these arrangements reduce channel profits. We examine this effect under competitive conditions (between retailers, manufacturers or channels) and analyze when (and to whom) such initiatives are beneficial.

SA18 ERP: The Implementation Process

Cluster: Enterprise Resource Planning
Invited Session
Chair: M. A. Venkataramanan, Indiana University, Kelley Sch. of Bus., Bloomington, IN 47405, venkatar@indiana.edu

1) ERP Implementation Success Factors: Lessons from North American Manufacturing Firms, ***Jeff K. Stratman***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0205, jeff.stratman@mgt.gatech.edu, ***Aleda V. Roth***

The benefits promised by ERP vendors have been elusive, with many implementations failing disastrously. Survey data from North American manufacturing firms with ERP systems is used to evaluate relationships between a portfolio of operational competency factors and business performance. Indicators of implementation success are identified.

2) The Process & Governance in Multi-Site ERP Implementation Projects, ***Kenneth E. Murphy***, Florida International University, Dept. of DS/IS, Coll. of Bus. Admin., Miami, FL 33199, murphyk@fiu.edu, ***Jose H. Noguera***, ***Paul Van Fenema***

To ensure successful implementation of ERP systems across multiple globally distributed sites, decisions concerning implementation sequencing and degree of individual site autonomy are crucial. An analytical framework to assist in this decision-making process will be presented. The framework is validated through the use of case studies.

3) Enterprise Resource Planning: Managing the Implementation Process, ***Vincent A. Mabert***, Indiana University, Kelley Sch. of Bus., Bloomington, IN 47405, ***Ashok K. Soni***, ***M. A. Venkataramanan***

We empirically investigate and identify key differences used by companies that managed their ERP implementations on time and/or on budget vs. the ones that did not, using data collected through a survey of US manufacturing companies that have implemented these systems.

SA19 Logistics I

Contributed Session
Chair: Necati Aras, McGill University, Faculty of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, aras@management.mcgill.ca

1) Managing Remanufacturing Systems under Uncertainty in Returned Item Quality, ***Necati Aras***, McGill University, Faculty of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, aras@management.mcgill.ca, ***Tamer Boyaci***, ***Vedat Verter***

A high level of uncertainty in the timing, quality and quantity of the returned items is one of the main characteristics of reverse logistics systems. We will

present a model to study the impact of quality differentiation in remanufacturing systems.

2) Revenue Management, ***Kevin Geraghty***, Revenue Research, Inc., 715 Denards Mill, Marietta, GA 30067, kevin@revenueresearch.com, www.revenueresearch.com

Revenue management is a pricing strategy developed by the travel industry in response to electronic distribution of virtual inventory by reservations systems. These techniques are now being successfully used by financial services, logistics and many other industries. We look at the key concepts that make these techniques so effective.

3) Vehicle Assignment & Navigation System, ***Jacky C. Wong***, Chinese University of Hong Kong, SE/EM Dept., Shatin NT, Hong Kong, cfwong@se.cuhk.edu.hk, ***Tze Wa Fung***, ***Chun-Hung Cheng***, ***Janny M. Y. Leung***

We describe a map-based vehicle assignment and navigation system (VANS) for delivery route planning. The system includes an interactive point-and-click multi-layered digital map. Functions include shortest-path evaluations, delivery planning, report generation, animated route display and manual adjustment.

4) Stochastic Approaches for Strategic Airline Fleet Planning, ***Ovidiu Listes***, Erasmus University Rotterdam, Econometrics & OR Dept., PO Box 1738, Rm. H11-02, Rotterdam, 3000 DR, The Netherlands, listes@few.eur.nl

In the airline industry, profit margins are under tremendous pressure. Therefore, a robust fleet composition is desirable at strategic levels. We consider a fleet assignment case with stochastic demands and emphasize the significant expected improvement generated by the stochastic solution as compared with the usual solution based on average demands.

SA20 Operations Management I

Contributed Session

Chair: Mohsen ElHafsi, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, mohsen.elhafsi@ucr.edu

1) Transporting & Managing Inventories of Liquid Chemicals using Oceangoing Vessels, ***Mohsen ElHafsi***, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, mohsen.elhafsi@ucr.edu, ***Abdelghani A. Elimam***, ***Bajis M. Dodin***

We determine the optimal schedule for shipping liquid chemicals using tanker ships while meeting product demands and ensuring the ship trim stability. The shipping schedule includes the number of trips taken between source and destination ports and product assignments to ship compartments in each trip. Our objective is to minimize the sum of product inventory holding/backlog costs...

2) withdrawn 10/15: An Operational Efficiency Model of an Assembly Cell & Assembly Line for Configure-to-Order Manufacturing, ***Jia Hua Weng***, Waseda University, 51-14-07, 3-4-1 Okuba, Shinjuku-ku, Tokyo, 169-8555, Japan, jiahua@ims.mgmt.waseda.ac.jp, ***Keisuke Takita***, ***Hisashi Onari***

3) A Decision Model for the Operational Control of Time-Constrained New Product Development Processes, ***Andreea B. Dragut***, Eindhoven University of Technology, Den Dolech 2, PO Box 513, Eindhoven, 5600 MB, The Netherlands, a.b.dragut@tm.tue.nl

To generate/respond to new information during development, the uncertainty in the new product definition is repeatedly solved as a function of the expected market payoff in a Markov decision model. Considering as given the delivery time, and the resources, at each decision point one can increase/decrease product performance or abandon it.

SA21 Manufacturing I

Contributed Session

Chair: Penny M. Leahy, RPI, 22 Warren Terrace, West Hartford, CT 06119, leahyp@pweh.com

1) A Manufacturing Cell Efficiency Study, ***Penny M. Leahy***, RPI, 22 Warren Terrace, West Hartford, CT 06119, leahyp@pweh.com

Discrete even simulation can assist in the design of more efficient manufacturing cells. We report on the use of DES modeling to investigate the performance of a manufacturing cell which is experiencing problems meeting schedule requirements. Simulation has suggested new strategies to improve cell performance and reduce waste.

2) Modeling a Generic Assembly System, ***Liesje De Boeck***, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, 2000, Belgium, liesje.deboeck@ua.ac.be, ***Nico J. Vandaele***

We focus on the modeling of a generic assembly system, consisting of 2 equally generally distributed input processes and infinite buffers. A kit consists of one unit of each input process. We obtain approximations for the synchronization times of components and the interarrival times of kits at the assembly machine.

3) A Model & Simulation for Remanufacturing, ***Shingo Funaki***, Waseda University, 3-4-1 Ohkubo Shinjuku-ku, Tokyo, 169-8555, Japan, 600b562@mn.waseda.ac.jp, ***Naoto Yatagai***, ***Hisashi Onari***

To predict returns, abandonment action should be expressed. As it would be affected by wear in use and appearance of new products, we propose a method to measure these 2 factors. We clarify the relationship between the user action and product's worth, which is decrease by these 2 factors.

4) A Game-Theoretic Perspective on Transaction Cost & the Decision to Make, Buy or Make-&-Buy, ***Wei Shi Lim***, National University of Singapore, 15 Law Link, FBA I, Singapore, 117591, Singapore, fbalimws@nus.edu.sg, ***Khai Sheang Lee***

We examine a firm's outsourcing decision over time. We identify specific learning and the salvageability of specific learning by suppliers as reasons for a firm to adopt a make-and-buy strategy, even when outsourcing is less costly initially. We show that when the specific learning effect is high, the firm follows a make-and-buy strategy, capitalizing on the cost savings in buying...

SA22 Supply Chain Risk Management & Coordination

Cluster: **Supply Chain Management**
Invited Session

Chair: Ioannis S. Papadakis, Drexel University, Dept. of Dec. Sci., Philadelphia, PA 19104, ioannis_papadakis@drexel.edu

1) Capacity Options in Capital Intensive Industries, ***Paul R. Kleindorfer***, University of Pennsylvania, The Wharton School, Philadelphia, PA 19104, kleindorfer@wharton.upenn.edu

We address a cyclic CONWIP flowshop problem and include 2 additional features over an earlier study: stochastic job processing times and limited storage space in between the machines. An iterative procedure is presented to determine the optimal WIP level and permutation schedule.

2) Online Reputation Systems: A Powerful Risk Management Asset for Open Supply Chains, ***MIT Dellarocas***, MIT, Sloan Sch. of Mgmt., E53-315, Cambridge, MA 02139, dell@mit.edu

A significant issue in flexible supply chains is the assessment of operational risks associated with new partners and processes. We argue that an impartial infomediary, which collects feedback from past transactions of an entire community and aggregates them into unbiased assessments of partner trustworthiness, can be a powerful risk management asset that benefits the entire community.

3) Models of Disruption Dynamics for PC Supply Chains, ***Ioannis S. Papadakis***, Drexel University, Dept. of Dec. Sci., Philadelphia, PA 19104, ioannis_papadakis@drexel.edu

Two models are developed for dynamic analysis of push and pull supply chains. Input price shocks arising after abrupt supply chain disruptions are analyzed. The usual pattern in the price of PC components is modeled as the sum of a downward drifting mean (Moore's law) and an Ito process.

4) Prescriptive Strategies for Contract Manufacturing in Supply Chains, ***Robert H. Burgess***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, robert.burgess@mgt.gatech.edu, ***Craig A. Hill***

We explore contract manufacturing companies and their influence on the supply chain. From case studies, inferences about supply chain performance improvements are highlighted. A model prescribing affects that a properly aligned contract manufacturer may have on the achievement of their customer's priorities is included.

5) An Analysis of Supply Chain Coordination Activities, ***Craig A. Hill***, Georgia State University, Robinson Sch. of Bus., PO Box 4014, Atlanta, GA 30302-4014, chill4@gsu.edu, ***Gary D. Scudder***

We present an empirical-based analysis of the use of coordination activities between supply chain members. Contrasts between the use of these activities with customers and with suppliers are highlighted. Further analysis between the use of coordination activities and measures of a firm's performance is included.

SA23 Supply Chain Management

Contributed Session

Chair: Paul Brown, Georgia State University, 35 Broad St., Atlanta, GA 30303, paul.d.brown@att.net

1) withdrawn 10/12: Comparing Pure & Modified Base-Stock

Policies for Ideal Assemble-to-Order Systems, ***Ton G. de Kok***, Technische Universiteit Eindhoven, Den Dolech 2, PO Box 513, Paviljoen F4, Eindhoven, 5600 MB, The Netherlands, a.g.d.kok@tm.tue.nl

2) An Optimal Purchase Contract with Uncertain Cost & Demand Forecast Updating, ***Hua Xiang***, Chinese University of Hong Kong, Dept. of SE/EM, Shatin NT, Hong Kong, China, hxiang@se.cuhk.edu.hk, ***Houmin Yan***, ***Hanqin Zhang***, ***Suresh P. Sethi***

We are concerned with the optimal ordering policies for a retailer who has 2 instants to order a seasonal product from a manufacture prior to a single selling season in a contracted framework. The optimal order quantity at each instant are developed.

3) A Simulation-Based Approach to Study Stochastic Inventory Planning Games, ***Jaideep J. Rao***, University of South Florida, Tampa, FL 33620, jjrao2@eng.usf.edu, ***Kiran K. Ravulapati***, ***Tapas K. Das***

A machine learning algorithm-based methodology to solve non-0 sum stochastic game problems that are modeled as competitive Markov decision process is presented and tested on a multiple retailer supply-chain inventory management problem. The methodology shows significant promise in effectively finding equilibrium policies and also in evaluating short-term rewards of stochastic games.

4) Diffusion of Electronic Exchanges: Impact on the E-Procurement Process, ***Paul Brown***, Georgia State University, 35 Broad St., Atlanta, GA 30303, paul.d.brown@att.net

The procurement function is becoming an increasingly strategic importance to organizations however,inefficiencies abound. A promising solution for these inefficiencies has been the development of electronic exchanges. Despite their proposed advantages, the adoption and diffusion of these systems have been slow. We investigate the issues that have affected the adoption and dissemination of electronic exchanges.

SA24 Supply Chain Management I

Contributed Session

Chair: Tsan-Ming Choi, Chinese University of Hong Kong, Ho Sing Hang Eng. Bldg., Rm. 116, Shatin NT, Hong Kong, tmchoi@se.cuhk.edu.hk

1) Mean-Variance Formulations for Supply Chain Management, ***Tsan-Ming Choi***, Chinese University of Hong Kong, Ho Sing Hang Eng. Bldg., Rm. 116, Shatin NT, Hong Kong, tmchoi@se.cuhk.edu.hk, ***Duan Li***, ***Houmin Yan***

Most research of supply chain management with stochastic demand focuses solely on the optimization objective of expected measures. The variance of the measures and the decision maker's preference are often ignored. We develop mean-variance decision frameworks for supply chain management under which tailor-made optimal managerial decisions can be made.

2) A Single-Period Inventory Placement Problem for a Serial Supply Chain with the Profit Attainment Objective & Positive Lost Sales Costs, ***James O. Flynn***, Cleveland State University, 1801 East 12th St., Cleveland, OH 44114, j.flynn@popmail.csuohio.edu, ***Chia-Shin Chung***, ***Piotr Stalinski***

We study a single-period serial supply chain, where the objective is to maximize the probability of achieving a budgeted profit level. Assuming positive lost sales costs, there exists an optimal stock vector with at most 3 positive components. We characterize its properties and provide an algorithm.

3) A Stochastic Model of a Purchase-Production-Sale Chain: Analysis of Global Performance Measures, ***Zhao Xiaobo***, Tsinghua University, Sch. of Economics & Mgmt., Beijing, 100084, China, zhaoxb@em.tsinghua.edu.cn, ***Deju Xu***, ***Hanqin Zhang***

We consider a PPS chain that consists of suppliers, a mixed-model assembly line (MMAL) and retailers. The MMAL comprises a set of workstations in series, each of which performs tasks of assembling specified components, to produce products with a variety of models. Every supplier delivers one kind component to the corresponding workstation on the MMAL, with the WIPs controlled by a Kanban mechanism...

4) Measuring Costs & Benefits from Forecast Sharing in the Case of Customized Production Equipment, ***Justin Z. Ren***, University of Pennsylvania, Wharton School, OPIM Dept., 1300 SH-DH 3620 Locust Walk, Philadelphia, PA 19104, justinren@wharton.upenn.edu, ***Morris A. Cohen***, ***Teck-Hua Ho***, ***Christian Terwiesch***

Facing long manufacturing lead time for customized production equipment, a supplier needs to decide when to begin the fulfillment of the order, even before she receives firm orders. Utilizing detailed data, we find the supplier focuses on minimizing cancellation and holding cost, which negates the effectiveness of forecast sharing mechanism.

5) A Single-Period Inventory Placement Problem for a Serial Supply Chain with the Profit Attainment Objective & Zero Lost Sales Costs, ***Chia-Shin Chung***, Cleveland State University, 1860 East 18th St., Cleveland, OH 44114, c.chung@csuohio.edu, ***James O. Flynn***, ***Piotr Stalinski***

We study a single-period serial supply chain, where the objective is to maximize the probability of achieving a budgeted profit level. Assuming 0 lost sales costs, an optimal stock vector places as much stock as possible in the downstream stages. We characterize its properties and provide an algorithm.

SA25 Scheduling in Computer & Manufacturing Systems

Cluster: Scheduling
Invited Session

Chair: Eric V. Denardo, Yale University, Dept. of OR, PO Box 208267, New Haven, CT 06520-8267

1) Manufacturing Logistics Scheduling: Coordination between Two-Stage Functions, ***Yung-Chia Chang***, Texas A&M University, Dept. of IE, 238 Zachry Bldg., College Station, TX 77843-3131, jasmine@tamu.edu, ***Chung-Yee Lee***

We study a problem that jointly considers the issue of machine scheduling and finishing product delivery. Different from the existing results found in literature, we consider the problems where each job occupies different physical size on a vehicle when delivered from the manufacturing facility to customers.

2) withdrawn 10/9: A Metaheuristic Method for a Real FMS, ***Malgorzata Sterna***, Poznan Institute of Technology, Inst. of Computing Sci., ul. Piotrowo 3A, Poznan, 60-965, Poland, malgorzata.sterna@cs.put.poznan.pl, ***Jacek A. Blazewicz***, ***Erwin Pesch***

3) Index Policies for Stochastic Search in a Forest with an Application to R&D Project Management, ***Eric V. Denardo***, Yale University, Dept. of OR, PO Box 208267, New Haven, CT 06520-8267, ***Uriel G. Rothblum***, ***Ludo Van Der Heyden***

A stochastic search problem in a forest is shown to have a simple solution: an index (ratio) is assigned to each edge such that expected utility is maximized by attempting, at each opportunity, an edge whose index is most positive. This result is achieved for linear and exponential utility functions.

4) withdrawn 10/9: Suboptimal Approaches to Scheduling Malleable Tasks, ***Jacek A. Blazewicz***, Poznan University of Technology, Inst. of Computing Sci., ul. Piotrowo 3a, Poznan, 60-965, Poland, blazewic@put.poznan.pl, ***Maciej Machowiak***, ***Gregory Mounie***, ***Denis Trystram***

SA26 Cash Flow Analysis in Project Scheduling

Cluster: Project Management
Invited Session

Chair: Gunduz Ulusoy, Sabanci University, Fens, Orhanli, Tuzla, Istanbul, 81474, Turkey, gunduz@sabaniciuniv.edu

1) Minimizing the Weighted Flow Time of Projects with In-Flows & Out-Flows, ***Joseph G. Szmerekovsky***, Case Western Reserve University, WSOM, Dept. of Operations, 10900 Euclid Ave., Cleveland, OH 44106-7235, jgs7@po.cwru.edu, ***George L. Vairaktarakis***

We consider the project scheduling problem of minimizing total weighted flow time with unrestricted weights (representing cash in- and out-flows) and due dates for activities. We describe the structure of an optimal solution and provide an efficient algorithm.

2) Linear Time-Dependent Cash Flows in Project Networks: An Enumeration Algorithm, ***Mario Vanhoucke***, Catholic University of Leuven, Dept. of Applied Econ., Op. Mgmt., Naamsestraat 69, Leuven, 3000, Belgium, mario.vanhoucke@econ.kuleuven.ac.be, ***Erik L. Demeulemeester***, ***Willy S. Herroelen***

We study the unconstrained project scheduling problem with discounted cash flows where the net cash flows are linear dependent on the completion times of the activities. The objective is to schedule the activities in order to maximize the net present value subject to the precedence constraints and a fixed deadline.

3) Payment Models for the Multi-Mode Resource Constrained Project Scheduling Problem with Discounted Cash Flows, ***Gunduz Ulusoy***, Sabanci University, Fens, Orhanli, Tuzla, Istanbul, 81474,

Turkey, gunduz@sabaniciuniv.edu, ***Funda Serifoglu-Sivrikaya***

Four payment models are considered for the project scheduling problem under scarce resources: lump sum payment at the terminal event, payments at prespecified event nodes, payments at prespecified time points and progress payments. The models are investigated at the hand of an example problem. Several sensitivity analyses are performed.

SA27 Some Issues in Continuous Quality Improvement

Cluster: **Quality Management**
Invited Session
Chair: M. Jeya Chandra, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, mjc3@psu.edu

1) Comparison of Some Process Adjustment Methods & their Integration with SPC Charts, ***Rong Pan***, Pennsylvania State University, Dept. of IME, University Park, PA 16802, rxp205@psu.edu, ***Enrique Del Castillo***

Several process adjustment techniques are discussed. We show that they can be unified by a Bayesian formulation (Kalman filter). Small-sample performance comparisons between these methods and discrete integral, also called EWMA, feedback control are provided. In conjunction with some commonly used control charts, these adjustment techniques are then applied on a manufacturing process...

2) Multivariate Capability Indices using Process-Oriented Basis Representations, ***Earnest J. Foster***, Pennsylvania State University, Dept. of IME, University Park, PA 16802, ejf131@psu.edu, ***Russell R. Barton***

Multivariate capability indices are examined as a diagnostic for process quality improvement. Using procces-oriented basis representations is a new approach to capability, allowing the computation of cause-related index values. Production irregularities are linked directly to their causes, allowing the efficient improvement of processes.

3) Justification of Investment in Measuring Equipment, ***M. Jeya Chandra***, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, mjc3@psu.edu, ***Hsu-Hua Lee***

A model for investment in test equipment will be developed. This investment can be related to the measurement variance and the proportion of nonconforming units among accepted items sent to the customer. This will affect the warranty cost and market share increase.

SA28 Combinatorics

Contributed Session
Chair: Steven B. Horton, US Military Academy, Dept. of Math. Sciences, West Point, NY 10996, steve-horton@usma.edu www.dean.usma.edu/math/people/horton/default.htm

1) Generating Computationally Difficult Set Covering Problems, ***Gerald L. Thompson***, Carnegie Mellon University, GSIA, 5000 Forbes Ave., Pittsburgh, PA 15213-3890, gt04@andrew.cmu.edu

The width of a 0-1 matrix is the objective value of a certain set covering problem. There are 2 principal ways of generating such problems using Kirkman numbers. We discuss recent results on generating both methods.

2) On the Complexity of Certain Completion Problems, ***Steven B. Horton***, US Military Academy, Dept. of Math. Sciences, West Point,NY10996,steve-horton@usma.eduwww.dean.usma.edu/math/people/horton/default.htm, ***R. Gary Parker***, ***Todd Easton***

Many combinatorial problems that are efficiently solvable are made more difficult by the imposition of a partial solution. For example, while the celebrated 4-color theorem guarantees that every planar graph can be 4-colored, if some of the vertices are colored as part of the instance, deciding if the remaining vertices can be properly colored with a total of 4 colors is NP-complete...

3) A Linear-Time Max-Cut Algorithm using Branch Decompositions, ***William A. Christian***, James Madison University, Coll. of Bus., MSC 0202, Harrisonburg, VA 22807, christwa@jmu.edu, http://chopsticks.cob.jmu.edu/~christwa

We present a linear-time algorithm for finding a node partition of a graph that maximizes the sum of the edges that cross the partition (max-cut). We present computational results as well as a description of the algorithmic framework for branch decomposition-based algorithms.

SA29 Tutorial: Data Mining through Activity Monitoring & Forecasting

Sponsor: **QSR**
Sponsored Session
Chair: Tom Au, Data Mining Group/AT&T Labs.

Co-Chair: Kwok L. Tsui, Georgia Institute of Technology, Sch. of ISYE, Atlanta, GA 30332, ktsui@isye.gatech.edu

1) Tutorial: Data Mining through Activity Monitoring & Forecasting, ***Tom Au***, Data Mining Group/AT&T Labs., ***Kwok L. Tsui***

We discuss activity monitoring for detection of interesting events that require actions, such as customer churn and fraud detection and forecasting methods for predicting sales and revenue. We will cover various topics in market segmentation, customer profiling, customer retention, activity detection, forecasting strategy and time series modeling.

SA30 Decision Analysis Computation

Sponsor: **Decision Analysis**
Sponsored Session
Chair: Ross D. Shachter, Stanford University, MSE Dept., Terman Engineering Ctr., Stanford, CA 94305-4026, shachter@stanford.edu

1) Data Mining at Microsoft, ***David E. Heckerman***, Microsoft Research, One Microsoft Way, 9S/1024, Redmond, WA 98052-6399, heckerma@microsoft.com

I will discuss data mining tools developed over the last decade at Microsoft Research. Some of these tools appear in SQL Server 2000 and Commerce Server 2000. Others will ship in future Microsoft products. I will illustrate the use of these tools using data from domains including web navigation, ecommerce, TV viewing and movie preferences.

2) Sequential Valuation Networks, ***Riza Demirer***, Kansas University Business School, Summerfield Hall, 1300 Sunnyside Ave., Lawrence, KS 66045-7585, riza@ku.edu, ***Prakash P. Shenoy***

We will describe a new technique for representing and solving asymmetric decision problems. Our technique is a hybrid of the best features of sequential decision diagrams and valuation networks and it succeeds in overcoming the weaknesses of these 2 techniques.

3) Principle-Agent Value Alignment, ***Daniel Shapiro***, Institute for the Study of Learning & Expertise, 2164 Staunton Ct., Palo Alto, CA 94306, dgs@stanford.edu, ***Ross D. Shachter***

In a principal-agent problem the principal seeks to motivate the actions of an agent through incentives. We identify necessary and sufficient conditions for establishing trust between the principal and agent, even when they perceive the world in incommensurate terms, such as when the agent is a technological artifact.

SA31 Panel: Recent Developments in Group Decision & Negotiation

Sponsor: **Group Decision & Negotiation**
Sponsored Session
Chair: Melvin F. Shakun, NYU, Stern Sch. of Bus., 44 West 4th St., New York, NY 10012-1126, mshakun@stern.nyu.edu

Co-Chair: D. Marc Kilgour, Wilfrid Laurier University, Dept. of Math, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@wlu.edu

1) Panel: Recent Developments in Group Decision & Negotiation, ***Gregory Kersten***, Concordia University, Molson Sch. of Bus., 1455 de Maisonneuve Blvd. West, Montreal, Quebec, H3G 1M8, Canada, gregory@mercato.concordia.ca, ***D. Marc Kilgour***, Wilfrid Laurier University, Dept. of Math, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@wlu.edu, ***Melvin F. Shakun***, NYU, Stern Sch. of Bus., 44 West 4th St., New York, NY 10012-1126, mshakun@stern.nyu.edu, ***Peri H. Iz***, Health Care Finance Administration, Office of Strategic Planning, 7500 Security Blvd, MS C31926, Baltimore, MD 21244, izperi@hcfa.gov

This panel session will discuss recent developments in GDN. Panelists will make opening remarks followed by panel discussion with audience participation.

SA32 Finance: Risk Management

Contributed Session

Chair: John M. Charnes, University of Kansas, Sch. of Business, 345 Summerfield Hall, Lawrence, KS 66045, jmc@ku.edu

1) Measuring Hedge Effectiveness for FAS 133 Compliance, ***John M. Charnes***, University of Kansas, Sch. of Business, 345 Summerfield Hall, Lawrence, KS 66045, jmc@ku.edu, ***Paul Koch***, ***Henk Berkman***

Under FAS 133, businesses qualify for hedge accounting treatment only if they document the expectation that their hedging strategy will be highly effective. We derive a new measure to help document this expectation and compare it to other proposed measures.

2) withdrawn 9/20: Managing Electricity Reliability Risk through the Markets, ***Afzal S. Siddiqui***, University of California/ Berkeley Lab, 1 Cyclotron Rd., MS 90-400, Berkeley, CA 94720, afzal@ieor.berkeley.edu

3) A Mean-Conditional VaR Model & the Second Order Stochastic Dominance, ***Weidong Lin***, NUS, SoC 3 Science Dr. 2, Singapore, 117543, Singapore, dislinwd@nus.edu.sg, ***Kang Hoh Phua***, ***Daohua Ming***

A mean-conditional VaR model, a mean-downside risk model, is attracting the attention of many practitioners and academics in portfolio management practices. We aim to study the relation between this model and stochastic dominance. We obtain a significant result that the portfolios on the efficient frontier generated by mean-conditional VaR model are efficient in the sense of the second order stochastic dominance.

4) Real Options Valuation in the Multi-Period Base-Stock Problem, ***Peter Berling***, Lund University, Box 118, Lund, 22100, Sweden, peter.berling@iml.lth.se

A multi-period base-stock problem with a financial risk associated with stochastic demand has been considered. A dynamic programming algorithm for finding the optimal policy, a state-dependent order-up-to-S policy, is presented. The optimal policy is then compared with heuristic methods. This study indicates that the effect of financial risk is negligible.

5) Development of a Hybrid Model for Electrical Power Spot Price, ***Lindsay Anderson***, University of Western Ontario, Dept. of Applied Math, London, Ontario, N6A 5B7, Canada, landerson@uwo.ca, http://www.apmaths.uwo.ca/~landerso, ***Matt Davison***

We use electricity price data to motivate a stochastic price model for electricity different from existing models both because it directly models price and because it incorporates the partially predictable load time series. We use a preliminary version of this model to price simple electricity options.

SA33 Tutorial: Internet & Intranet in Acute Care Hospitals

Sponsor: Social Science Applications

Sponsored Session

Chair: Myron Hatcher, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, myron_hatcher@csufresno.edu

1) Tutorial: Internet & Intranet in Acute Care Hospitals, ***Myron Hatcher***, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, myron_hatcher@csufresno.edu

Two national surveys of Acute Care hospitals have been conducted in the last 5 years. This tutorial will focus on the impact of network technologies in health care. Topics will include systems analysis approaches such as business process reengineering, computerized decision modeling, user involvement and network staff support. Policies will be suggested for network technology transfer.

SA34 Using OR for Transit Operations & Customer Information

Sponsor: TSS

Sponsored Session

Chair: Rabi Mishalani, Ohio State University, Dept. of Civil & Environ. Eng., Columbus, OH 43210, mishalani.1@osu.edu

1) Information Critical Arcs for On-Line Routing, ***Baiyu Yang***, Pennsylvania State University, Dept. of Civ. & Environ. Eng., University Park, PA 16802, hxt14@psu.edu, ***Elise Miller-Hooks***

We present a mathematical formulation and heuristic procedure for selecting a subset of network arcs (due to monetary constraints), called information critical arcs, for which real-time travel information will be collected. A real-time routing algorithm is used in a stochastic, time-varying environment to provide path guidance given this real-time information. Solutions are evaluated.

2) Investigating Information Quality & Effectiveness of Alternative Real-Time Information Supply Strategies, ***Karthik Srinivasan***, Vanderbilt University, Dept. of Civil & Environ. Eng., 206B Jacobs Hall, Nashville, TN 37235, karthik.k.srinivasan@vanderbilt.edu, ***Ke Chen***

We investigate the effect of alternative information supply strategies on information quality and system performance. Specifically, differences between VMS-based information and in-vehicle devices are examined using simulation experiments. The performance of the information strategies under various driver response behaviors, incident rates and recurrent congestion conditions is reported.

3) Using Current Bus Location Information in Passenger Itinerary Planning, ***Mark Hickman***, University of Arizona, Civil Eng. & Eng. Mechanics, mhickman@engr.arizona.edu

Many transit agencies can monitor current bus locations. It is possible to use this information to inform passengers about better paths (itineraries) from their origin to their destination. Using stochastic and time-dependent shortest paths, we present an algorithm for generating passenger itineraries that uses real-time bus location information.

4) Effects of Demand Patterns & Bus Holding on Real-Time Passenger Information, ***Rabi Mishalani***, Ohio State University, Dept. of Civil & Environ. Eng., Columbus, OH 43210, mishalani.1@osu.edu, ***Mark McCord***, ***Chi-Ping Lam***

An evaluation methodology that quantifies the value of bus arrival information systems to passengers waiting at bus stops under various passenger arrival patterns and bus holding policies is presented. Transit demand and supply are modeled as a stochastic system with an operator providing optimal passenger information. Simulation results are discussed.

SA35 New Developments in Logistics & Transportation Planning

Sponsor: TSS

Sponsored Session

Chair: Zhi-Long Chen, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu

1) Planning Virtual Inventories, ***Apostolos N. Burnetas***, Case Western Reserve University, Dept. of Ops., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu, ***Ronald H. Ballou***

Supplying customer demand from alternate inventory locations when an item is out of stock at its primary stocking point creates a virtual inventory for that item. The expectation is that if more inventories can be drawn upon, the inventory for an item would be lower, the fill rate would be higher, or both. While generally true for safety stock, regular stocks, on the other hand, rise with such cross filling of demand...

2) Capacity & Flexibility Assessment of Transportation Systems, ***Denny Cho***, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, denny@seas.upenn.edu, ***Edward K. Morlok***, ***Zhi-Long Chen***

We review existing models and approaches for assessing capacity and flexibility of a transportation system. New models, metrics and solution approaches based on optimization and simulation will be presented.

3) Supply Chain Networks with Competition, ***Anna Nagurney***, University of Massachusetts, Isenberg Sch. of Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu, ***June Dong***, ***Ding Zhang***

We develop a framework for the formulation, analysis and computation of solutions to supply chain network problems with competition. We identify the network structure of the supply chain problem in equilibrium and utilize the variational inequality formulation for the prediction of the prices and shipments.

4) Vehicle Routing with Cross Docking, ***Zhi-Long Chen***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu, ***Hang Xu***

We consider vehicle routing problems where there are some cross docks available in the underlying network. An order can be either directly delivered without using a cross dock or delivered through a cross dock. We propose heuristics for solving such problems and analyze their asymptopic performance.

SA36 Crew Management I

Sponsor: Aviation Applications
Sponsored Session

Chair: Diego Klabjan, University of Illinois, Dept. of MIE, 140 ME Bldg., 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu

1) Modeling & Optimization of Large-Scale Bidline-Generation Problems, ***Tomas Gustafsson***, Carmen Systems Ltd., 1800 McGill College Ave., Ste. 2800, Montreal, Quebec, H3A 3J6, Canada, tomas.gustafsson@carmensystems.ca, ***Stefan E. Karisch***

Bidline-generation problem aims at constructing rosters for crew members that are productive and satisfy quality criteria such as regularity, robustness and fairness. We describe different approaches for modeling and optimizing bidline-generation problem using the Carmen crew rostering system combining Carmen's fully flexible rule modeling language with advanced column generation techniques.

2) Solving the Airline Crew Pairing Problem using the Least-Squares Primal-Dual Sub-Problem Method, ***Ellis L. Johnson***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ejohnson@isye.gatech.edu, ***Balaji Gopalakrishnan***

The airline crew pairing problem formulated as a set partitioning problem has many columns and is known to be highly degenerate. We discuss a least-squares primal-dual sub-problem method for solving this problem. This method is impervious to degeneracy and could lead to fewer iterations and better solution time for solving the crew pairing problem. We also discuss the computational issues involved.

3) Airport Ground Staff Scheduling, ***Niklas Kohl***, Carmen Consulting, Fruebjergvej 3, Kobenhavn, DK 2100, Denmark, niklas@carmen.se, ***Erik Hasselberg***

We consider the rostering of ground staff in a major international airport. Each staff member has a qualification profile and the tasks to be scheduled have different qualification requirements. The monthly rosters must satisfy a number of rules and staff bids should be satisfied whenever possible.

4) Recurrent Training Scheduling, ***Milind G. Sohoni***, Delta Technology, OR Dept., Atlanta, GA, milind.sohoni@delta.com, ***Glenn Bailey***, ***Kristi Martin***, ***Helen S. Carter***, ***Ellis L. Johnson***

Cockpit crews must undergo periodic recurrent training to maintain flight qualification. Recurrent training must be completed within a specified time window every year. Scheduling recurrent training is a very complex task for major airlines given all the contractual obligations, federal aviation rules, fleet mix, simulator and ground school availability. Furthermore, scheduling recurrent training often results in a large amount of trips dropped from pilot flying...

SA37 Revenue Management I

Sponsor: Revenue Management & Pricing
Sponsored Session

Chair: Garrett J. van Ryzin, Columbia University, Grad. Sch. of Bus., 412 Uris Hall, New York, NY 10027, gjv1@columbia.edu

1) Implementation of a Bilevel Model for Yield Management in the Airline Industry, ***Patrice Marcotte***, Universite de Montreal, DIRO, CP 6128, Succ. Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, marcotte@iro.umontreal.ca, ***Gilles Savard***, ***Jean-Philippe Cote***

We consider the problem of simultaneously determining a price schedule and a seat allocation policy for an airline. Our bilevel model, which is based on a disaggregate representation of demand, takes explicitly into account the competing routes available to the customers. We will discuss the implementation of a solution algorithm on a network of realistic size.

2) A Continuous-Time Fluid Dynamics Model for Dynamic Pricing, ***Soulaymane Kachani***, MIT, OR Ctr., 1 Amherst St., Cambridge, MA, kachani@mit.edu, ***Georgia Perakis***

Dynamic pricing has become very important in a variety of arenas including revenue management, inventory control and supply chain management. We present a continuous fluid dynamics model that includes joint pricing, production and inventory decisions in a multi-product environment. Our model incorporates the delay of price in affecting demand for non-perishable goods.

3) withdrawn 10/9: Product Design & Positioning of Yield Management Products, ***Kalyan Talluri***, Universitat Pompeu Fabra, Ramon Trias, Fargas 25-27, Barcelona, 08005, Spain, talluri@econ.upf.es

4) Joint Overbooking & Fare Class Allocation on a Network, ***Itir Z. Karaesmen***, Carnegie Mellon University, Grad. Sch. of Ind. Admin., 5000 Forbes Ave., Pittsburgh, PA 15213, itir@andrew.cmu.edu, ***Garrett J. van Ryzin***

We develop and analyze a method for jointly setting overbooking levels and fare-class allocations on a network. We prove the asymptotic optimality of the method and provide an efficient computational algorithm.

SA38 Business Applications I

Contributed Session

Chair: Mohamed Djerdjour, SUNY, School of Bus. & Economics, 101 Broad St., Plattsburgh, NY 12901, djerdjm@plattsburgh.edu

1) An Analytic Hierarchy Process Application for Project Evaluation, ***Mohamed Djerdjour***, SUNY, School of Bus. & Economics, 101 Broad St., Plattsburgh, NY 12901, djerdjm@plattsburgh.edu

We discuss the decision problem of the management team of a large organization that wants to evaluate bidding firms for a large development project. Faced with many bidders and many factors to include in the evaluation, the team wanted to determine which projects were most likely to succeed. We will present the AHP model developed together with the results of a practical application...

2) Should Product Innovation be Radical? A Computational Study, ***Susan Slotnick***, Arizona State University West, Sch. of Mgmt., MC 2451, 4701 Thunderbird Rd., Phoenix, AZ 85069-7100, slotnick@asu.edu, ***Kathy A. Paulson Gjerde***, ***Matthew J. Sobel***

When technology changes, how much should a firm change its product from one version to the next? We present a computational study that augments previous theoretical work and leads to insights about when to make radical product changes and bundle innovations across features.

3) An Integrated Product Returns Model, ***Baris Yalabik***, University of Illinois, 350 Wohlers Hall, 1206 South 6th St., Champaign, IL 61820, yalabik@uiuc.edu, ***Dilip Chhajed***, ***Nicholas C. Petruzzi***

We develop an economic model for designing a product returns system that combines logistical efficiency with marketing effectiveness. After establishing the optimal refund policy for given levels of marketing and logistics efforts, we solve for the optimal investments in marketing and logistics to maximize profits of the retailer.

4) A DEA-Type Procedure for Benchmarking Medical Treatment Processes, ***Robert E. Stanford***, University of Alabama, Dept. of FEQM, Sch. of Business, Birmingham, AL 35294-4460, stanford@uab.edu

We apply LP-based frontier methodology to define and develop efficiency measures for benchmarking hospital performance in the treatment of heart attack patients. Inputs for the process are the rates of proper recognition of 6 standard treatment processes and the output is an ordinal ranking of individual hospital performance scores.

SA39 George B. Dantzig Dissertation Finalists' Presentations

Prize Session

Chair: Tava Lennon Olsen, Washington University, Olin Sch. of Bus., CB 1133, 1 Brookings Dr., St. Louis, MO 63130-4899, olsen@olin.wustl.edu

1) Composite Variable Formulations for Express Shipment Service Network Design, ***Andrew P. Armacost***, USAFA/DFM, 2354 Fairchild Dr., USAFA, CO 80840, andy.armacost@usafa.af.mil, ***Cynthia Barnhart***

We consider large-scale network design problems, specifically the problem of designing the air network of an express shipment (i.e., overnight) delivery operation. We focus on simultaneously determining the route structure, the assignment of fleet types to routes and the flow of packages on aircraft.

2) An Optimization Algorithm for the Inventory Routing Problem & its Implementation at a Large Supermarket Chain, ***Vishal Gaur***, NYU, Stern Sch. of Bus., Dept. of Op. Mgmt., vgaur@stern.nyu.edu, ***Marshall Fisher***

We present an algorithm for the inventory routing problem in a distribution network for a private truck fleet delivering from a central location to multiple stores and describe its implementation at a supermarket chain. The algorithm is optimal for a restricted class of policies and has resulted in significant cost savings.

3) Modeling Critically Ill Patients with Data Envelopment

Analysis, ***Brian Nathanson***, 25 Willow Circle, Longmeadow, MA 01106, brian.h.nathanson@att.net, ***Richard J. Giglio***

Critically ill patients suffering from either closed head trauma or septic shock were studied retrospectively and the mathematical programming technique of DEA was used to develop models to offer physicians a deeper understanding of an individual patient's progress in an ICU.

SA40 Optimization in Energy I

Cluster: Energy
Sponsor: ENRE
Sponsored Session
Chair: Steven A. Gabriel, University of Maryland, Dept. of Civil & Environ. Eng., 1143 Martin Hall, College Park, MD 20742-3021, sgabriel@eng.umd.edu

1) withdrawn 10/15: The Retail Electrical Power Marketer's Problem, ***Steven A. Gabriel***, University of Maryland, Dept. of Civil & Environ. Eng., 1143 Martin Hall, College Park, MD 20742-3021, sgabriel@eng.umd.edu, ***Mehmet F. Genc***, ***S. Balakrishnan***

2) A Model of Parking & Lending Service for Natural Gas Storage, ***Huagang Li***, Lukens Energy Group, Houston, TX, hli@lukensgroup.com

Many natural gas storages provide the so-called parking and lending service. This service is a right to inject gas in a certain month and withdraw in a certain future month. The revenue of such service is dependent on the forward price curve and its movement, therefore is stochastic. The provider of such service makes dynamic decisions on when to offer the service, on which pairs of months...

3) Nash-Cournot & Conjectured Supply Function Equilibria in Power Markets on a Linearized DC Network with Arbritrage, ***Jong-Shi Pang***, JHU, Dept. of Math Sci., Baltimore, MD, jsp@vicp1@mts.jhu.edu, ***Benjamin F. Hobbs***, ***Carolyn B. Metzler***, ***Christopher J. Day***

We present market models for a linearized DC network with affine demand. The models differ in how arbitrage is handled and the conjectured response of rival firms. In Stackelberg version, the producers anticipate how arbitrage affects prices at different locations in the other version, arbitrage is exogenous to the firm.

4) Evaluating Individual Market Power in Electricity Markets with Agent-Based Simulation, ***Fernando S. Oliveira***, London Business School, Sussex Place, Regent's Park, London, Nw1 4SA, UK, foliveira@london.edu, ***Derek W. Bunn***

We analyze the implications of learning processes and strategic interaction on market power using agent-based simulations. We present a recent case study on the England and Wales electricity market which was part of a Competition Commission Inquiry into whether 2 particular "small" generators could profitably influence wholesale prices.

SA41 Panel: The Academic Job Search for PhD Students

Sponsored Session
Chair: Russell D. Meller, Virginia Tech., Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, rmeller@vt.edu

1) Panel: The Academic Jobs/Search for PhD Students, ***Russell D. Meller***, Virginia Tech., Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, rmeller@vt.edu, ***Leslie O. Morgan***, University of Utah, 1645 East Campus Center Dr., Salt Lake City, UT 84112, mgtlm@business.utah.edu, www.business.utah.edu/~mgtlm/, ***Lawrence W. Robinson***, Cornell University, Johnson Grad. Sch. of Mgmt., 433 Sage Hall, Ithaca, NY 14853-6201, lwr2@cornell.edu, ***Zelda B. Zabinsky***, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195-2650, zelda@u.washington.edu

Come to the two Job Placement Committee panel discussions Sunday morning before heading to the Job Placement Services Job Fair in the afternoon. We will discuss the basic interview process and do's and don'ts associated with the job search.

SA43 Education I

Contributed Session
Chair: Douglas A. Bodner, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, douglas.bodner@isye.gatech.edu

1) Computational Learning Environments for the Undergraduate Curriculum: The Virtual Industrial System, ***Douglas A. Bodner***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, douglas.bodner@isye.gatech.edu, ***Jane C. Ammons***, ***Marc Goetschalckx***, ***T. Govindaraj***, ***Leon McGinnis***, ***Spyros A. Reveliotis***, ***Gunter P. Sharp***, ***Chen Zhou***

Recent advances in computer technology have facilitated the use of active learning in the IE/OR curriculum. We discuss computational lab exercises that teach concepts such as forecasting, production planning and facility design. The goal is to create a web-based "virtual industrial system" that provides realistic case data, based on an underlying object model, as well as capability for exploration and experimentation.

2) withdrawn 10/15: An Intuitive Approach to Hypothesis Testing, ***Ismael G. Dambolena***, Babson College, Math/Sci. Division, Babson Park, MA 02457, damabolena@babson.edu, ***Steven E. Eriksen***, ***Denise Troxell***

3) Impacts of Human-Simulation & Human-Human Interaction on Task Performance & Learning, ***Hassan Qudrat-Ullah***, National University of Singapore, NUS Bus. Sch., 15 Law Link, FBA-1, Singapore, 117591, Singapore, fbaquh@nus.edu.sg, ***Jacob Lee***

Experimental research on the effects of major factors of a computer simulation-based interactive learning environment on task performance and learning is reviewed. A descriptive model of the impacts of decision-maker, decision-task, decision-making environment and facilitator factors is constructed. Human-simulation and human-human interactions appear crucial to optimal performance and learning.

SA44 Decision Support Systems I

Contributed Session
Chair: Don Petkov, University of Natal Pietermaritzburg, Sch. of Maths & IT, Private Bag X01, Scottsville, KZN, 3209, South Africa, petkov@comp.unp.ac.za

1) Web DSS on Technology Innovation for Small Businesses, ***Don Petkov***, University of Natal Pietermaritzburg, Sch. of Maths & IT, Private Bag X01, Scottsville, KZN, 3209, South Africa, petkov@comp.unp.ac.za, ***Olga Petkova***, ***Mohamed Keeka***

Technology innovation issues are difficult to manage within small businesses. We report on a web-based DSS for this purpose. The relevant issues of the user interface are discussed as well as the capabilities of a DSS using SMART on the choice of technologies and direction of product development.

2) Least Cost Design of Drinking Water Treatment Plants Considering Variability & Uncertainty, ***Dominic L. Boccelli***, Carnegie Mellon University, Dept. of Civil & Environ. Eng., 5000 Forbes Ave., Pittsburgh, PA 15213, dominicb@andrew.cmu.edu, ***Urmila Diwekar***, ***Mitchell J. Small***

The design of drinking water treatment plants typically assumes known influent and model parameter values. Practically, the design must accommodate influent variability and parameter uncertainty. We present a framework for the least cost design of treatment plants considering variability and uncertainty and investigate the importance of variable and uncertain parameters.

3) withdrawn 10/1: Decision Support by Generalized Data Envelopment Analysis, ***Yeboon Yun***, Kagawa University, 2217-20 Hayashicho, Takamatsu, Kagawa, 761-0396, Japan, yun@eng.kagawa-u.ac.jp, ***Hirotaka Nakayama***, ***Masao Arakawa***

4) On-Line Machine Diagnosis using Adaptive Decision Tree Learning, ***Jun-Geol Baek***, Korea University, Dept. of IE, 1 5-Ga, Anamdong, Sungbuk-ku, Seoul, 136-701, Korea, jgbaek@korea.ac.kr, ***Chang-Ouk Kim***, ***Sung-Schick Kim***

Most contemporary research works on machine diagnosis aim at extracting the operational patterns of machine from a fixed set of training data. This static learning paradigm would be very hard to successfully apply to on-line learning situations. We consider on-line machine diagnosis, for which a new adaptive, computationally efficient decision tree learning method is developed.

SA45 Scheduling V

Contributed Session
Chair: Robert A. Russell, University of Tulsa, 600 South College Ave., Tulsa, OK 74104, rrussell@utulsa.edu

1) Scheduling Sports Competitions on Multiple Venues, ***Robert A. Russell***, University of Tulsa, 600 South College Ave., Tulsa, OK 74104, rrussell@utulsa.edu, ***Timothy L. Urban***

We consider the scheduling and balancing of sports competitions that take place on several venues. An integer goal program is developed to construct a schedule

present a model to study the impact of quality differentiation in remanufacturing systems.

2) Revenue Management, ***Kevin Geraghty***, Revenue Research, Inc., 715 Denards Mill, Marietta, GA 30067, kevin@revenueresearch.com, www.revenueresearch.com

Revenue management is a pricing strategy developed by the travel industry in response to electronic distribution of virtual inventory by reservations systems. These techniques are now being successfully used by financial services, logistics and many other industries. We look at the key concepts that make these techniques so effective.

3) Vehicle Assignment & Navigation System, ***Jacky C. Wong***, Chinese University of Hong Kong, SE/EM Dept., Shatin NT, Hong Kong, cfwong@se.cuhk.edu.hk, ***Tze Wa Fung***, ***Chun-Hung Cheng***, ***Janny M. Y. Leung***

We describe a map-based vehicle assignment and navigation system (VANS) for delivery route planning. The system includes an interactive point-and-click multi-layered digital map. Functions include shortest-path evaluations, delivery planning, report generation, animated route display and manual adjustment.

4) Stochastic Approaches for Strategic Airline Fleet Planning, ***Ovidiu Listes***, Erasmus University Rotterdam, Econometrics & OR Dept., PO Box 1738, Rm. H11-02, Rotterdam, 3000 DR, The Netherlands, listes@few.eur.nl

In the airline industry, profit margins are under tremendous pressure. Therefore, a robust fleet composition is desirable at strategic levels. We consider a fleet assignment case with stochastic demands and emphasize the significant expected improvement generated by the stochastic solution as compared with the usual solution based on average demands.

SA20 Operations Management I

Contributed Session

Chair: Mohsen ElHafsi, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, mohsen.elhafsi@ucr.edu

1) Transporting & Managing Inventories of Liquid Chemicals using Oceangoing Vessels, ***Mohsen ElHafsi***, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, mohsen.elhafsi@ucr.edu, ***Abdelghani A. Elimam***, ***Bajis M. Dodin***

We determine the optimal schedule for shipping liquid chemicals using tanker ships while meeting product demands and ensuring the ship trim stability. The shipping schedule includes the number of trips taken between source and destination ports and product assignments to ship compartments in each trip. Our objective is to minimize the sum of product inventory holding/backlog costs...

2) withdrawn 10/15: An Operational Efficiency Model of an Assembly Cell & Assembly Line for Configure-to-Order Manufacturing, ***Jia Hua Weng***, Waseda University, 51-14-07, 3-4-1 Okuba, Shinjuku-ku, Tokyo, 169-8555, Japan, jiahua@ims.mgmt.waseda.ac.jp, ***Keisuke Takita***, ***Hisashi Onari***

3) A Decision Model for the Operational Control of Time-Constrained New Product Development Processes, ***Andreea B. Dragut***, Eindhoven University of Technology, Den Dolech 2, PO Box 513, Eindhoven, 5600 MB, The Netherlands, a.b.dragut@tm.tue.nl

To generate/respond to new information during development, the uncertainty in the new product definition is repeatedly solved as a function of the expected market payoff in a Markov decision model. Considering as given the delivery time, and the resources, at each decision point one can increase/decrease product performance or abandon it.

SA21 Manufacturing I

Contributed Session

Chair: Penny M. Leahy, RPI, 22 Warren Terrace, West Hartford, CT 06119, leahyp@pweh.com

1) A Manufacturing Cell Efficiency Study, ***Penny M. Leahy***, RPI, 22 Warren Terrace, West Hartford, CT 06119, leahyp@pweh.com

Discrete even simulation can assist in the design of more efficient manufacturing cells. We report on the use of DES modeling to investigate the performance of a manufacturing cell which is experiencing problems meeting schedule requirements. Simulation has suggested new strategies to improve cell performance and reduce waste.

2) Modeling a Generic Assembly System, ***Liesje De Boeck***, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, 2000, Belgium, liesje.deboeck@ua.ac.be, ***Nico J. Vandaele***

We focus on the modeling of a generic assembly system, consisting of 2 equally generally distributed input processes and infinite buffers. A kit consists of one unit of each input process. We obtain approximations for the synchronization times of components and the interarrival times of kits at the assembly machine.

3) A Model & Simulation for Remanufacturing, ***Shingo Funaki***, Waseda University, 3-4-1 Ohkubo Shinjuku-ku, Tokyo, 169-8555, Japan, 600b562@mn.waseda.ac.jp, ***Naoto Yatagai***, ***Hisashi Onari***

To predict returns, abandonment action should be expressed. As it would be affected by wear in use and appearance of new products, we propose a method to measure these 2 factors. We clarify the relationship between the user action and product's worth, which is decrease by these 2 factors.

4) A Game-Theoretic Perspective on Transaction Cost & the Decision to Make, Buy or Make-&-Buy, ***Wei Shi Lim***, National University of Singapore, 15 Law Link, FBA I, Singapore, 117591, Singapore, fbalimws@nus.edu.sg, ***Khai Sheang Lee***

We examine a firm's outsourcing decision over time. We identify specific learning and the salvageability of specific learning by suppliers as reasons for a firm to adopt a make-and-buy strategy, even when outsourcing is less costly initially. We show that when the specific learning effect is high, the firm follows a make-and-buy strategy, capitalizing on the cost savings in buying...

SA22 Supply Chain Risk Management & Coordination

Cluster: Supply Chain Management
Invited Session

Chair: Ioannis S. Papadakis, Drexel University, Dept. of Dec. Sci., Philadelphia, PA 19104, ioannis_papadakis@drexel.edu

1) Capacity Options in Capital Intensive Industries, ***Paul R. Kleindorfer***, University of Pennsylvania, The Wharton School, Philadelphia, PA 19104, kleindorfer@wharton.upenn.edu

We address a cyclic CONWIP flowshop problem and include 2 additional features over an earlier study: stochastic job processing times and limited storage space in between the machines. An iterative procedure is presented to determine the optimal WIP level and permutation schedule.

2) Online Reputation Systems: A Powerful Risk Management Asset for Open Supply Chains, ***MIT Dellarocas***, MIT, Sloan Sch. of Mgmt., E53-315, Cambridge, MA 02139, dell@mit.edu

A significant issue in flexible supply chains is the assessment of operational risks associated with new partners and processes. We argue that an impartial infomediary, which collects feedback from past transactions of an entire community and aggregates them into unbiased assessments of partner trustworthiness, can be a powerful risk management asset that benefits the entire community.

3) Models of Disruption Dynamics for PC Supply Chains, ***Ioannis S. Papadakis***, Drexel University, Dept. of Dec. Sci., Philadelphia, PA 19104, ioannis_papadakis@drexel.edu

Two models are developed for dynamic analysis of push and pull supply chains. Input price shocks arising after abrupt supply chain disruptions are analyzed. The usual pattern in the price of PC components is modeled as the sum of a downward drifting mean (Moore's law) and an Ito process.

4) Prescriptive Strategies for Contract Manufacturing in Supply Chains, ***Robert H. Burgess***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, robert.burgess@mgt.gatech.edu, ***Craig A. Hill***

We explore contract manufacturing companies and their influence on the supply chain. From case studies, inferences about supply chain performance improvements are highlighted. A model prescribing affects that a properly aligned contract manufacturer may have on the achievement of their customer's priorities is included.

5) An Analysis of Supply Chain Coordination Activities, ***Craig A. Hill***, Georgia State University, Robinson Sch. of Bus., PO Box 4014, Atlanta, GA 30302-4014, chill4@gsu.edu, ***Gary D. Scudder***

We present an empirical-based analysis of the use of coordination activities between supply chain members. Contrasts between the use of these activities with customers and with suppliers are highlighted. Further analysis between the use of coordination activities and measures of a firm's performance is included.

SA23 Supply Chain Management

Contributed Session

Chair: Paul Brown, Georgia State University, 35 Broad St., Atlanta, GA 30303, paul.d.brown@att.net

1) withdrawn 10/12: Comparing Pure & Modified Base-Stock

Policies for Ideal Assemble-to-Order Systems, ***Ton G. de Kok***, Technische Universiteit Eindhoven, Den Dolech 2, PO Box 513, Paviljoen F4, Eindhoven, 5600 MB, The Netherlands, a.g.d.kok@tm.tue.nl

2) An Optimal Purchase Contract with Uncertain Cost & Demand Forecast Updating, ***Hua Xiang***, Chinese University of Hong Kong, Dept. of SE/EM, Shatin NT, Hong Kong, China, hxiang@se.cuhk.edu.hk, ***Houmin Yan***, ***Hanqin Zhang***, ***Suresh P. Sethi***

We are concerned with the optimal ordering policies for a retailer who has 2 instants to order a seasonal product from a manufacture prior to a single selling season in a contracted framework. The optimal order quantity at each instant are developed.

3) A Simulation-Based Approach to Study Stochastic Inventory Planning Games, ***Jaideep J. Rao***, University of South Florida, Tampa, FL 33620, jjrao2@eng.usf.edu, ***Kiran K. Ravulapati***, ***Tapas K. Das***

A machine learning algorithm-based methodology to solve non-0 sum stochastic game problems that are modeled as competitive Markov decision process is presented and tested on a multiple retailer supply-chain inventory management problem. The methodology shows significant promise in effectively finding equilibrium policies and also in evaluating short-term rewards of stochastic games.

4) Diffusion of Electronic Exchanges: Impact on the E-Procurement Process, ***Paul Brown***, Georgia State University, 35 Broad St., Atlanta, GA 30303, paul.d.brown@att.net

The procurement function is becoming an increasingly strategic importance to organizations however,inefficiencies abound. A promising solution for these inefficiencies has been the development of electronic exchanges. Despite their proposed advantages, the adoption and diffusion of these systems have been slow. We investigate the issues that have affected the adoption and dissemination of electronic exchanges.

SA24 Supply Chain Management I

Contributed Session

Chair: Tsan-Ming Choi, Chinese University of Hong Kong, Ho Sing Hang Eng. Bldg., Rm. 116, Shatin NT, Hong Kong, tmchoi@se.cuhk.edu.hk

1) Mean-Variance Formulations for Supply Chain Management, ***Tsan-Ming Choi***, Chinese University of Hong Kong, Ho Sing Hang Eng. Bldg., Rm. 116, Shatin NT, Hong Kong, tmchoi@se.cuhk.edu.hk, ***Duan Li***, ***Houmin Yan***

Most research of supply chain management with stochastic demand focuses solely on the optimization objective of expected measures. The variance of the measures and the decision maker's preference are often ignored. We develop mean-variance decision frameworks for supply chain management under which tailor-made optimal managerial decisions can be made.

2) A Single-Period Inventory Placement Problem for a Serial Supply Chain with the Profit Attainment Objective & Positive Lost Sales Costs, ***James O. Flynn***, Cleveland State University, 1801 East 12th St., Cleveland, OH 44114, j.flynn@popmail.csuohio.edu, ***Chia-Shin Chung***, ***Piotr Stalinski***

We study a single-period serial supply chain, where the objective is to maximize the probability of achieving a budgeted profit level. Assuming positive lost sales costs, there exists an optimal stock vector with at most 3 positive components. We characterize its properties and provide an algorithm.

3) A Stochastic Model of a Purchase-Production-Sale Chain: Analysis of Global Performance Measures, ***Zhao Xiaobo***, Tsinghua University, Sch. of Economics & Mgmt., Beijing, 100084, China, zhaoxb@em.tsinghua.edu.cn, ***Deju Xu***, ***Hanqin Zhang***

We consider a PPS chain that consists of suppliers, a mixed-model assembly line (MMAL) and retailers. The MMAL comprises a set of workstations in series, each of which performs tasks of assembling specified components, to produce products with a variety of models. Every supplier delivers one kind component to the corresponding workstation on the MMAL, with the WIPs controlled by a Kanban mechanism...

4) Measuring Costs & Benefits from Forecast Sharing in the Case of Customized Production Equipment, ***Justin Z. Ren***, University of Pennsylvania, Wharton School, OPIM Dept., 1300 SH-DH 3620 Locust Walk, Philadelphia, PA 19104, justinren@wharton.upenn.edu, ***Morris A. Cohen***, ***Teck-Hua Ho***, ***Christian Terwiesch***

Facing long manufacturing lead time for customized production equipment, a supplier needs to decide when to begin the fulfillment of the order, even before she receives firm orders. Utilizing detailed data, we find the supplier focuses on minimizing cancellation and holding cost, which negates the effectiveness of forecast sharing mechanism.

5) A Single-Period Inventory Placement Problem for a Serial Supply Chain with the Profit Attainment Objective & Zero Lost Sales Costs, ***Chia-Shin Chung***, Cleveland State University, 1860 East 18th St., Cleveland, OH 44114, c.chung@csuohio.edu, ***James O. Flynn***, ***Piotr Stalinski***

We study a single-period serial supply chain, where the objective is to maximize the probability of achieving a budgeted profit level. Assuming 0 lost sales costs, an optimal stock vector places as much stock as possible in the downstream stages. We characterize its properties and provide an algorithm.

SA25 Scheduling in Computer & Manufacturing Systems

Cluster: Scheduling
Invited Session

Chair: Eric V. Denardo, Yale University, Dept. of OR, PO Box 208267, New Haven, CT 06520-8267

1) Manufacturing Logistics Scheduling: Coordination between Two-Stage Functions, ***Yung-Chia Chang***, Texas A&M University, Dept. of IE, 238 Zachry Bldg., College Station, TX 77843-3131, jasmine@tamu.edu, ***Chung-Yee Lee***

We study a problem that jointly considers the issue of machine scheduling and finishing product delivery. Different from the existing results found in literature, we consider the problems where each job occupies different physical size on a vehicle when delivered from the manufacturing facility to customers.

2) withdrawn 10/9: A Metaheuristic Method for a Real FMS, ***Malgorzata Sterna***, Poznan Institute of Technology, Inst. of Computing Sci., ul. Piotrowo 3A, Poznan, 60-965, Poland, malgorzata.sterna@cs.put.poznan.pl, ***Jacek A. Blazewicz***, ***Erwin Pesch***

3) Index Policies for Stochastic Search in a Forest with an Application to R&D Project Management, ***Eric V. Denardo***, Yale University, Dept. of OR, PO Box 208267, New Haven, CT 06520-8267, ***Uriel G. Rothblum***, ***Ludo Van Der Heyden***

A stochastic search problem in a forest is shown to have a simple solution: an index (ratio) is assigned to each edge such that expected utility is maximized by attempting, at each opportunity, an edge whose index is most positive. This result is achieved for linear and exponential utility functions.

4) withdrawn 10/9: Suboptimal Approaches to Scheduling Malleable Tasks, ***Jacek A. Blazewicz***, Poznan University of Technology, Inst. of Computing Sci., ul. Piotrowo 3a, Poznan, 60-965, Poland, blazewic@put.poznan.pl, ***Maciej Machowiak***, ***Gregory Mounie***, ***Denis Trystram***

SA26 Cash Flow Analysis in Project Scheduling

Cluster: Project Management
Invited Session

Chair: Gunduz Ulusoy, Sabanci University, Fens, Orhanli, Tuzla, Istanbul, 81474, Turkey, gunduz@sabaniciuniv.edu

1) Minimizing the Weighted Flow Time of Projects with In-Flows & Out-Flows, ***Joseph G. Szmerekovsky***, Case Western Reserve University, WSOM, Dept. of Operations, 10900 Euclid Ave., Cleveland, OH 44106-7235, jgs7@po.cwru.edu, ***George L. Vairaktarakis***

We consider the project scheduling problem of minimizing total weighted flow time with unrestricted weights (representing cash in- and out-flows) and due dates for activities. We describe the structure of an optimal solution and provide an efficient algorithm.

2) Linear Time-Dependent Cash Flows in Project Networks: An Enumeration Algorithm, ***Mario Vanhoucke***, Catholic University of Leuven, Dept. of Applied Econ., Op. Mgmt., Naamsestraat 69, Leuven, 3000, Belgium, mario.vanhoucke@econ.kuleuven.ac.be, ***Erik L. Demeulemeester***, ***Willy S. Herroelen***

We study the unconstrained project scheduling problem with discounted cash flows where the net cash flows are linear dependent on the completion times of the activities. The objective is to schedule the activities in order to maximize the net present value subject to the precedence constraints and a fixed deadline.

3) Payment Models for the Multi-Mode Resource Constrained Project Scheduling Problem with Discounted Cash Flows, ***Gunduz Ulusoy***, Sabanci University, Fens, Orhanli, Tuzla, Istanbul, 81474,

Turkey, gunduz@sabaniciuniv.edu, ***Funda Serifoglu-Sivrikaya***

Four payment models are considered for the project scheduling problem under scarce resources: lump sum payment at the terminal event, payments at prespecified event nodes, payments at prespecified time points and progress payments. The models are investigated at the hand of an example problem. Several sensitivity analyses are performed.

SA27 Some Issues in Continuous Quality Improvement

Cluster: Quality Management
Invited Session
Chair: M. Jeya Chandra, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, mjc3@psu.edu

1) Comparison of Some Process Adjustment Methods & their Integration with SPC Charts, ***Rong Pan***, Pennsylvania State University, Dept. of IME, University Park, PA 16802, rxp205@psu.edu, ***Enrique Del Castillo***

Several process adjustment techniques are discussed. We show that they can be unified by a Bayesian formulation (Kalman filter). Small-sample performance comparisons between these methods and discrete integral, also called EWMA, feedback control are provided. In conjunction with some commonly used control charts, these adjustment techniques are then applied on a manufacturing process...

2) Multivariate Capability Indices using Process-Oriented Basis Representations, ***Earnest J. Foster***, Pennsylvania State University, Dept. of IME, University Park, PA 16802, ejf131@psu.edu, ***Russell R. Barton***

Multivariate capability indices are examined as a diagnostic for process quality improvement. Using procces-oriented basis representations is a new approach to capability, allowing the computation of cause-related index values. Production irregularities are linked directly to their causes, allowing the efficient improvement of processes.

3) Justification of Investment in Measuring Equipment, ***M. Jeya Chandra***, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, mjc3@psu.edu, ***Hsu-Hua Lee***

A model for investment in test equipment will be developed. This investment can be related to the measurement variance and the proportion of nonconforming units among accepted items sent to the customer. This will affect the warranty cost and market share increase.

SA28 Combinatorics

Contributed Session
Chair: Steven B. Horton, US Military Academy, Dept. of Math. Sciences, West Point, NY 10996, steve-horton@usma.edu www.dean.usma.edu/math/people/horton/default.htm

1) Generating Computationally Difficult Set Covering Problems, ***Gerald L. Thompson***, Carnegie Mellon University, GSIA, 5000 Forbes Ave., Pittsburgh, PA 15213-3890, gt04@andrew.cmu.edu

The width of a 0-1 matrix is the objective value of a certain set covering problem. There are 2 principal ways of generating such problems using Kirkman numbers. We discuss recent results on generating both methods.

2) On the Complexity of Certain Completion Problems, ***Steven B. Horton***, US Military Academy, Dept. of Math. Sciences, West Point,NY10996,steve-horton@usma.eduwww.dean.usma.edu/math/people/horton/default.htm, ***R. Gary Parker***, ***Todd Easton***

Many combinatorial problems that are efficiently solvable are made more difficult by the imposition of a partial solution. For example, while the celebrated 4-color theorem guarantees that every planar graph can be 4-colored, if some of the vertices are colored as part of the instance, deciding if the remaining vertices can be properly colored with a total of 4 colors is NP-complete...

3) A Linear-Time Max-Cut Algorithm using Branch Decompositions, ***William A. Christian***, James Madison University, Coll. of Bus., MSC 0202, Harrisonburg, VA 22807, christwa@jmu.edu, http://chopsticks.cob.jmu.edu/~christwa

We present a linear-time algorithm for finding a node partition of a graph that maximizes the sum of the edges that cross the partition (max-cut). We present computational results as well as a description of the algorithmic framework for branch decomposition-based algorithms.

SA29 Tutorial: Data Mining through Activity Monitoring & Forecasting

Sponsor: QSR
Sponsored Session
Chair: Tom Au, Data Mining Group/AT&T Labs.

Co-Chair: Kwok L. Tsui, Georgia Institute of Technology, Sch. of ISYE, Atlanta, GA 30332, ktsui@isye.gatech.edu

1) Tutorial: Data Mining through Activity Monitoring & Forecasting, ***Tom Au***, Data Mining Group/AT&T Labs., ***Kwok L. Tsui***

We discuss activity monitoring for detection of interesting events that require actions, such as customer churn and fraud detection and forecasting methods for predicting sales and revenue. We will cover various topics in market segmentation, customer profiling, customer retention, activity detection, forecasting strategy and time series modeling.

SA30 Decision Analysis Computation

Sponsor: Decision Analysis
Sponsored Session
Chair: Ross D. Shachter, Stanford University, MSE Dept., Terman Engineering Ctr., Stanford, CA 94305-4026, shachter@stanford.edu

1) Data Mining at Microsoft, ***David E. Heckerman***, Microsoft Research, One Microsoft Way, 9S/1024, Redmond, WA 98052-6399, heckerma@microsoft.com

I will discuss data mining tools developed over the last decade at Microsoft Research. Some of these tools appear in SQL Server 2000 and Commerce Server 2000. Others will ship in future Microsoft products. I will illustrate the use of these tools using data from domains including web navigation, ecommerce, TV viewing and movie preferences.

2) Sequential Valuation Networks, ***Riza Demirer***, Kansas University Business School, Summerfield Hall, 1300 Sunnyside Ave., Lawrence, KS 66045-7585, riza@ku.edu, ***Prakash P. Shenoy***

We will describe a new technique for representing and solving asymmetric decision problems. Our technique is a hybrid of the best features of sequential decision diagrams and valuation networks and it succeeds in overcoming the weaknesses of these 2 techniques.

3) Principle-Agent Value Alignment, ***Daniel Shapiro***, Institute for the Study of Learning & Expertise, 2164 Staunton Ct., Palo Alto, CA 94306, dgs@stanford.edu, ***Ross D. Shachter***

In a principal-agent problem the principal seeks to motivate the actions of an agent through incentives. We identify necessary and sufficient conditions for establishing trust between the principal and agent, even when they perceive the world in incommensurate terms, such as when the agent is a technological artifact.

SA31 Panel: Recent Developments in Group Decision & Negotiation

Sponsor: Group Decision & Negotiation
Sponsored Session
Chair: Melvin F. Shakun, NYU, Stern Sch. of Bus., 44 West 4th St., New York, NY 10012-1126, mshakun@stern.nyu.edu

Co-Chair: D. Marc Kilgour, Wilfrid Laurier University, Dept. of Math, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@wlu.edu

1) Panel: Recent Developments in Group Decision & Negotiation, ***Gregory Kersten***, Concordia University, Molson Sch. of Bus., 1455 de Maisonneuve Blvd. West, Montreal, Quebec, H3G 1M8, Canada, gregory@mercato.concordia.ca, ***D. Marc Kilgour***, Wilfrid Laurier University, Dept. of Math, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@wlu.edu, ***Melvin F. Shakun***, NYU, Stern Sch. of Bus., 44 West 4th St., New York, NY 10012-1126, mshakun@stern.nyu.edu, ***Peri H. Iz***, Health Care Finance Administration, Office of Strategic Planning, 7500 Security Blvd, MS C31926, Baltimore, MD 21244, izperi@hcfa.gov

This panel session will discuss recent developments in GDN. Panelists will make opening remarks followed by panel discussion with audience participation.

SA32 Finance: Risk Management

Contributed Session

Chair: John M. Charnes, University of Kansas, Sch. of Business, 345 Summerfield Hall, Lawrence, KS 66045, jmc@ku.edu

1) Measuring Hedge Effectiveness for FAS 133 Compliance, ***John M. Charnes***, University of Kansas, Sch. of Business, 345 Summerfield Hall, Lawrence, KS 66045, jmc@ku.edu, ***Paul Koch***, ***Henk Berkman***

Under FAS 133, businesses qualify for hedge accounting treatment only if they document the expectation that their hedging strategy will be highly effective. We derive a new measure to help document this expectation and compare it to other proposed measures.

2) withdrawn 9/20: Managing Electricity Reliability Risk through the Markets, ***Afzal S. Siddiqui***, University of California/ Berkeley Lab, 1 Cyclotron Rd., MS 90-400, Berkeley, CA 94720, afzal@ieor.berkeley.edu

3) A Mean-Conditional VaR Model & the Second Order Stochastic Dominance, ***Weidong Lin***, NUS, SoC 3 Science Dr. 2, Singapore, 117543, Singapore, dislinwd@nus.edu.sg, ***Kang Hoh Phua***, ***Daohua Ming***

A mean-conditional VaR model, a mean-downside risk model, is attracting the attention of many practitioners and academics in portfolio management practices. We aim to study the relation between this model and stochastic dominance. We obtain a significant result that the portfolios on the efficient frontier generated by mean-conditional VaR model are efficient in the sense of the second order stochastic dominance.

4) Real Options Valuation in the Multi-Period Base-Stock Problem, ***Peter Berling***, Lund University, Box 118, Lund, 22100, Sweden, peter.berling@iml.lth.se

A multi-period base-stock problem with a financial risk associated with stochastic demand has been considered. A dynamic programming algorithm for finding the optimal policy, a state-dependent order-up-to-S policy, is presented. The optimal policy is then compared with heuristic methods. This study indicates that the effect of financial risk is negligible.

5) Development of a Hybrid Model for Electrical Power Spot Price, ***Lindsay Anderson***, University of Western Ontario, Dept. of Applied Math, London, Ontario, N6A 5B7, Canada, landerson@uwo.ca, http://www.apmaths.uwo.ca/~landerso, ***Matt Davison***

We use electricity price data to motivate a stochastic price model for electricity different from existing models both because it directly models price and because it incorporates the partially predictable load time series. We use a preliminary version of this model to price simple electricity options.

SA33 Tutorial: Internet & Intranet in Acute Care Hospitals

Sponsor: Social Science Applications

Sponsored Session

Chair: Myron Hatcher, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, myron_hatcher@csufresno.edu

1) Tutorial: Internet & Intranet in Acute Care Hospitals, ***Myron Hatcher***, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, myron_hatcher@csufresno.edu

Two national surveys of Acute Care hospitals have been conducted in the last 5 years. This tutorial will focus on the impact of network technologies in health care. Topics will include systems analysis approaches such as business process reengineering, computerized decision modeling, user involvement and network staff support. Policies will be suggested for network technology transfer.

SA34 Using OR for Transit Operations & Customer Information

Sponsor: TSS

Sponsored Session

Chair: Rabi Mishalani, Ohio State University, Dept. of Civil & Environ. Eng., Columbus, OH 43210, mishalani.1@osu.edu

1) Information Critical Arcs for On-Line Routing, ***Baiyu Yang***, Pennsylvania State University, Dept. of Civ. & Environ. Eng., University Park, PA 16802, hxt14@psu.edu, ***Elise Miller-Hooks***

We present a mathematical formulation and heuristic procedure for selecting a subset of network arcs (due to monetary constraints), called information critical arcs, for which real-time travel information will be collected. A real-time routing algorithm is used in a stochastic, time-varying environment to provide path guidance given this real-time information. Solutions are evaluated.

2) Investigating Information Quality & Effectiveness of Alternative Real-Time Information Supply Strategies, ***Karthik Srinivasan***, Vanderbilt University, Dept. of Civil & Environ. Eng., 206B Jacobs Hall, Nashville, TN 37235, karthik.k.srinivasan@vanderbilt.edu, ***Ke Chen***

We investigate the effect of alternative information supply strategies on information quality and system performance. Specifically, differences between VMS-based information and in-vehicle devices are examined using simulation experiments. The performance of the information strategies under various driver response behaviors, incident rates and recurrent congestion conditions is reported.

3) Using Current Bus Location Information in Passenger Itinerary Planning, ***Mark Hickman***, University of Arizona, Civil Eng. & Eng. Mechanics, mhickman@engr.arizona.edu

Many transit agencies can monitor current bus locations. It is possible to use this information to inform passengers about better paths (itineraries) from their origin to their destination. Using stochastic and time-dependent shortest paths, we present an algorithm for generating passenger itineraries that uses real-time bus location information.

4) Effects of Demand Patterns & Bus Holding on Real-Time Passenger Information, ***Rabi Mishalani***, Ohio State University, Dept. of Civil & Environ. Eng., Columbus, OH 43210, mishalani.1@osu.edu, ***Mark McCord***, ***Chi-Ping Lam***

An evaluation methodology that quantifies the value of bus arrival information systems to passengers waiting at bus stops under various passenger arrival patterns and bus holding policies is presented. Transit demand and supply are modeled as a stochastic system with an operator providing optimal passenger information. Simulation results are discussed.

SA35 New Developments in Logistics & Transportation Planning

Sponsor: TSS

Sponsored Session

Chair: Zhi-Long Chen, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu

1) Planning Virtual Inventories, ***Apostolos N. Burnetas***, Case Western Reserve University, Dept. of Ops., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu, ***Ronald H. Ballou***

Supplying customer demand from alternate inventory locations when an item is out of stock at its primary stocking point creates a virtual inventory for that item. The expectation is that if more inventories can be drawn upon, the inventory for an item would be lower, the fill rate would be higher, or both. While generally true for safety stock, regular stocks, on the other hand, rise with such cross filling of demand...

2) Capacity & Flexibility Assessment of Transportation Systems, ***Denny Cho***, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, denny@seas.upenn.edu, ***Edward K. Morlok***, ***Zhi-Long Chen***

We review existing models and approaches for assessing capacity and flexibility of a transportation system. New models, metrics and solution approaches based on optimization and simulation will be presented.

3) Supply Chain Networks with Competition, ***Anna Nagurney***, University of Massachusetts, Isenberg Sch. of Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu, ***June Dong***, ***Ding Zhang***

We develop a framework for the formulation, analysis and computation of solutions to supply chain network problems with competition. We identify the network structure of the supply chain problem in equilibrium and utilize the variational inequality formulation for the prediction of the prices and shipments.

4) Vehicle Routing with Cross Docking, ***Zhi-Long Chen***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu, ***Hang Xu***

We consider vehicle routing problems where there are some cross docks available in the underlying network. An order can be either directly delivered without using a cross dock or delivered through a cross dock. We propose heuristics for solving such problems and analyze their asymptopic performance.

SA36 Crew Management I

Sponsor: Aviation Applications
Sponsored Session

Chair: Diego Klabjan, University of Illinois, Dept. of MIE, 140 ME Bldg., 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu

1) Modeling & Optimization of Large-Scale Bidline-Generation Problems, ***Tomas Gustafsson***, Carmen Systems Ltd., 1800 McGill College Ave., Ste. 2800, Montreal, Quebec, H3A 3J6, Canada, tomas.gustafsson@carmensystems.ca, ***Stefan E. Karisch***

Bidline-generation problem aims at constructing rosters for crew members that are productive and satisfy quality criteria such as regularity, robustness and fairness. We describe different approaches for modeling and optimizing bidline-generation problem using the Carmen crew rostering system combining Carmen's fully flexible rule modeling language with advanced column generation techniques.

2) Solving the Airline Crew Pairing Problem using the Least-Squares Primal-Dual Sub-Problem Method, ***Ellis L. Johnson***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ejohnson@isye.gatech.edu, ***Balaji Gopalakrishnan***

The airline crew pairing problem formulated as a set partitioning problem has many columns and is known to be highly degenerate. We discuss a least-squares primal-dual sub-problem method for solving this problem. This method is impervious to degeneracy and could lead to fewer iterations and better solution time for solving the crew pairing problem. We also discuss the computational issues involved.

3) Airport Ground Staff Scheduling, ***Niklas Kohl***, Carmen Consulting, Fruebjergvej 3, Kobenhavn, DK 2100, Denmark, niklas@carmen.se, ***Erik Hasselberg***

We consider the rostering of ground staff in a major international airport. Each staff member has a qualification profile and the tasks to be scheduled have different qualification requirements. The monthly rosters must satisfy a number of rules and staff bids should be satisfied whenever possible.

4) Recurrent Training Scheduling, ***Milind G. Sohoni***, Delta Technology, OR Dept., Atlanta, GA, milind.sohoni@delta.com, ***Glenn Bailey***, ***Kristi Martin***, ***Helen S. Carter***, ***Ellis L. Johnson***

Cockpit crews must undergo periodic recurrent training to maintain flight qualification. Recurrent training must be completed within a specified time window every year. Scheduling recurrent training is a very complex task for major airlines given all the contractual obligations, federal aviation rules, fleet mix, simulator and ground school availability. Furthermore, scheduling recurrent training often results in a large amount of trips dropped from pilot flying...

SA37 Revenue Management I

Sponsor: Revenue Management & Pricing
Sponsored Session

Chair: Garrett J. van Ryzin, Columbia University, Grad. Sch. of Bus., 412 Uris Hall, New York, NY 10027, gjv1@columbia.edu

1) Implementation of a Bilevel Model for Yield Management in the Airline Industry, ***Patrice Marcotte***, Universite de Montreal, DIRO, CP 6128, Succ. Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, marcotte@iro.umontreal.ca, ***Gilles Savard***, ***Jean-Philippe Cote***

We consider the problem of simultaneously determining a price schedule and a seat allocation policy for an airline. Our bilevel model, which is based on a disaggregate representation of demand, takes explicitly into account the competing routes available to the customers. We will discuss the implementation of a solution algorithm on a network of realistic size.

2) A Continuous-Time Fluid Dynamics Model for Dynamic Pricing, ***Soulaymane Kachani***, MIT, OR Ctr., 1 Amherst St., Cambridge, MA, kachani@mit.edu, ***Georgia Perakis***

Dynamic pricing has become very important in a variety of arenas including revenue management, inventory control and supply chain management. We present a continuous fluid dynamics model that includes joint pricing, production and inventory decisions in a multi-product environment. Our model incorporates the delay of price in affecting demand for non-perishable goods.

3) withdrawn 10/9: Product Design & Positioning of Yield Management Products, ***Kalyan Talluri***, Universitat Pompeu Fabra, Ramon Trias, Fargas 25-27, Barcelona, 08005, Spain, talluri@econ.upf.es

4) Joint Overbooking & Fare Class Allocation on a Network, ***Itir Z. Karaesmen***, Carnegie Mellon University, Grad. Sch. of Ind. Admin., 5000 Forbes Ave., Pittsburgh, PA 15213, itir@andrew.cmu.edu, ***Garrett J. van Ryzin***

We develop and analyze a method for jointly setting overbooking levels and fare-class allocations on a network. We prove the asymptotic optimality of the method and provide an efficient computational algorithm.

SA38 Business Applications I

Contributed Session

Chair: Mohamed Djerdjour, SUNY, School of Bus. & Economics, 101 Broad St., Plattsburgh, NY 12901, djerdjm@plattsburgh.edu

1) An Analytic Hierarchy Process Application for Project Evaluation, ***Mohamed Djerdjour***, SUNY, School of Bus. & Economics, 101 Broad St., Plattsburgh, NY 12901, djerdjm@plattsburgh.edu

We discuss the decision problem of the management team of a large organization that wants to evaluate bidding firms for a large development project. Faced with many bidders and many factors to include in the evaluation, the team wanted to determine which projects were most likely to succeed. We will present the AHP model developed together with the results of a practical application...

2) Should Product Innovation be Radical? A Computational Study, ***Susan Slotnick***, Arizona State University West, Sch. of Mgmt., MC 2451, 4701 Thunderbird Rd., Phoenix, AZ 85069-7100, slotnick@asu.edu, ***Kathy A. Paulson Gjerde***, ***Matthew J. Sobel***

When technology changes, how much should a firm change its product from one version to the next? We present a computational study that augments previous theoretical work and leads to insights about when to make radical product changes and bundle innovations across features.

3) An Integrated Product Returns Model, ***Baris Yalabik***, University of Illinois, 350 Wohlers Hall, 1206 South 6th St., Champaign, IL 61820, yalabik@uiuc.edu, ***Dilip Chhajed***, ***Nicholas C. Petruzzi***

We develop an economic model for designing a product returns system that combines logistical efficiency with marketing effectiveness. After establishing the optimal refund policy for given levels of marketing and logistics efforts, we solve for the optimal investments in marketing and logistics to maximize profits of the retailer.

4) A DEA-Type Procedure for Benchmarking Medical Treatment Processes, ***Robert E. Stanford***, University of Alabama, Dept. of FEQM, Sch. of Business, Birmingham, AL 35294-4460, stanford@uab.edu

We apply LP-based frontier methodology to define and develop efficiency measures for benchmarking hospital performance in the treatment of heart attack patients. Inputs for the process are the rates of proper recognition of 6 standard treatment processes and the output is an ordinal ranking of individual hospital performance scores.

SA39 George B. Dantzig Dissertation Finalists' Presentations

Prize Session

Chair: Tava Lennon Olsen, Washington University, Olin Sch. of Bus., CB 1133, 1 Brookings Dr., St. Louis, MO 63130-4899, olsen@olin.wustl.edu

1) Composite Variable Formulations for Express Shipment Service Network Design, ***Andrew P. Armacost***, USAFA/DFM, 2354 Fairchild Dr., USAFA, CO 80840, andy.armacost@usafa.af.mil, ***Cynthia Barnhart***

We consider large-scale network design problems, specifically the problem of designing the air network of an express shipment (i.e., overnight) delivery operation. We focus on simultaneously determining the route structure, the assignment of fleet types to routes and the flow of packages on aircraft.

2) An Optimization Algorithm for the Inventory Routing Problem & its Implementation at a Large Supermarket Chain, ***Vishal Gaur***, NYU, Stern Sch. of Bus., Dept. of Op. Mgmt., vgaur@stern.nyu.edu, ***Marshall Fisher***

We present an algorithm for the inventory routing problem in a distribution network for a private truck fleet delivering from a central location to multiple stores and describe its implementation at a supermarket chain. The algorithm is optimal for a restricted class of policies and has resulted in significant cost savings.

3) Modeling Critically Ill Patients with Data Envelopment

Analysis, ***Brian Nathanson***, 25 Willow Circle, Longmeadow, MA 01106, brian.h.nathanson@att.net, ***Richard J. Giglio***

Critically ill patients suffering from either closed head trauma or septic shock were studied retrospectively and the mathematical programming technique of DEA was used to develop models to offer physicians a deeper understanding of an individual patient's progress in an ICU.

SA40 Optimization in Energy I

Cluster: Energy
Sponsor: ENRE
Sponsored Session
Chair: Steven A. Gabriel, University of Maryland, Dept. of Civil & Environ. Eng., 1143 Martin Hall, College Park, MD 20742-3021, sgabriel@eng.umd.edu

1) withdrawn 10/15: The Retail Electrical Power Marketer's Problem, ***Steven A. Gabriel***, University of Maryland, Dept. of Civil & Environ. Eng., 1143 Martin Hall, College Park, MD 20742-3021, sgabriel@eng.umd.edu, ***Mehmet F. Genc***, ***S. Balakrishnan***

2) A Model of Parking & Lending Service for Natural Gas Storage, ***Huagang Li***, Lukens Energy Group, Houston, TX, hli@lukensgroup.com

Many natural gas storages provide the so-called parking and lending service. This service is a right to inject gas in a certain month and withdraw in a certain future month. The revenue of such service is dependent on the forward price curve and its movement, therefore is stochastic. The provider of such service makes dynamic decisions on when to offer the service, on which pairs of months...

3) Nash-Cournot & Conjectured Supply Function Equilibria in Power Markets on a Linearized DC Network with Arbritrage, ***Jong-Shi Pang***, JHU, Dept. of Math Sci., Baltimore, MD, jsp@vicp1@mts.jhu.edu, ***Benjamin F. Hobbs***, ***Carolyn B. Metzler***, ***Christopher J. Day***

We present market models for a linearized DC network with affine demand. The models differ in how arbitrage is handled and the conjectured response of rival firms. In Stackelberg version, the producers anticipate how arbitrage affects prices at different locations in the other version, arbitrage is exogenous to the firm.

4) Evaluating Individual Market Power in Electricity Markets with Agent-Based Simulation, ***Fernando S. Oliveira***, London Business School, Sussex Place, Regent's Park, London, Nw1 4SA, UK, foliveira@london.edu, ***Derek W. Bunn***

We analyze the implications of learning processes and strategic interaction on market power using agent-based simulations. We present a recent case study on the England and Wales electricity market which was part of a Competition Commission Inquiry into whether 2 particular "small" generators could profitably influence wholesale prices.

SA41 Panel: The Academic Job Search for PhD Students

Sponsored Session
Chair: Russell D. Meller, Virginia Tech., Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, rmeller@vt.edu

1) Panel: The Academic Jobs/Search for PhD Students, ***Russell D. Meller***, Virginia Tech., Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, rmeller@vt.edu, ***Leslie O. Morgan***, University of Utah, 1645 East Campus Center Dr., Salt Lake City, UT 84112, mgtlm@business.utah.edu, www.business.utah.edu/~mgtlm/, ***Lawrence W. Robinson***, Cornell University, Johnson Grad. Sch. of Mgmt., 433 Sage Hall, Ithaca, NY 14853-6201, lwr2@cornell.edu, ***Zelda B. Zabinsky***, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195-2650, zelda@u.washington.edu

Come to the two Job Placement Committee panel discussions Sunday morning before heading to the Job Placement Services Job Fair in the afternoon. We will discuss the basic interview process and do's and don'ts associated with the job search.

SA43 Education I

Contributed Session
Chair: Douglas A. Bodner, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, douglas.bodner@isye.gatech.edu

1) Computational Learning Environments for the Undergraduate Curriculum: The Virtual Industrial System, ***Douglas A. Bodner***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, douglas.bodner@isye.gatech.edu, ***Jane C. Ammons***, ***Marc Goetschalckx***, ***T. Govindaraj***, ***Leon McGinnis***, ***Spyros A. Reveliotis***, ***Gunter P. Sharp***, ***Chen Zhou***

Recent advances in computer technology have facilitated the use of active learning in the IE/OR curriculum. We discuss computational lab exercises that teach concepts such as forecasting, production planning and facility design. The goal is to create a web-based "virtual industrial system" that provides realistic case data, based on an underlying object model, as well as capability for exploration and experimentation.

2) withdrawn 10/15: An Intuitive Approach to Hypothesis Testing, ***Ismael G. Dambolena***, Babson College, Math/Sci. Division, Babson Park, MA 02457, damabolena@babson.edu, ***Steven E. Eriksen***, ***Denise Troxell***

3) Impacts of Human-Simulation & Human-Human Interaction on Task Performance & Learning, ***Hassan Qudrat-Ullah***, National University of Singapore, NUS Bus. Sch., 15 Law Link, FBA-1, Singapore, 117591, Singapore, fbaquh@nus.edu.sg, ***Jacob Lee***

Experimental research on the effects of major factors of a computer simulation-based interactive learning environment on task performance and learning is reviewed. A descriptive model of the impacts of decision-maker, decision-task, decision-making environment and facilitator factors is constructed. Human-simulation and human-human interactions appear crucial to optimal performance and learning.

SA44 Decision Support Systems I

Contributed Session
Chair: Don Petkov, University of Natal Pietermaritzburg, Sch. of Maths & IT, Private Bag X01, Scottsville, KZN, 3209, South Africa, petkov@comp.unp.ac.za

1) Web DSS on Technology Innovation for Small Businesses, ***Don Petkov***, University of Natal Pietermaritzburg, Sch. of Maths & IT, Private Bag X01, Scottsville, KZN, 3209, South Africa, petkov@comp.unp.ac.za, ***Olga Petkova***, ***Mohamed Keeka***

Technology innovation issues are difficult to manage within small businesses. We report on a web-based DSS for this purpose. The relevant issues of the user interface are discussed as well as the capabilities of a DSS using SMART on the choice of technologies and direction of product development.

2) Least Cost Design of Drinking Water Treatment Plants Considering Variability & Uncertainty, ***Dominic L. Boccelli***, Carnegie Mellon University, Dept. of Civil & Environ. Eng., 5000 Forbes Ave., Pittsburgh, PA 15213, dominicb@andrew.cmu.edu, ***Urmila Diwekar***, ***Mitchell J. Small***

The design of drinking water treatment plants typically assumes known influent and model parameter values. Practically, the design must accommodate influent variability and parameter uncertainty. We present a framework for the least cost design of treatment plants considering variability and uncertainty and investigate the importance of variable and uncertain parameters.

3) withdrawn 10/1: Decision Support by Generalized Data Envelopment Analysis, ***Yeboon Yun***, Kagawa University, 2217-20 Hayashicho, Takamatsu, Kagawa, 761-0396, Japan, yun@eng.kagawa-u.ac.jp, ***Hirotaka Nakayama***, ***Masao Arakawa***

4) On-Line Machine Diagnosis using Adaptive Decision Tree Learning, ***Jun-Geol Baek***, Korea University, Dept. of IE, 1 5-Ga, Anamdong, Sungbuk-ku, Seoul, 136-701, Korea, jgbaek@korea.ac.kr, ***Chang-Ouk Kim***, ***Sung-Schick Kim***

Most contemporary research works on machine diagnosis aim at extracting the operational patterns of machine from a fixed set of training data. This static learning paradigm would be very hard to successfully apply to on-line learning situations. We consider on-line machine diagnosis, for which a new adaptive, computationally efficient decision tree learning method is developed.

SA45 Scheduling V

Contributed Session
Chair: Robert A. Russell, University of Tulsa, 600 South College Ave., Tulsa, OK 74104, rrussell@utulsa.edu

1) Scheduling Sports Competitions on Multiple Venues, ***Robert A. Russell***, University of Tulsa, 600 South College Ave., Tulsa, OK 74104, rrussell@utulsa.edu, ***Timothy L. Urban***

We consider the scheduling and balancing of sports competitions that take place on several venues. An integer goal program is developed to construct a schedule

that satisfies a variety of conditions.

2) Heuristics for Family Scheduling Problems to Minimize Total Tardiness, ***Samarn Chantaravarapan***, Texas Tech University, IE Dept., 201 Indiana Ave., #301B, Lubbock, TX 79415, schantar@ttacs.ttu.edu, ***Milton L. Smith***

Family scheduling involves multiple job types where jobs are classified into specific families by their similarity characteristics. Setup occurs only when the 2 consecutive jobs are from different families. We consider the single machine family scheduling to minimize the total tardiness. The problem is considered NP-hard. We propose heuristics that can obtain good solutions within a reasonable time. Experimental results are presented.

3) The Orienteering Flow-Shop Scheduling Problem: A Genetic Algorithm, ***Fatih M. Tasgetiren***, University of Puerto Rico, Dept. of IE, PO Box 9043, Mayaguez, PR 00681-9043, m_fatih@rumac.uprm.edu, http://ininweb.uprm.edu:1941/m_fatih

We present a GA to solve the permutation flow-shop scheduling problem subject to prescribed time constraints, which can be formulated as a variant of the orienteering problem. The objective is to find a sequence or permutation of jobs that maximizes the sequence's total score subject to a given time budget. For this purpose, modified test problems from the literature are solved by the GA and the results are presented.

4) Search Neighborhoods for Generalized Nonregular Scheduling Problems, ***Selcuk Avci***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, selcuk@princeton.edu, ***Robert H. Storer***

We focus on a class of generalized dynamic nonregular scheduling problems in multi-machine production environments. We develop an adjacent pairwise interchange neighborhood that is a generalization of a well-known compact search neighborhood for the classic JSP. We propose several heuristic solution methods based on this search neighborhood.

SA46 Marketing I

Contributed Session

Chair: Sam Koslowsky, Harte Hanks, Inc., 260 Madison Ave., New York, NY 10016, samkos@aol.com

1) The Ten Deadly Data Mining Errors, ***Sam Koslowsky***, Harte Hanks, Inc., 260 Madison Ave., New York, NY 10016, samkos@aol.com

Data mining has taken on a life of it's own. Some marketers claim that data mining is the universal solution to their problems. Others see it replacing a trained analyst. We review fatal errors that can make the best data mining efforts useless and explain how all the hype is just that - hype.

2) On using Bayesian Analysis for Two-Stage Search in Direct Marketing, ***Chaim Meyer Ehrman***, Loyola University, 820 North Michigan Ave., Chicago, IL 60611, cehrman@luc.edu

Bayesian analysis can be used to generate posterior probabilities on sales likelihood for mailing lists. Mail order houses allow potential buyers to assess sales potential from mailing list using systematic sampling. Direct marketers can incorporate his/her own expertise to assign posterior probabilities and expected revenues per list before making the actual list selection.

3) An Optimal Dynamic Marketing Mix in a Dynamic Duopoly, ***Fouad El Ouardighi***, ESSEC Business School, Ave. Bernard Hirsch, BP 105, Cergy Pontoise, 95021, France, elouardighi@essec.fr

A Lanchester-structured marketing differential game model involving attraction factors (price and advetising) and one rejection factor (quality) is formulated. Some results are inferred from the proposed model, such as the open-loop Nash equilibrium strategies for price, advertising effort and product quality.

4) A Heuristic Approach to the Product Design Problem under Conjoint & Hybrid-Conjoint Analysis, ***Junying Wu***, University of Cincinnati, ML 130, Cincinnati, OH 45221, wujn@email.uc.edu, ***Jeffrey D. Camm***

We propose a heuristic technique to the new product design problem using data from conjoint and hybrid-conjoint analysis. The proposed method starts with feasible, multi-attribute product profiles and then uses local search procedures to identify a product profile for the share-of-choice problem in a competitive market.

Sunday 10:15-11:45

SB03 Doing Business in the Electronic Era: Three Perspectives

Sponsor: Information Systems
Sponsored Session

Chair: Ritu Agarwal, University of Maryland, Smith Sch. of Bus., College Park, MD 20742-1815, ragarwal@rhsmith.umd.edu

1) E-Business & Globalization: Managing Global Work, ***Kuldeep Kumar***, Florida International University, Coll. of Business Admin., BA 356, University Park, Miami, FL 33199, kumark@fiu.edu

The convergence of 3 trends - the global reach of the Internet, reliance on e-business models using the net as the business platform and global trade deregulation - is leading to the globalization of e-business. This in turn is manifested into technology-enabled global distribution of physical work (global supply chains), service work (outsourced back-office operations) and intellectual work (global R&D and software projects)...

2) Electronic Market Mechanisms to Support Business-to-Business Activities, ***Jonathan W. Palmer***, University of Maryland, Smith Sch. of Bus., Dec. & IT, 4348 Van Munching Hall, College Park, MD 20742, jpalmer@rhsmith.umd.edu

B2B connections offer a number of advantages for connecting both buyers and sellers. A growing number of companies are employing web-based applications and e-commerce to automate the purchasing of business goods and services. Broker, dealer, auction, exchange and multi-vendor catalog mechanisms offer a variety of different capabilities in terms of search costs, order execution, pricing and transaction frequency.

3) Recalibrating Digital Integration in Demand-Supply Networks, ***Arun Rai***, Georgia State University, E-Commerce Inst., 823 RCB Bldg, Robinson Coll. of Bus., Atlanta, GA 30080, arunrai@gsu.edu

End-to-end digital integration of the demand-supply network, if inappropriately conceptualized, can have a detrimental impact on market responsiveness and value generation. Major configurations of demand-supply networks and their digital integration stressors are identified. Managerial, technological and partnership solutions to transform configurations and achieve requisite digital integration levels are enumerated. Best practice illustrations are provided.

SB05 Tutorial: An Introduction to Analyses of Adaptive Stochastic Search Methods for Global Optimization

Invited Session

Chair: Zelda B. Zabinsky, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195-2650, zelda@u.washington.edu

1) Tutorial: An Introduction to Analyses of Adaptive Stochastic Search Methods for Global Optimization, ***Zelda B. Zabinsky***, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195-2650, zelda@u.washington.edu

SB06 Modeling the Evolving Communications Landscape

Sponsor: Telecommunications
Sponsored Session

Chair: Youngho Lee, Korea University, Ind. Systems & Info. Eng. Dept, Sung-Buk Ku, Anam-Dong 5-1, Seoul, 136-701, Korea, yhlee@korea.ac.kr

1) Telecommunications Considerations in dpLP: A Distributed Simplex Method, ***Gavriel Yarmish***, Brooklyn College, Dept. of CIS, 2900 Bedford Ave., Brooklyn, NY 11210, gyarmish@photon.poly.edu, ***Richard M. Van Slyke***

Today's revised simplex implementations do not support scalable, distributed extensions the original, standard form does. However, telecommunications programming used to connect processors must be done carefully. We use validated computing and communication performance models to establish the scalability of the IP programming used in our distributed simplex implementation.

2) The Optimal Policy of Heartbeat Communication for High-Availability in Cluster Systems, ***Chang-Won Ahn***, ETRI, 161 Gajeong-dong, Yuseong-gu, Daejeon, 305-350, South Korea, ahn@etri.re.kr, ***Eun-Ji Lim***

The high availability property of the cluster system is to provide customers with

stable services. One cluster member should fulfill its obligation of load balancer with a virtual IP for a service at any time. Other members should periodically check the availability of the current load balancer and quickly elect a new load balancer if a problem is found or the current load balancer becomes unavailable, with a minimum burden of cluster system.

3) Improving Telecommunication Network Performance by Incremental Demand Rerouting, ***Imran Ismail***, SMU, Dept. of EMIS, PO Box 750122, Dallas, TX 75275-0122, imran@engr.smu.edu

Network managers are reluctant to make wholesale changes to an established and reliable routing assignment. We develop a heuristic to address the path-assignment problem in this context, that takes a given feasible, but sub-optimal, solution and "re-optimizes" it via incremental improvements, each of which reroutes a small number of demands.

4) Modeling & Algorithms for Solving a Network Design Problem of the Optical Internet, ***Youngho Lee***, Korea University, Ind. Systems & Info. Eng. Dept, Sung-Buk Ku, Anam-Dong 5-1, Seoul, 136-701, Korea, yhlee@korea.ac.kr, ***Kugchang Kang***

We address some important design issues in deploying the optical Internet. In particular, we focus on the optimization modeling of the optical transport network including DWDM. By exploiting the inherent special structure of the problem, we develop an effective heuristic procedure. Some preliminary computational results are reported.

SB07 Data Mining

Sponsor: Computing
Sponsored Session
Chair: Edward A. Wasil, American University, Kogod Sch. of Bus., 4400 Massachusetts Ave. NW, Washington, DC 20016, ewasil@american.edu

Co-Chair: Bruce L. Golden, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, bgolden@rhsmith.umd.edu

1) Extreme Data Mining: What to do with a Flood of Training Data, ***Lawrence O. Hall***, University of South Florida, Dept. of CS & Eng., ENB 118, 4202 East Fowler Ave., Tampa, FL 33620, hall@csee.usf.edu, ***K. W. Bowyer, N. Chawla, T. Moore, Jr., W. P. Kegelmeyer, C. Springer***

We discuss results from the CASP4 contest to predict the secondary structure of proteins. We used all of known proteins up to 7/4/200 with suitable resolution to build a set of classifiers. This is up to 30GB of data. We were able to build a distributed set of decision tree classifiers that outperform the classifier built on all the data (over 30 days).

2) Evolutionary Computation for Multi-Objective Data Mining, ***Siddhartha Bhattacharyya***, University of Illinois, IDS Dept., Coll. of Bus. Admin, 601 South Morgan St., MC 294, Chicago, IL 60607, sidb@uic.edu

Real-world data mining problems often involve multiple objectives. Traditional methods typically optimize a combined function of these, yielding a single "best" solution. Multi-objective problems, however, can characterize a frontier of non-dominated solutions, each incorporating a different level of tradeoff. We consider how evolutionary computation techniques can be useful for multi-objective data mining.

3) A Discrete Optimization Approach to Data Visualization, ***S. Raghavan***, University of Maryland, Smith Sch. of Bus., Van Munching Hall, College Park, MD 20742-1815, sr141@umail.umd.edu, ***Roselyn Abbiw-Jackson, Bruce L. Golden, Shreevardhan Lele, Edward A. Wasil***

Given pairwise distance measures between data points, multidimensional scaling and Sammon maps are traditional techniques to locate these points in two dimensions. We propose an IP model for this problem. Using the IP model, we develop a heuristic technique that appears computationally viable. Preliminary computational results will be presented.

4) A Visualization Model based on Adjacency Data, ***Edward A. Wasil***, American University, Kogod Sch. of Bus., 4400 Massachusetts Ave. NW, Washington, DC 20016, ewasil@american.edu, ***Edward Condon, Bruce L. Golden, Shreevardhan Lele, S. Raghavan***

We describe a visualization model where the data are provided in adjacency format. We present a technique for obtaining distance measures between data points. Armed with the resulting distance matrix, we show how Sammon maps can be used to visualize the data points. An application to the college selection process is presented.

SB08 DO-12

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Andrew J. Schaefer, University of Pittsburgh, Dept. of IE, 1031 Benedum Hall, Pittsburgh, PA 15261, schaefer@engrng.pitt.edu

1) Design of a Stochastic Synchronous Optical Network, ***Cole Smith***, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, cole@sie.arizona.edu, ***Andrew J. Schaefer, Joyce Yen***

We consider a SONET design problem that minimizes a mix of capital equipment expenditures and penalties associated with failure to route portions of future demands. Our approach will involve a stochastic integer programming methodology, utilizing a specialized class of heuristics to obtain tight upper bounds to the problem.

2) Supply Chain Management & Design in the Steel Industry, ***Jayant Rajgopal***, University of Pittsburgh, Dept. of IE, Pittsburgh, PA 15261, rajgopal@engrng.pitt.edu, ***Aykut Arapoglu, Andrew J. Schaefer***

We consider a supply chain optimization problem arising from the operations of a major steel company. Demand for various widths of rolled steel occur randomly at geographically distributed points. We give an effective control policy and provide extensions to optimal distribution network design.

3) The Distance-Specific Inverse Multicommodity Flow Problem, ***Joel S. Sokol***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, jsokol@isye.gatech.edu, ***Shabbir Ahmed, Kai Huang***

In this variation on the standard inverse multicommodity flow problem, there are restrictions on the travel distances of each commodity but not their specific paths. We discuss the complexity of different variants of the problem, describe solution strategies and algorithms and present preliminary computational results.

SB09 DO-14

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Karen Aardal, Utrecht University, Institute of ICS, PO Box 80089, Utrecht, 3508TB, The Netherlands, aardal@cs.uu.nl

1) Gomory Families of Integer Programs, ***Rekha R. Thomas***, University of Washington, Dept. of Math., 438 Padelford, Box 345350, Seattle, WA 98195, thomas@math.washington.edu, ***Serkan Hosten***

Gomory integer programs generalize the notion of TDI-ness. It is conjectured that such families can be constructed from normal matrices (matrices whose columns form a Hilbert basis). We prove this conjecture in certain special cases.

2) An Integer Programming Algorithm, ***Robert Weismantel***, Otto-von-Guericke University of Magdeburg, Dept. of Math/IMO, Universitatsplatz 2, Magdeburg, D-39106, Germany, weismant@saturn.math.uni-magdeburg.de

This talk deals with the design of an efficient augmentation algorithm for general integer programming. It is based on the theory of irreducible sets of points. We demonstrate on various MIPLIB instances its practical potential.

3) Hard Integer, Equality Constrained Knapsack Problems, ***Karen Aardal***, Utrecht University, Institute of ICS, PO Box 80089, Utrecht, 3508TB, The Netherlands, aardal@cs.uu.nl, ***A. K. Lenstra***

We consider the problem of determining whether there exists a nonnegative integer solution to the equation $a*Tx = a_0$. For a particularly difficult subclass of the problem we demonstrate that a certain full-dimensional reformulation is relatively "easy" to solve in the space of the reformulation.

SB10 Optimization Techniques VI

Contributed Session
Chair: Jiu Ding, University of Southern Mississippi, Box 5045, Hattiesburg, MS 39406-5045, jiu.ding@usm.edu, pax.st.usm.edu/~jding

1) withdrawn 10/15: An Evolutionary Heuristic for Finding

Efficient Partial Information for Combinatorial Multi-Objective Problems, ***Murat M. Koksalan***, Purdue University, Krannert Sch. of Mgmt., West Lafayette, IN 47907, koksalanm@mgmt.purdue.edu, ***Selcen F. Pamuk***

2) Algorithms for Directed Network Design Problems, ***Vardges Melkonian***, Cornell University, Dept. of OR/IE, Rhodes Hall, Ithaca, NY 14853, vardges@orie.cornell.edu, http://www.orie.cornell.edu/~vardges, ***Eva Tardos***

Given a directed graph G, the strong connectivity problem seeks a minimum cost strongly connected spanning subgraph of G. Our algorithms for the problem range from primal-dual method to simulated annealing. We give theoretical guarantees for their performance and present experimental results.

3) On the Spectrum & Pseudoinverse of a Special Bordered Matrix, ***Jiu Ding***, University of Southern Mississippi, Box 5045, Hattiesburg, MS 39406-5045, jiu.ding@usm.edu, pax.st.usm.edu/~jding, ***Wallace C. Pye***

The characteristic polynomial of a low rank bordered matrix of special structures is determined by elementary means. This result includes as a special case a recent result by A. Farkas et al. on AHP. We also obtain a pseudoinverse formula for the matrix.

4) An Interior-Point Perspeceive on Sensitivity Analysis in Semi-Definite Programming, ***Alper Yildirim***, SUNY, Dept. of Applied Math & Stats., Stony Brook, NY 11794-3600, yildirim@orie.cornell.edu, www.orie.cornell.edu/~yildirim

We study the asymptotic behavior of the interior-point bounds arising from the work of Yildirim & Todd on sensitivity analysis on perturbations of the right-hand side and cost parameters in semi-definite programming in comparison with the optimal partition bounds.

SB11 Networks & Graphs II

Contributed Session

Chair: William W. Hager, University of Florida, Dept. of Math., 358 Little Hall, Gainesville, FL 32611, hager@math.ufl.edu

1) A Hop-Indexed Generalization of Sub-Tour Elimination Contraints for the Capacitated Minimum Spanning Tree Problem, ***Pedro Martins***, Polytechnic Institute of Coimbra, Quinta Agricola-Bencanta, Coimbra, 3040-316, Portugal, pmartins@isac.pt, ***Luis Gouveia***

We propose a new set of valid inequalities for the capacitated minimum spanning tree problem. These inequalities are hop-indexed generalizations of the well-known generalized sub-tour elimination constraints, which have long been used in modeling some network design problems. We present some computational results, using both sets of inequalities.

2) Quadratic Programming Solutions of the Graph Partitioning Problem, ***William W. Hager***, University of Florida, Dept. of Math., 358 Little Hall, Gainesville, FL 32611, hager@math.ufl.edu

We give an algorithm for approximately solving the graph partitioning problem and compare it to other approaches.

3) withdrawn 10/9: Shunting Passenger Trains for the Dutch Railways, ***Richard Freling***, Erasmus University Rotterdam, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, freling@few.eur.nl, www.few.eur.nl/few/people/freling/

SB12 Application & Extensions of Metaheuristics

Cluster: Combinatorial Optimization
Invited Session

Chair: Gary A. Kochenberger, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, gkockenberger@bus.olemiss.edu

1) Local Search & Constraint Programming, ***Andrea Lodi***, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 40136, Italy, alodi@deis.unibo.it, ***Filippo Focacci***, ***Francois Laburthe***

Real-world combinatorial optimization problems have 2 main characteristics that make them difficult: they are usually large and they are not pure, i.e., they involve a heterogeneous set of side constraints. Hence, in most cases, exact approaches cannot be applied to solve real-world problems, whereas local search methods have been proved to obtain very good results in practice...

2) Extension of the Reverse Elimination Method through Dynamic Management of the Tabu List, ***Said Hanafi***, Universite de Valenciennes LAMIH, Lab. LAMIH CNRS, Recherche Op. & Info., Valenciennes Cedex, 59313, France, said.hanafi@univ-valenciennes.fr, ***Arnaud Freville***

The REM proposed by Glover (1990) is a dynamic strategy for managing the tabu list during the search. New dynamic rules for adjusting the integer parameter t in the so-called REM-t method are designed in order to create a balance between diversification and intensification.

3) New Heuristic Approaches to Graph Optimization & Related Problems, ***Gary A. Kochenberger***, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, gkockenberger@bus.olemiss.edu, ***Fred W. Glover***, ***Bahram Alidaee***

New approaches, including simple heuristics and more involved tabu search methods, are proposed for a variety of graph optimization and related problems. We also highlight simple reformulations applicable to an even larger set of problem classes. Computational experience illustrates the viability of our methods.

SB13 Linear Programming

Contributed Session

Chair: Michael Wagner, Old Dominion University, Dept. of Math & Stats., Norfolk, VA 23529-0077, mwagner@odu.edu, www.lions.odu.edu/~mwagner

1) Huge Linear Programs for Protein Folding, ***Michael Wagner***, Old Dominion University, Dept. of Math & Stats., Norfolk, VA 23529-0077, mwagner@odu.edu, www.lions.odu.edu/~mwagner, ***Jarek Meller***

We present a dense parallel adaptation of the linear programming code PCx. With this, we can solve parameter identification problems arising in the design of potential functions for protein folding. We will discuss techniques we use to exploit the structure of this problem which allow us to solve problems with tens (possibly hundreds) of millions of constraints.

2) withdrawn 9/24: Using Linear Programming to Solve Simultaneous Equation Model Research Models, ***Clement O. Psenicka***, Youngstown State University, One University Plaza, Youngstown, OH 44555, cpsenick@cc.ysu.edu

3) withdrawn 10/11: Sensitivity Analysis for the Assignment Problem, ***Ue-Pyng Wen***, National Tsing Hua University, Dept. of IEEM, 101 Kuang Fu Rd., Sec. 2, Hsinchu, Taiwan, 300, ROC, upwen@ie.nthu.edu.tw, http://upwen.ie.nthu.edu.tw, ***Chih-Jen Lin***

4) A Model for Resource Management in Small Businesses, ***Juan J. Gonzalez***, University of Texas, College of Bus., San Antonio, TX 78249, jgonzalez@utsa.edu

The resources available to any organization provide a set of constraints that limit its accomplishments. This makes resources management very critical for small business. A linear programming model and an example are presented.

5) Some Optimization Models for Warehouse Selection, Sizing & Stocking, ***Brian T. Downs***, Aspen Technology, Inc., 1293 Eldridge Parkway, Houston, TX 77077, brian.downs@aspentech.com, ***John H. Semple***

We extend the work of Downs, Metters & Semple (2000). Convex, separable LP models are implemented in the eSupply Chain Suite of Aspen Technology, Inc., to create a DSS for warehouse selection and sizing, as well as for setting base-stock levels within the selected warehouse spaces.

SB14 Analysis of Queueing Systems

Cluster: Queueing/Transportation Models in Logistics
Invited Session

Chair: Sudha Jain, University of Toronto, Dept. of Stats., 100 Saint George St., Toronto, Ontario, M5S 3G3, Canada, jainsu@utstat.utoronto.ca

1) Using Common Probability Distributions in Cumulant Derivation Procedures, ***Timothy Matis***, Texas A&M University, Dept. of IE, Zachary Engineering Ctr., College Station, TX 77843-3131, t-matis@tamu.edu

Cumulant derivation procedures are used to efficiently approximate the low-order cumulants (mean, variance, skewness), of the state of Markovian queueing networks with state-dependent arrivals, services and routings. Such procedures have traditionally relied on the truncation of high-order cumulants. We consider approximating such cumulants with common uni- and multi-variate distributions to the end of improving low-order cumulant approximations.

2) No Title Supplied, ***Jeffrey P. Kharoufeh***, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, jpk175@psu.edu

We derive the analytical cumulative distribution function of travel time for a

vehicle whose velocity is modulated by a random environment process. Transient and asymptotic moments are computed directly from the LST and compared with moment computations from the M/G/C/C state-dependent queueing model of Jain & Smith (1997).

3) Multi-Threshold Control of $MBAP/SM/1/K$ Queue with Group Services, ***Srinivas R. Chakravarthy***, Kettering University, Dept. of IME & Bus., 1700 West 3rd Ave., Flint, MI 48504-4898, schakrav@kettering.edu, ***Alexander Dudin***

We consider a finite capacity queue in which arrivals occur according to a batch Markovian arrival process. The customers are served in groups of varying sizes. The services are governed by a controlled semi-Markovian process according to a multi-threshold strategy. We perform the steady-state analysis of this model by computing the queue length distributions at departure and arbitrary epochs...

4) A Finite-Capacity Double-Ended Queue with State-Dependent Rates, ***Sudha Jain***, University of Toronto, Dept. of Stats., 100 Saint George St., Toronto, Ontario, M5S 3G3, Canada, jainsu@utstat.utoronto.ca, ***T. S. S. Srinivasa Rao***

We develop explicitly a computational approach for the finite-capacity double-ended queue with state-dependent rates. To obtain a steady-state solution, the supplementary variable technique has been used. We present some computational results with various interarrival time distributions. An application to the inventory problem is also included.

SB15 Operations Management V

Contributed Session

Chair: Dennis F. X. Mathaisel, Babson College, Babson Hall, Babson Park, MA 02457, dfxm@mit.edu, web.mit.edu/dfxm/www/

1) A Framework for the Indentification & Classification of Best Practices for Sustainment, ***Dennis F. X. Mathaisel***, Babson College, Babson Hall, Babson Park, MA 02457, dfxm@mit.edu, web.mit.edu/dfxm/www/, ***Clare L. Comm***

A framework was developed for identifying and classifying a set of best practices that can increase the quality, reliability and timeliness of industries that provide maintenance, repair and overhaul services on products. By cataloguing and documenting these best

2) Total Quality Management in the Saudi Public Sector, ***Rashid M. Alhamali Alkahtani***, King Saud University, PO Box 105502, Riyadh, 11656, Saudi Arabia, rkahtani@ksu.edu.sa

We investigate the implementation of TQM in the government sector in Saudi Arabia. We try to measure the decision makers understanding of the TQM concept. In addition, we try to determine the obstacles and ways of enhancing the use of TQM in the public sector in Saudi Arabia. The study is carried out by choosing a sample of the decision makers in this sector and asking them to answer the questions provided.

3) A Design Methodology for Cellular Manufacturing using Axiomatic Design Principles, ***M. Bulent Durmusoglu***, Istanbul Technical University, Isletme Fakultesi, Endustri Muhendisligi Bolumu, Istanbul, 80680, Turkey, bulent@ayasofya.isl.itu.edu.tr, ***Suleyman Tufekci, Osman Kulak***

We propose a design methodology for cellular manufacturing based on AD principles. All methods and activities are integrated into a logic based on AD framework. It leads the cell designer towards optimum cell design in a systematic way. A case study on converting a conventional metal ramp/stairway manufacturer from process oriented layout to cellular manufacturing will also be presented.

4) Modeling Product Variety: An Integrated Approach, ***Carlos Ocampo y Vilas***, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, 2000, Belgium, carlos.ocampoyvilas@ufsia.ac.be, ***Nico J. Vandaele***

The effect of product variety on costs and operating performance is analyzed. We use a multi-product, multi-machine queueing network to calculate lead times. These are processed in a market share model so that the model helps us to evaluate and select a product variety strategy.

SB16 Tutorial: Operations Management in Financial Services

Sponsor: MSOM

Sponsored Session

Chair: Michael L. Pinedo, NYU, Stern Sch. of Bus., Tisch 7-03, 40 West 4th St., New York, NY 10012, mpinedo@stern.nyu.edu

1) Tutorial: Operations Management in Financial Services, ***Michael L. Pinedo***, NYU, Stern Sch. of Bus., Tisch 7-03, 40 West 4th St., New York, NY 10012, mpinedo@stern.nyu.edu

This tutorial gives an overview of the applications of operations management techniques in financial services. These applications include productivity measurement and quality control, design and analysis of front offices (distribution channels) as well as of back offices and the analysis of operational risk.

SB17 Managing Learning to Improve Operations

Sponsor: MSOM

Sponsored Session

Chair: Michael A. Lapre, Vanderbilt University, Owen Grad. Sch. of Mgmt., Nashville, TN 37203, michael.lapre@owen.vanderbilt.edu

1) A Unified Framework for Learning by Experimentation, ***Roger Bohn***, University of California, Grad. Sch. of IR/PS, La Jolla, CA 92093-0519, rbohn@ucsd.edu

Experimentation is a fundamental activity in knowledge-based activities including manufacturing, product design, and marketing. Classic controlled experiments in the "real world" are only one approach. We analyze a range of experimental methods including data mining, simulation and natural experiments.

2) Learning, Process Change & Replication during Production Ramp-up, ***Christian Terwiesch***, University of Pennsylvania, The Wharton Sch., OPIM Dept., 1319 SH-DH, Philadelphia, PA 19104, terwiesch@wharton.upenn.edu, ***Yi Xu***

We study a manufacturing process for a new product during the production ramp-up stage. Management needs to balance 3 conflicting objectives: learning about the current process, further improving the current process and replicating elements of the process in order to increase capacity. These trade-offs are explored with a continuous time profit maximization model.

3) Learning by Doing & Knowledge Transfer in Service Settings: Customer Outrage in Airlines, ***Michael A. Lapre***, Vanderbilt University, Owen Grad. Sch. of Mgmt., Nashville, TN 37203, michael.lapre@owen.vanderbilt.edu, ***Nikos Tsikriktsis***

We analyze customer complaint learning-curves in the US domestic airline industry using data for all major airlines available since the Department of Transportation introduced service quality indicators. Geographic specialist airlines reduced complaints via learning-by-doing, whereas generalist airlines did not. Experience from other airlines employing similar strategies also reduced complaints.

SB18 ERP: Extension to the E-Business Supply Chain

Cluster: Enterprise Resource Planning

Invited Session

Chair: Elliot Bendoly, Emory University, Goizueta Sch. of Bus., Atlanta, GA 30322, ebendoly@indiana.edu

1) APS Implementation Issues in an ERP-Enabled Supply Chain, ***Mary J. Meixell***, George Mason University, Sch. of Mgmt., Enterprise Hall, MSN 5F4, Fairfax, VA 22030-4444, mmeixell@som.gsu.edu

ERP improves supply chain performance by incorporating supplier constraints into the APS production planning process. Supply chains, however, are often too complex to be modeled in full detail. We report on a study of implementation issues associated with APS and propose a process for addressing complexity issues.

2) The Impact of Enterprise Systems on Business-to-Business & Business-to-Commerce Transactional Efficiency, ***Elliot Bendoly***, Emory University, Goizueta Sch. of Bus., Atlanta, GA 30322, ebendoly@indiana.edu, ***Frederick Kaefer***

Many firms have recently jumped into B2C and B2B ventures, without ERP technologies in-house. This is interesting, given that much of the strength of ERP become apparent only in intra-organizational technologies built onto them. We present preliminary survey findings on the impact of ERP systems on transactional efficiencies of these projects.

3) The Argument against E-Hubs, ***Daniel G. Conway***, University of Notre Dame, Mendoza Coll. of Bus., Notre Dame, IN 46556-5646, conwaydg@dale.cba.ufl.edu

The concept of the centralized virtual marketplace, e-hubs, appears promising. Subsequently, ERP vendors have begun to extend their fundamentally intra-organizational applications to inter-organizational arenas. Here, extensions into both centralized marketplaces and more traditional supply chain applications are considered. Results show that e-hub trading markets might not

support current operational practices.

SB19 Logistics Ii

Contributed Session

Chair: Rob A. Zuidwijk, Erasmus University, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, r.zuidwijk@fbk.eur.nl

1) Continuing Customer Targeting under Limited Logistics Resources, ***Rob A. Zuidwijk***, Erasmus University, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, r.zuidwijk@fbk.eur.nl, ***Roelof Kuik***

Traditional analysis of logistics systems focuses on the management of logistics configurations such as routes, location, allocation, deployment of resources, under predetermined price structures and customer relations. We explore instances in which prices and customer relations are not fixed and may change during the decision process.

2) A Data Integrated Mathematical Programming Approach for Logistics Alliances, ***Metin Turkay***, Koc University, Dept. of IE, Rumelifeneri Yolu, Sariyer, Istanbul, 80910, Turkey, mturkay@ku.edu.tr, ***Fujita Kaoru***

Logistics alliances among different manufacturers and distribution companies are a common practice for decreasing fixed and variable distribution cost. A data integrated mathematical programming approach that combines a relational database management system with mathematical programming will be presented. The approach will be illustrated with an industrial problem.

3) Multi-Echelon Production & Transportation Scheduling, ***Tan Miller***, Pfizer, Inc., 201 Tabor Rd., Morris Plains, NJ 07950, tan.miller@pfizer.com

In a multi-echelon manufacturing environment, there are many factors to evaluate in the development of integrated production and transportation schedules across echelons. Often, little effort is made to establish integrated schedules. We examine the potential costs of a non-integrated approach.

4) The Nested Knapsack Problem, ***Nezih Altay***, University of Richmond, Robins Sch. of Bus., Richmond, VA 23173, naltay@richmond.edu, http://www.richmond.edu/~naltay, ***Powell Robinson***

In the nested knapsack problem, a binary decision variable decides whether a family of products will be eligible for the knapsack or not. This problem has its applications in freight consolidation for the LTL carriers. A cross decomposition-based algorithm is used to solve the problem to optimality.

SB20 Operations Management II

Contributed Session

Chair: Alp Muharremoglu, MIT, OR Ctr., Bldg. E40-130, 77 Massachusetts Ave., Cambridge, MA 02139, alp@mit.edu

1) Echelon Base-Stock Policies in Uncapacitated Serial Inventory Systems, ***Alp Muharremoglu***, MIT, OR Ctr., Bldg. E40-130, 77 Massachusetts Ave., Cambridge, MA 02139, alp@mit.edu, ***John N. Tsitsiklis***

We show the optimality of echelon base-stock policies in uncapacitated serial inventory systems, by exploiting the structure of a subproblem involving a single item-customer pair. We cover finite and infinite horizon problems, Markov modulated demand, stochastic non-order-crossing lead-times and obtain an efficient algorithm.

2) Achieving Just-in-Time & Material Requirements Planning Integration through Mathematical Programming & Heuristic Approaches, ***Johnny C. Ho***, Columbus State University, Abbott Turner Coll. of Bus., Columbus, GA 31907, ho_johnny@colstate.edu

We describe a framework that integrates the pull element of JIT production into MRP. We model the framework using integer programming and propose heuristics to obtain detailed operations schedules for the proposed framework. A simulation study is performed to evaluate the effectiveness of the proposed heuristics.

3) A Branch & Price Algorithm for the Capacitated Lot-Sizing Problem with Set-Up Times, ***Raf Jans***, Katholieke Universiteit Leuven, Naamsestraat 69, Leuven, 3000, Belgium, raf.jans@econ.kuleuven.ac.be, ***Zeger Degraeve***

Two new decomposition formulations are proposed for the capacitated lot sizing problem with setup times. In the master, we retain either the capacity constraints or the demand constraints. We show how these models can be implemented in a B&P scheme and propose solution methods for the subproblems.

4) withdrawn 10/10: Lot-Sizing Methods for Joint Products in MRP/ERP Systems, ***Charles H. Apigian***, University of Toledo, Coll. of Bus., Toledo, OH 43606, capigian@mediaone.net, ***Ram Rachamadugu***

SB21 Manufacturing II

Contributed Session

Chair: Inneke Van Nieuwenhuyse, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, 2000, Belgium, inneke.vannieuwenhuyse@ufsia.ac.be

1) The Impact of the Maximum Lateness Priority Rule on Product Lead Time & Customer Service Level, ***Inneke Van Nieuwenhuyse***, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, 2000, Belgium, inneke.vannieuwenhuyse@ufsia.ac.be, ***An Dupon***, ***Nico J. Vandaele***, ***Marc R. Lambrecht***

In practice, sequence changes during production often occur due to material shortages, rush jobs, etc. In many cases, however, it is less clear to which extent expediting and de-expediting influence throughput times and customer service level. We study the impact of sequence changes based on the maximum lateness priority rule on the average throughput time and its variability, by means of simulation.

2) Minimizing the Flying Probe Test Time: Algorithm Development & Analysis, ***Bertha Arteta***, Florida International University, 10555 West Flagler St., Miami, FL 33174, berthica33@hotmail.com, ***Ronald Giachetti***

In electronics manufacturing, the miniaturization of electronics and smaller lot sizes is forcing many manufacturers to use a moving probe test for continuity testing. The moving probe test is modeled as a variation of the TSP since the movement of 2 or more probes must be coordinated. An algorithm is developed for this problem and compared with 2 other algorithms. Experimental results are presented...

3) Process Change in Response to the Demand for Increasing Product Variety: Implications on Profitability, ***Robert H. Burgess***, Georgia Institute of Technology, 336 Welton Way, Peachtree City, GA 30269, robert.burgess@mgt.gatech.edu, ***Cheryl Gaimon***

A model is developed reconciling a firm's operations capabilities with changing market forces. We explore the role of process change as a strategic response to increasing demand for product variety. The rate of process change, the level of product variety and price offered by the firm are determined.

4) Post-Printing Inspection for High Volume Electronics Manufacturing, ***Jorge Valenzuela***, Auburn University, 211 Dunstan Hall, Auburn, AL 36849, jvalenz@eng.auburn.edu, www.eng.auburn.edu/~jvalenz, ***Jeffrey S. Smith***, ***John L. Evans***

Surface-mount technology has become pervasive in the electronics manufacturing industry. The quality characteristic of a solder paste deposit is mainly determined by its area, volume and location. We propose a post-printing inspection algorithm that implicitly considers the trade-off between board throughput rate and inspection accuracy.

SB22 Knowledge & Information Flows in Supply Chains

Cluster: Supply Chain Management

Invited Session

Chair: Geoffrey G. Parker, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, gparker@tulane.edu

1) Revisiting the Price/Quantity Setting Firm under Stochastic Demand, ***Gal Raz***, Stanford University, Grad. Sch. of Bus., 518 Memorial Way, Stanford, CA 94305-5015, galraz@stanford.edu, ***Evan L. Porteus***

Simultaneous pricing and quantity setting is further explored in a newsvendor setting. A discrete model of possible demands for each price reveals managerial insights: as outcomes become stochastically better, the (optimal) price increases but the quantity is non-monotone. As unit cost increases, quantity decreases but price is non-monotone.

2) withdrawn 10/10: Decomposition of Design within a Technology Supply Chain, ***Nitin Joglekar***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu, ***Geoffrey G. Parker***, ***Charles Fine***

3) "Optimizing" the Supply Chain One Flowpath at a Time, ***Mark L. Spearman***, Factory Physics, Inc., College Station, TX 77845-4480, spearman@factoryphysics.net, ***Silke Kroeckel***

We consider a production/inventory system with significant changeover times between products and present heuristisc for obtaining production quantities and

re-order points. We also discuss how this model can be extended to larger supply chain applications using a generalized pull strategy. Finally, we discuss how these heuristics can be used to set "campaign" sizes in the pharmaceutical industry.

4) Capacity & Backlog Management in Service-Oriented Supply Chains, ***Edward G. Anderson***, University of Texas, Mgmt. Dept., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu, ***Douglas J. Morrice***

We investigate service-oriented supply chains in which each stage holds no finished goods inventory, rather only backlogs that can be managed solely by adjusting capacity. Using control theory, we study the impact of different management strategies. One non-intuitive result is that lead-time reduction can exacerbate the bullwhip effect.

SB23 Collaborative Decision Making in E-Marketplaces

Cluster: **Supply Chain & E-Market Optimization**
Invited Session

Chair: Sridhar Seshadri, NYU, Stern Sch. of Bus., New York, NY 10012, sseshadr@stern.nyu.edu

1) Alternative Collaborative Technology Approaches in E-Marketplaces, ***Norman White***, NYU, Stern Sch. of Bus., 4 West 4th St., Rm. 9-81, New Yorkk, NY 10012, nwhite@stern.nyu.edu

As e-marketplaces evolve, it has become clear support for collaboration between supply chain participants is often a key to success. We will discuss the many alternative technology platforms used for collaboration in e-marketplaces. The results of a survey of current platform usage will be presented and discussed.

2) Impact of Inter-Enterprise Collaboration on Supply Chain Management, ***Narayan Venkatasubramanyan***, i2 Technologies, 11511 Luna Rd., MD 2-4B-B21, Dallas, TX 75234, narayan@i2.com

The Emergence of e-marketplaces can dramatically alter the practice of supply chain management within an enterprise. Collaboration between partners in a multi-enterprise supply chain will place unforeseen demands on decision support. We highlight some of the key challenges and discuss emerging problems and solutions due to this development.

3) Reverse Auctions for Direct Procurement, ***Jayant Kalagnanam***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, jayant@us.ibm.com, ***Andrew J. Davenport***

We discuss a collaborative environment for direct procurement in which buyers solicit bids and suppliers respond with volume discount bids and/or bundled bids. The objective is to minimize the cost, satisfy all business requirements and satisfy additional constraints such as fairness, the minimum and the maximum number of suppliers.

4) Issues in Economically Aware Learning, ***Maytal Saar-Tsechansky***, NYU, Dept. of IS, Stern Sch. of Bus, 4 West 4th St., Rm. 9-181, New York, NY 10012, mtsechan@stern.nyu.edu, ***Foster Provost***

The applicability of many data mining applications is often critically dependent on economic concerns. In learning, both the cost of training examples and the cost structure of the application are of interest. I present approaches towards learning with a variety of cost considerations.

SB24 Supply Chain Management II

Contributed Session

Chair: Ali R. Behnezhad, California State University, Dept. of MS, Northridge, CA 91330-8378, ali.behnezhad@csun.edu

1) Concurrent Product & Supply Chain Design, ***Ali R. Behnezhad***, California State University, Dept. of MS, Northridge, CA 91330-8378, ali.behnezhad@csun.edu

A systematic approach to coordinate product and supply chain design will be presented. Various product and process design methodologies that result in more effective management of the supply chain will be discussed.

2) Optimizing Inventory Levels & Order Fulfillment Strategies in a Supply Chain, ***Geetika Rana***, SUNY, Dept. of IE, Buffalo, NY 14260-2050, grana@eng.buffalo.edu, ***Rajan Batta***, ***Robert J. Szczerba***

CPLEX is called within a simulation model of a supply chain (that has several distribution centers and a single manufacturing facility) to solve MIP problems to minimize transportation and inventory costs. We use iterative scheme to set target inventory levels and also consider batching of orders and risk pooling.

3) Mathematical Modeling for Reverse Logistics, ***Hyun-Jeung Ko***, University of Louisville, Dept. of IE, Louisville, KY 40292, h0k0001@athena.louisville.edu, ***Gerald E. Evans***, ***Hokey Min***

The backward flow of products, i.e. customer returns, is receiving increasing attention in the OR community. We represent a review of the literature on the modeling of backward flow. Emphasis placed on the choice of reverse channels in order to minimize cost subject to an appropriate consumer response time.

4) Supply Chain Management for an International Apparel Manufacturer, ***Lefteris T. Iakovou***, University of Miami, Dept. of IEN, PO Box 248294, Coral Gables, FL 33124, eiakovou@miami.edu, ***Juan C. Morales***, ***Olga Ortiz***

We present a hierarchical framework that captures the supply chain of an international apparel manufacturer. Commodities include more than 40,000 SKUs. The manufacturer ships orders from its DC to customers ranging from mass merchants to small stores. We further provide a system-wide optimization methodology for both make-to-order and make-to-stock items.

SB25 Exact & Approximation Algorithms for Scheduling Problems

Cluster: **Scheduling**
Invited Session

Chair: Peter J. S. Brucker, University of Osnabrueck, Albrechtstr. 28, Osnabrueck, 49069, Germany, peter.brucker@mathematik.uni-osnabrueck.de

1) withdrawn 10/9: Preemptive Scheduling of Identical Machines, ***Philippe Baptiste***, University of Technology of Compiegne, BP 20529, Compiegne Cedex, 60205, France, baptiste@utc.fr

2) Tabu Search Algorithms for Job-Shop Problems with a Single Transport Robot, ***Johann Hurink***, University of Twente, PO Box 217, Enschede, 7500 AE, The Netherlands, j.l.hurink@math.utwente.nl, ***Sigrid Knust***

We consider a generalized job-shop problem where the jobs additionally have to be transported between the machines by a single transport robot. We present local search algorithms for this problem where appropriate neighborhood structures are defined using problem-specific properties. Computational results are presented.

3) Approximation Algorithms for Vector Packing Problems with Applications to Scheduling, ***Hans Kellerer***, University of Graz, Universitaetsstr. 15, Graz, A 8010, Austria, hans.kellerer@kfunigraz.ac.at

D-dimensional vector packing is a generalization of the classic bin packing problem and can be interpreted as unit-time scheduling with d resources. The existence of an APTAS is excluded even for 2 dimensions. We give an APTAS for so-called correlated vector packing problems and present a heuristic for 2-dimensions.

4) Complexity Results for Shop Problems with Transportation Delays, ***Peter J. S. Brucker***, University of Osnabrueck, Albrechtstr. 28, Osnabrueck, 49069, Germany, peter.brucker@mathematik.uni-osnabrueck.de, ***Sigrid Knust***, ***Edwin T. C. Cheng***, ***Natalia V. Shakhlevich***

Flow-shop and open-shop scheduling problems with delays that occur due to the fact that jobs must be transported from one machine to the next are considered. New complexity results are presented for the case in which the number of transport robots is large.

SB26 New Results in Project Planning & Control

Cluster: **Project Management**
Invited Session

Chair: Willy S. Herroelen, Catholic University of Leuven, Dept. of Applied Econ., Op. Mgmt., Naamsestraat 69, Leuven, 3000, Belgium, willy.herroelen@econ.kuleuven.ac.be

1) Analytical Methods in Project Planning & Control: Current Practice & Future Research Directions, ***Bruce Pollack-Johnson***, Villanova University, Dept. of Math. Sci., Liberal Arts & Sciences, Villanova, PA 19085, bruce.pollack-johnson@villanova.edu, ***Matthew J. Liberatore***

We present and analyze empirical results on quantitative technique usage within project management software for planning and control and on future research. The effect of demographic and work environment factors on the level of technique use is highlighted. Responses concerning interest in future research are summarized.

2) Due Date Project Scheduling in Supply Chain Management,

Abdelghani A. Elimam, San Francisco State University, Coll. of Bus., 1600 Holloway Ave., San Francisco, CA 94132, aelimam@sfsu.edu, ***Bajis M. Dodin***

We model the supply chain activities as a project network. We then develop MIP models to represent such a project network. We provide the minimum cost project schedule for these activities in order to meet required due dates. The impact of violating these due dates on inventory levels and meeting customer demands on time is studied. Computational work to illustrate the benefits is presented.

3) A Model for Robust Resource Allocation in Project Scheduling, *Roel Leus*, Catholic University of Leuven, Dept. of Applied Econ., Op. Mgmt., Naamsestraat 69, Leuven, 3000, Belgium, roel.leus@econ.kuleuven.ac.be, ***Willy S. Herroelen***

The validity of static deterministic scheduling has been questioned lately: projects have to face uncertainty. We present a resource allocation algorithm that protects the schedule makespan against activity duration variability, exploiting a resource flow representation of allocation decisions. Computational experiments have been conducted and the results will be discussed.

SB27 Six Sigma

Cluster: Quality Management
Invited Session

Chair: Kevin Linderman, University of Minnesota, Carlson Sch. of Mgmt., Op. & MS, 321 19th Ave. South, Minneapolis, MN 55455, klinderman@csom.umn.edu

1) Organizational Knowledge Creation in the Six Sigma Approach, *Adrian Choo*, University of Minnesota, Carlson Sch. of Mgmt., Op. & MS, 321 19th Ave. South, Minneapolis, MN 55455, choo0006@umn.edu

Knowledge creation in Six Sigma projects is examined by studying two alternative views of knowledge creation. One posits that knowledge creation is like a production process and can be controlled by using the right method, while the other claims that knowledge creation can only be enabled given the right context.

2) Defining Six Sigma, *Kevin Linderman*, University of Minnesota, Carlson Sch. of Mgmt., Op. & MS, 321 19th Ave. South, Minneapolis, MN 55455, klinderman@csom.umn.edu, ***Roger Schroeder***

Little is known about how Six Sigma methods are being used in bueiness and their impact on business results. We provide an initial definition of Six Sigma as a basis for further research. We also discuss the controversial question of what is new about Six Sigma and what is already known.

3) Efficient Screening Experiments for Six Sigma Quality Improvement, *William Li*, University of Minnesota, Carlson Sch. of Mgmt., Op. & MS, 321 19th Ave. South, Minneapolis, MN 55455, lixxx091@umn.edu, ***Christopher J. Nachtsheim***

Six Sigma quality improvement generally requires identification of key causal variables or factors for variation reduction. Design of experiments is the tool of choice, although experimentation is often prohibitively expensive. We describe a new class of supersaturated screening experiments developed for separating the "vital few" factors from the "trivial many."

4) Quality Improvement & Propensity Models, *Thomas E. Love*, Case Western Reserve University, WSOM, Dept. of Operations, 10900 Euclid Ave., Cleveland, OH 44106-7235, tel3@po.cwru.edu

Adjustment for differences in baseline characteristics is essential for comparing groups in observational (non-experimental) studies, due to potential selection bias. Propensity scores aid in classification, matching and multivariable adjustment modeling. Sensitivity analyses assess the potential effects of an unknown covariate, allowing more informed judgments about the likely stability of conclusions.

SB28 MCDM

Contributed Session

Chair: Ron Janssen, IVM VU, De Boelelaan 1115, Amsterdam, 1115 BG, The Netherlands, ron.janssen@ivm.vu.nl

1) On the Use of Multi-Criteria Analysis in Environmental Impact Assissment in the Netherlands, *Ron Janssen*, IVM VU, de Boelelaan 1115, Amsterdam, 1115 BG, The Netherlands, ron.janssen@ivm.vu.nl

MCA is a popular tool in Dutch environmental impact assessment. We provide an overview of decision problems supported and MCA approaches used. Furthermore, the role of MCA in the decision process is analyzed and a special case is presented where the MCA results were challenged in court.

2) DEFINITE, A Toolbox to Support Decisions on a Finite Set of Alternatives, *Marjan van Herwijnin*, IVM VU, de Boelelaan 1115, Amsterdam, 1115 BG, The Netherlands, marjan@ivm.vu.nl, ***Ron Janssen***

DEFINITE is a toolkit of methods that can be used on a wide variety of problems. DEFINITE supports the whole decision process, from problem definition to report generation. The methods range from value functions, graphical methods and multi-criteria methods to sensitivity analyses. Case studies are used to demonstrate the potential of the program.

3) Analytic Hierarchy Robust Priorities & Thurstone Scaling, *Stan Lipovetsky*, Custom Research Inc., 8401 Golden Valley Rd., Minneapolis, MN 55427, lipovetsky@customresearch.com, www.customresearch.com, ***Michael W. Conklin***

AHP matrices are considered as contingency tables that help to identify errors in data. Estimation of priority vectors not prone to errors is described via transformation of Saaty matrices to shares matrices of Thurstone scaling. A special eigen problem is designed for transformed matrices. Optimizing objective yielding robust priority estimation is suggested.

4) A Procedure to Quantify the Relative Importance of the Members, *Khaled Jabeur*, Universite Laval, 3412 Rue Maricourt #8, Ste-Foy, Quebec, G1W 2M5, Canada, khaled.kabeur@centor.ulaval.ca, ***Jean-Marc Martel***

The notion of power or the relative importance of group members was often neglected in works related to group decision-making. However, in real group decision-making situations, members (expert, decision-makers, etc.) having expertise or occupying a privileged hierarchical level in an organization could have more influence than others on final recommendations...

SB29 Best Student Paper Presentations

Sponsor: QSR
Sponsored Session

Chair: Darek Ceglarek, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706-1572, darek@engr.wisc.edu

SB30 Recent Developments in Risk & Decision Analysis at Caltech/JPL

Sponsor: Decision Analysis
Sponsored Session

Chair: Ralph Miles, EER Systems, 3608 Canon Blvd., Altadena, CA 91001, rmiles2@earthlink.net

1) Programmatic Risk Analysis to Search for Life on Mars, *Elisabeth M. Pate-Cornell*, Stanford University, Dept. of MSE, Stanford, CA 94305, mep@leland.stanford.edu, ***Robin Dillon***

NASA is developing a strategy for the future exploration of Mars. To support the planetary exploration program, we describe an analytical framework that determines the optimal budget allocation based on the maximization of a valuation function that captures tradeoffs among technical and management failure risks and the mission's scientific benefits.

2) Risk-Adjusted Mission Value for Space Missions, *Ralph Miles*, EER Systems, 3608 Canon Blvd., Altadena, CA 91001, rmiles2@earthlink.net

NASA has requested their Centers and the Jet Propulsion Laboratory to incorporate probabilistic risk assessment into their risk management activities. PRA cannot make mission risk vs. mission return tradeoffs because PRA has no "value" component. We show how to combine PRA and decision analysis to make tradeoffs for space missions.

3) Preference Reversals in Risk Management: Where They Occur & How to Avoid Them, *Matthias Hild*, Caltech, Humanities & Social Sciences, MC 228-77, Pasadena, CA 91125, hild@caltech.edu

Reversals of social preferences occur when the social decision maker aggregates individuals' subjective utilities for the outcomes of a risky policy measure. The level of detail with which these outcomes are described can significantly affect the resulting policy recommendation. We discuss an alternative approach to decision-theoretically sound risk management.

SB31 The GMCR Technology for Conflict Analysis & Management

Sponsor: Group Decision & Negotiation
Sponsored Session

Chair: D. Marc Kilgour, Wilfrid Laurier University, Dept. of Math, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@wlu.edu

1) Resolution of Water Conflicts between Canada & the US, ***Keith W. Hipel***, University of Waterloo, Dept. of Systems Design Eng., Waterloo, Ontario, N2L 3G1, Canada, kwhipel@uwaterloo.ca, ***D. Marc Kilgour***, ***Liping Fang***, ***Kevin W. Li***

The graph model for conflict resolution, a methodology for the analysis of strategic conflict, is applied to a Canada-US water conflict. The DSS GMCR II identifies likely outcomes, providing a deeper understanding of the dispute and showing how an impartial scientific body contributed to the resolution.

2) An Examination of the Salmon Aquaculture Conflict in British Columbia using GMCR II, ***Donald J. Noakes***, Fisheries & Oceans Canada, Pacific Biological Station, Nanaimo, BC, V9R 5K6, Canada, noakesd@pac.dfo.mpo.gc.ca, ***Liping Fang***, ***Keith W. Hipel***, ***D. Marc Kilgour***

A long-standing conflict among governments, communities, natives, and the British Columbia salmon aquaculture industry is analyzed using the decision support system GMCR II. Strategic comparisons explain why the provincial government at first delayed any decision, and then implemented review recommendations and partially lifted an aquaculture expansion moratorium.

3) Graphical GMCR: Conflict Modeling & Analysis using Graphical Input, ***D. Marc Kilgour***, Wilfrid Laurier University, Dept. of Math, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@wlu.edu, ***Aihua Song***, ***Keith W. Hipel***

Graphical GMCR, a negotiation support system with graphical input, applies the graph model for conflict resolution using the proven analysis engine of GMCR II. With graphical features based on Visio 2000, it enables the user to "model while drawing," encouraging immediate analyses and creative solutions.

SB32 Finance: Theory & Empirics I

Contributed Session

Chair: Juha I. Seppala, University of Illinois, 1206 South Sixth St., Champaign, IL 61820, seppala@uiuc.edu, http://www.cba.uiuc.edu/seppala/

1) Asset Prices & Business Cycles under Limited Commitment, ***Juha I. Seppala***, University of Illinois, 1206 South Sixth St., Champaign, IL 61820, seppala@uiuc.edu, http://www.cba.uiuc.edu/seppala/

We present a business-cycle model with heterogeneous agents that have access to complete markets but face endogenous borrowing and savings constraints. These constraints are motivated by the agents' limited commitment technology. In this environment, aggregate fluctuations are close to the ones generated by Pareto optimal (full commitment) risk-sharing arrangements. However, endogenous borrowing and savings constraints force agents to under-invest in capital...

2) Moving Regression as a Portfolio Technical Indicator, ***Kwang-Soo Lee***, Indiana State University, Sch. of Bus., Terre Haute, IN 47809, sdkwang@befac.indstate.edu

We consider moving regression as a portfolio technical indicator that presents the smoothed values of security prices and indices for various time periods. Problems associated with testing the model with moving averages and preliminary test results based on daily closing stock prices and indices are discussed.

3) Using Web-Based Simulation software for E-Learning of OR, ***Ingolf Stahl***, Stockholm School of Economics, Box 6501, Stockholm, SE-113 83, Sweden, ingolf.stahl@hhs.se, webgpss.hk-r.se

WebGPSS, available free at webgpss.hk-r.se and very easy to learn and use, has been used in distance courses for teaching different aspects of OR, such as inventory management, testing of LP solutions, analyzing queueing theory, sales forecasting for new products, cash flow forecasting, testing of PERT solutions and simulation-based ABC.

4) A Real Options Model for Evaluating Multi-Product, Multi-Stage Natural Resource Investments, ***Vassil A. Konstantinov***, University of Wyoming, Coll. of Bus., PO Box 3985, Laramie, WY 82071-3985, konstant@uwyo.edu, business.uwyo.edu/people/Konstantinov/default.htm, ***Hongsen Chen***, ***Satoko Kurita***, ***Stefanos Nastis***, ***Aleksey S. Telyakovskiy***

We propose a model that can be used to value multi-product, multistage natural resource investments in a complete markets setting. Using arbitrage arguments, we derive a second-order partial differential equation that the value of the natural resource obeys. We solve the PDE numerically. We apply the model to 2 cases: the extraction and processing of bi-metallic ores and the optimal operation of a factory that purchases tradable pollution permits.

SB33 Social Science Applications

Sponsor: Social Science Applications

Sponsored Session

Chair: Thad Usowicz, California State University, School of Bus., San Francisco, CA 94127, usowicz@sfsu.edu

1) Fulbright Experience & Reflections: A Case Study, ***Thad Usowicz***, California State University, School of Bus., San Francisco, CA 94127, usowicz@sfsu.edu

I will explain how to obtain a Fulbright scholarship, my experience and answer questions. I will reflect on the values to me and my institution. There are "scholarships" for graduate students for doing their dissertation. For faculty, you have research awards, combination research/lectureship and "senior lecturer" awards. The standard award for faculty is for 5 or 10 months...

SB34 OR/MS Tools for Public Transit Planning

Sponsor: TSS

Sponsored Session

Chair: Mark Hickman, University of Arizona, Civil Eng. & Eng. Mechanics, mhickman@engr.arizona.edu

1) Miami International Airport: Automated People Mover, Passenger Flow Simulation, ***Gediz Er***, Lea+Elliot, Inc., 14325 Willard Rd., Ste. 200, Chantilly, VA 20151, ger@leaelliott.com, ***Deanna Doan***

Discrete event simulation was used system-wide to identify bottlenecks and interdependencies at the planning stage. Alternative baggage handling scenarios were evaluated. Decision criterion was Level of Service on platforms, including queue space, aisle width, and vertical circulation requirements.

2) A Hybrid Scheduling Approach for Pickup & Delivery of Para-Transit Demand, ***Majid Aldaihani***, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, ***Maged Dessouky***

Most of the scheduling literature on para-transit systems are for strictly curb-to-curb systems. With the increased demand and usage of these systems, alternative methods for transporting elderly and disabled passengers need to be developed. We present a heuristic that schedules these type of passengers that integrates a curb-to-curb system with a fixed route line.

3) An Assessment of Integrated Transit Service, ***Mark Hickman***, University of Arizona, Civil Eng. & Eng. Mechanics, mhickman@engr.arizona.edu

Many transit agencies are considering integrating their fixed-route and demand-responsive transit service. We present a methodology that illustrates one way to schedule such an integrated service. The technique is illustrated using an extensive case study from Houston, Texas, illustrating both passenger and agency benefits of service integration.

4) An Exact Algorithm for the Multiple Vehicle Pickup & Delivery Problem, ***Quan Lu***, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, ***Maged Dessouky***

We develop an optimal solution procedure for the multiple vehicle pickup and delivery problem. This problem has numerous applications such as the dial-a-ride problem for the transportation of elderly and disabled passengers. As opposed to other optimal solution procedures, our approach does not require either tight capacity or time window constraints.

SB35 Dynamic Vehicle Routing

Sponsor: TSS

Sponsored Session

Chair: Alan L. Erera, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, alan.erera@isye.gatech.edu

1) Routing On-Line Service Orders Dynamically, ***Buyang Cao***, ESRI, Inc., 380 New York St., Redlands, CA 92373, bcao@esri.com, ***Burcin Bozkaya***

We present an e-tailer system that accepts the on-line service orders, assigns the orders to the service persons and routes the service orders dynamically. The core algorithms of the system are discussed, and the system architecture is described.

2) Territory Planning & Vehicle Dispatching with Stochastic Customers & Demand, ***Hongsheng Zhong***, University of Southern California, Dept. ISE, Los Angeles, CA 90089-0193, hzhong@ups.com

The objective is to provide realistic models to optimize vehicle dispatching with random customer and demand, while maintaining driver's familiarity with service territory. Core areas are identified in the strategic territory planning

stage and actual routes are constructed in the operational daily routing stage using a cellular routing schema.

3) Analysis of Day-to-Day Network Flow Evolution in Transportation Networks: Some Simulation Experiments, ***Karthik Srinivasan***, Vanderbilt University, Dept. of Civil & Environ. Eng., 206B Jacobs Hall, Nashville, TN 37235, karthik.k.srinivasan@vanderbilt.edu

We investigate the phenomenon day-to-day dynamics in transportation networks. In this study, realistic user-behavior rules (calibrated and validated in earlier studies) are used to simulate network evolution both within-day and day-to-day. The results are compared against conventional benchmarks: time-dependent user equilibrium and system optimal performance.

4) Dynamic Coordination for Load-Constrained Vehicle Routing with Uncertain Demands, ***Alan L. Erera***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, alan.erera@isye.gatech.edu, ***Carlos F. Daganzo***

We consider a single-period load-constrained VRP in which customer lot sizes are uncertain when planning. Operating strategies that utilize dynamic coordination can reduce costs (fleet and distance) substantially over traditional non-coordinated a priori strategies. We analyze coordinated strategies using an approximation approach, and verify results via simulation.

SB36 Crew Management II

Sponsor: Aviation Applications
Sponsored Session

Chair: Diego Klabjan, University of Illinois, Dept. of MIE, 140 ME Bldg., 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu

1) Robust Reserve Crew Utilization & Crew Manpower Planning, ***Milind G. Sohoni***, Delta Technology, OR Dept., Atlanta, GA, milind.sohoni@delta.com, ***Glenn Bailey***, ***Helen S. Carter***, ***Ellis L. Johnson***

Airlines are continually faced with the challenge of efficient utilization of their cockpit crew resources. In addition to regular flying crews, airlines have to maintain significant reserve staffing levels to meet contractual obligations and provide smooth daily operations. Reserve crew pay, combined with premium pay out due to irregular operations, can result in significant operating expenses for an airline...

2) The Crew Maintenance Problem, ***Beniamino Paoletti***, Alitalia, Operational Research Dept., Viale A. Marchetti, Rome, 120-00148, Italy, paoletti.beniamino@alitalia.it, ***Marco Carcieri***

We built a model for the crew maintenance problem after the published of monthly roster. The algorithm is based on two main steps and tackles them separately, like classical scheduling approach. The first step is the generation of new pairings, as close as possible to the planned pairings, then the second step is the assignment of new pairings to the original roster.

3) Efficient Pricing Techniques for Airline Crew Pairing, ***Alexandra Makri***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, makri@uiuc.edu, ***Diego Klabjan***

Column generation is needed for solving airline crew pairing problems. Traditionally, pairings with the lowest reduced cost are added to the master problem. Bixby et.al. propose to assign a score to each pairing, which is a nonlinear function of the dual vector and to add to the master problem pairings with the lowest score. We embed their idea in the column generation framework...

4) Crew Group Construction for an Airline Cabin Crew, ***Tomas Liden***, Carmen Consulting, Maria Bangata 6, Stockholm, S 118 63, Sweden, tomas.liden@carmen.se

Some airlines schedule groups of cabin crew together for a whole month. These groups must be planned according to crew preferences as well as qualifications, preferred days off, preassigned duties etc. We present an application based on constraint programming developed for a major European airline.

SB37 Revenue Management II

Sponsor: Revenue Management & Pricing
Sponsored Session

Chair: E. Andrew Boyd, PROS Revenue Management, 3223 Smith St., Houston, TX 77006, aboyd@prosrm.com

1) Integration of Revenue & Risk Management for Perishable Assets, ***Youyi Feng***, Enron Corp., 1400 Smith St., Houston, TX 77002-7361, youyi.fend@enron.com, ***Baichun Xiao***

Most revenue management models attempt to maximize expected revenues. However, they do not incorporate risk management in analyses. Hence, some fundamental theoretical results fail to explain real-world policies. We discuss the relationship between revenue management and risk management and propose an integrated R2 model for perishable assets.

2) Forecasting Advertising Demand using Hierarchical Bayesian Models, ***Elinor Hartman***, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, ehartman@prosrm.com

The PROS broadcast RM system implements hierarchical Bayesian forecast models for demand and ratings. The models consider future scheduling and historical data. Hierarchical structure depends on run-type, a classification of programs based on scheduling patterns. We describe the methodology of this approach, the application's limitations and thoughts for improvement.

3) The Impact of Buy-Down on Unconstraining, Sell-Up & Spiral-Down, ***E. Andrew Boyd***, PROS Revenue Management, 3223 Smith St., Houston, TX 77006, aboyd@prosrm.com, ***Edward Kambour***

In revenue management applications, the most common model of demand assumes customers arrive with a particular fare product in mind and purchase that fare product if it is open for sale - even if lower cost fare products are available. As an alternative, we assume there is a probability that customers are willing to buy-down to the lowest available fare product. We analyze the impact on unconstraining, sell-up and spiral-down. Computational advantages are discussed.

SB38 Yield Management in the Rail Industry

Sponsor: RASIG
Sponsored Session

Chair: Larry Shughart, CSX Transportation, 500 Water St., J210, Jacksonville, FL 32202, larry_shughart@csx.com

1) Revenue Management in the Rail Industry, ***Larry Shughart***, CSX Transportation, 500 Water St., J210, Jacksonville, FL 32202, larry_shughart@csx.com

We attempt to inventory an exhaustive list of issues that could fall under the umbrella of "yield management" at a North American Class I railroad and also list potential challenges to implementing a yield management strategy. The inhibitors we discuss will include specific items related to the organization, market expectations, IT systems and product knowledge.

2) Revenue Management at Amtrak Express, ***Chip Kraft***, Amtrak, 512 Partridge Way, Frederick, MD 21703, chip.kraft@aol.com

3) Ancillary Benefits of Yield Management at Freight Railroads, ***Bruce W. Patty***, Kingsley Group, Inc., 44 Montgomery St., Ste. 3850, San Francisco, CA 94104, bpatty@kingsley-group.com

4) Rail Revenue Management in a Half-Open Passenger System, ***Johannes Enders***, PROS Revenue Management, Inc., 3223 Smith St., Ste. 100, Houston, TX 77006, jenders@prosrm.com, ***Maarten Oosten***

We will discuss the opportunities and challenges of implementing a revenue management system for the transportation of passengers by train. An aspect of particular interest is the fact that the system is half-open. In a half-open system only some of the tariffs are controlled, typically the cheaper ones.

SB39 Nicholson Student Paper Prize Competition I

Prize Session

Chair: Maurice Queyranne, University of British Columbia, Fac. of Commerce & Bus. Admin., Vancouver, BC, V6T 1Z2, Canada, maurice.queyranne@commerce.ubc.ca

1) Nicholson Student Prize Competition

This session features selected finalists in the Nicholson Student Paper Prize Competition. It represents an opportunity for faculty, professionals and other students to see some of the best research being performed by students. All are welcome.

SB40 Optimization in Energy II

Cluster: Energy
Sponsor: ENRE
Sponsored Session

Chair: Steven A. Gabriel, University of Maryland, Dept. of Civil & Environ. Eng., 1143 Martin Hall, College Park, MD 20742-3021, sgabriel@eng.umd.edu

1) A Non-Markovian Process for Power Prices with Spikes & Valuation of European Contingent Claims on Power, ***Valery Kholodnyi***, TXU Energy Trading, 1717 Main St., Ste. 18024, Dallas,

TX 75201, vkholod1@txu.com

We propose a new natural approach to modeling spikes in power prices based on a non-Markovian process. In contrast to the standard approaches we model spikes directly as self-reversing jumps. We also show how this approach can be used to value European contingent claims on power with spikes.

2) Pricing Forward Contracts for Electricity & Reserves, ***Afzal S. Siddiqui***, University of California/Berkeley Lab, 1 Cyclotron Rd., MS 90-400, Berkeley, CA 94720, afzal@ieor.berkeley.edu

We use a market equilibrium model to analyze a competitive framework in which electricity and reserves are substitute products for the generators. Price-responsive demand enables end-user participation. Upon solving the model, we obtain equilibrium forward prices for both types of contracts.

3) Multi-Settlement Systems for Electricity Markets in the Presence of Uncertainty & Congestion, ***Rajnish Kamat***, University of California, Dept. of IEOR, Berkeley, CA 94720, kamat@ieor.berkeley.edu, ***Shmuel S. Oren***

We analyze alternative market designs for a multi-settlement system for electricity in which the resolution of the transmission network is increased as time approaches real-time and uncertainty about congestion patterns is resolved. Variations of such systems are implemented or have been proposed in California and other parts of the US.

4) A New Approach to Generate Price Lattices for Correlated Weiner Processes & its Application to Generation Asset Valuation, ***Chung-Li Tseng***, University of Maryland, Dept. of Civil Engineering, College Park, MD 20742, chungli@eng.umd.edu, ***Kyle Lin***

We propose 2 approaches to generate discrete price lattices that approximate the evolution of correlated Wiener processes. In addition to matching the first 2 moments, branch probabilities are selected to mimic the joint distribution by minimizing some objective function. We compare our methods with existing ones in literature and apply them to generation asset valuation.

SB41 Panel: The Industry Job Search for PhD Students

Sponsored Session

Chair: Russell D. Meller, Virginia Tech., Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, rmeller@vt.edu

1) Panel: The Industry Job Search for PhD Students, ***Russell D. Meller***, Virginia Tech., Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, rmeller@vt.edu, ***Brenda Dietrich***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, dietric@us.ibm.com, ***Anand Iyer***, i2 Technologies, Inc.

Come to the two Job Placement Committee panel discussions Sunday morning before heading to the Job Placement Services Job Fair in the afternoon. We will discuss the basic interview process and do's and don'ts associated with the job search.

SB43 Tutorial: Using VBA in the Classroom to Develop Decision Support Systems

Invited Session

Chair: Chris Albright, Indiana University, albright@indiana.edu

1) Tutorial: Using VBA in the Classroom to Develop Decisio Support Systems, ***Chris Albright***, Indiana University, albright@indiana.edu

SB44 Stochastic Dynamic Programming

Cluster: Bellman Memorial Cluster on Dynamic Programming
Invited Session

Chair: Mark E. Lewis, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, melewis@engin.umich.edu

1) Online Scheduling with Hard Constraints: A Semi-Markov Decision Process Approach, ***Eugene A. Feinberg***, SUNY, Dept. of Applied. Math & Stats, Stony Brook, NY 11794-3775, eugene.feinberg@sunysb.edu, ***Michael Bender***, ***Michael Curry***

Consider a non-preemptive infinite horizon service system with a fixed finite number of machines characterized by a service time and a maximum allowable time between its consecutive services. We provide a dynamic programming algorithm for determining a feasible schedule, prove it is NP-hard and develop a heuristic based on constrained semi-MDP.

2) A Comparison of Anticipatory & Reactive Routing Policies, ***Barrett Thomas***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-1227, barrettt@umich.edu, ***Chelsea C. White, III***

Using an MDP, we model and analyze the problem of constructing a minimum expected total cost route that anticipates and then responds to service requests, if they occur, while a vehicle is enroute. We demonstrate the superiority of an optimal anticipatory policy, relative to a reactive routing approach.

3) Inventory Control Problems with Risk-Sensitive Criteria, ***Emmanuel Fernandez***, University of Cincinnati, ECECS Dept., 811L Rhodes Hall, PO Box 210030, Cincinnati, OH 45221-0030, emmanuel@ececs.uc.edu, www.ececs.uc.edu/~emmanuel, ***Guadalupe Avila-Godoy***

We present a formulation of an inventory control problem under a risk-sensitive performance criterion as a controlled Markov chain. Consider a simplified model with countable disturbance space and transition law which is a stochastic kernel independent of the prior disturbance. We derive a base-stock optimal policy which is ultimately stationary for the infinite case.

4) Perfect Simulation & the Policy Iteration Algorithm, ***Mark E. Lewis***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, melewis@engin.umich.edu, ***William L. Cooper***, ***Shane G. Henderson***

We analyze a modification of the policy iteration algorithm for solving Markov decision processes. Rather than solving Poisson's equation, we estimate the bias of the current policy via perfect simulation. Under easily-verifiable assumptions, we show that with probability one, the modified algorithm converges to the set of optimal decisions.

SB45 Operations Management VIII

Contributed Session

Chair: Elkafi Hassini, University of Waterloo, Dept. of MS, Waterloo, Ontario, N2L 3G1, Canada, ehassini@uwaterloo.ca, http://mansci2.uwaterloo.ca/~ehassini

1) An Intelligent System for Locating Products on Single-Server Multiple-Carousel Systems, ***Elkafi Hassini***, University of Waterloo, Dept. of MS, Waterloo, Ontario, N2L 3G1, Canada, ehassini@uwaterloo.ca, http://mansci2.uwaterloo.ca/~ehassini, ***Raymond G. Vickson***

We present an intelligent system that helps locate products in carousels that are grouped in pods of two, where each pod is served by a single operator. The system has the ability to incorporate several layout and operational configuration parameters. The system is built on a GA.

2) Seasonality Forecasting using Time-Series Clustering in the Presence of Errors, ***Mahesh Kumar***, MIT, 1 Amherst St., E40-149, Cambridge, MA 02139, maheshk@mit.edu, ***Jon Woo***, ***Peter Gaidarev***

A model for seasonality forecasting problem is proposed using time-series clustering that incorporates the information on error in data. A novel distance function is designed that is used in hierarchical clustering to predict future points and to understand the underlying structure in data. Experimental results are presented on retail-industry data.

3) A Consumer Vehicle Demand Model, ***Yong Yang***, Ford Motor Co., 16800 Executive Plaza Dr., RCB 3S264, Dearborn, MI 48126, yyang1@ford.com, ***Gint V. Puskorius***, ***Rose Peng***

We have developed an econometric consumer vehicle demand model. Although our emphasis is on the demand side, the strategic interactions among auto manufacturers are also accounted for by a game-theoretical framework. Different from previous similiar models, our model not only gauges how demand responds to price changes but also measures how demand reacts to quality improvements.

4) Adoption of New Processes & Products into an Existing Operations System, ***Tushar Mehta***, University of Rochester, Simon School, Rochester, NY 14627, mehtatd@ssb.rochester.edu, ***Phillip J. Lederer***

Motivated by a case study, we study the economic and manufacturing parameters under which products and production processes are complements or substitutes. Key product characteristics include profitability, production complexity and price-discounts for longer deliveries. Key process attributes include marginal cost and technical capability. A queueing network models the shop floor.

SB46 Decision Support Systems II

Contributed Session

Chair: Stanley A. Erickson, UC/LLNL, 3684 Chillingham Ct., Pleasonton, CA 94588, serickson@llnl.gov

1) Effectiveness Models for Counter Smuggling, ***Stanley A. Erickson***, UC/LLNL, 3684 Chillingham Ct., Pleasonton, CA 94588, serickson@llnl.gov

We consider the problem of internal pricing with refund for the express service in a finite-capacity service system. Customers decide whether to pay for such service based on the price, refund and the guaranteed minimum loss rates. A model describing the relation between the price and the service value is developed.

2) On Designing Spatial Decision Support System for Site Selection for Service Organizations, ***Mehdi Beheshtian***, Southern Illinois University, Dept. of Mgmt., MC 4627, Carbondale, IL 62901, mehdib@cba.siu.edu

A gravity model-based spatial DSS is developed for finding locations where people can access a post office with minimum travel time between their residence and the post office and the next destination. The result of this system is a pattern of post offices, which can attract more people to these sites. A DSS is designed which utilizes GIS (ArcInfo) and Oracle DBMS to attain a flexible interactive solution.

3) A Queueing-Based Optimization at an Airline Company's Check-In Area, ***Kris L. T. Lieckens***, University of Antwerp, Prinsstraat 13, Antwerpen, 2000, Belgium, kris.lieckens@ufsia.ac.be, ***Nico J. Vandaele***

Based on known approximations for G/G/m queues, we construct a dynamic decision tool for an airline company to deal with increasing passenger flow congestion. This tool determines hourly the optimal number of check-in desks, taking into account the flight schedule and the explicitly articulated service constraints for different customer classes.

4) Strategic Consideratons in Optimization of Urban Storm Water Management Systems, ***James P. Heaney***, University of Colorado, Campus Box 428, Boulder, CO 80309-0428, heaney@spot.colorado.edu, ***Leonard Wright***

In order to optimize urban storm water systems, it is necessary to develop a process simulation model that describes the hydrology and hydraulics, and either interface or integrate this model with a classic optimizer or metaheuristic. Strategic considerations to expedite the search for the optimal solution are discussed along with an example.

5) Geospatial Information Utility: An Estimation of the Relevance of Geospatial Information to Users, ***W. Lee Meeks***, George Washington University, 7032 Darby Towne Ct, Alexandria, VA 22315, lmeeks@gwu.edu, ***Subhasish Dasgupta***

The acquisition and use of information are costly, forcing economic tradeoffs. Valuing information is attracting research; however, little attention is being paid to spatio-temporal information that improves decision-making. We propose a geospatial information utility metric to allow decision makers to assess risk incurred when making decisions incorporating geospatial data.

Sunday 13:00-14:30

SC03 Management & Impacts of Information Technology

Sponsor: Information Systems
Sponsored Session

Chair: Rajiv Sabherwal, University of Missouri, Coll. of Business Admin., CCB 234, St. Louis, MO 63121, sabherwal@umsl.edu

1) The Effects of Information Technology Failures on the Market Value of Firms: An Empirical Examination, ***Anandhi S. Bharadwaj***, Emory University, Goizueta Business School, 1300 Clifton Rd., Atlanta, GA 30322, anandhi_bharadwaj@bus.emory.edu

In the new digital economy, success of many firms depends considerably on successful development and smooth functioning of IT systems. Therefore, it is important to understand and quantify the financial impact of IT-related failures and glitches. We analyze the stock market reactions to announcements of IT-related failures by publicly traded firms, using the event study methodology...

2) Perception Formulation & the Evolution of the Information Technology Function: The Case of Texaco Inc., ***Rudy Hirschheim***, University of Houston, Bauer Coll. of Bus., Houston, TX 77204-6282, rudy@uh.edu

During the past 40 years, the Texaco IT function has come under increased scrutiny and become diminished to the point where today its future is uncertain. We help understand why this is so by interpreting Texaco IT's history applying three fundamentally different ways of describing organizational change: mechanistic, organic and colonial systems. Our major conclusion is that changing the negative perceptions of IT functions may require more fundamental changes...

3) Shaping Agility through Digital Options, ***V. Sambamurthy***, University of Maryland, Smith Sch. of Business, College Park, MD 20742-1815, smurthy@rhsmith.umd.edu

Agility is crucial to firm performance in contemporary business environments. In their quest for competitive agility, firms are increasingly relying on the information systems, including the Internet suite of technologies, process technologies, and knowledge technologies. However, the relationship between these IT investments and firm performance is not well understood. We shed light on this relationship by drawing upon strategic options theory...

SC05 Tutorial: Global Optimization - Software & Applications

Invited Session

Chair: Janos D. Pinter, PCS/Dalhousie University, dpinter@is.dal.ca

1) withdrawn 9/24: Tutorial: Global Optimization - Software & Applications, ***Janos D. Pinter***, PCS/Dalhousie University, dpinter@is.dal.ca

SC06 Telecommunications Network Design Models

Sponsor: Telecommunications
Sponsored Session

Chair: Stefan Voss, Technische Universitaet Braunschweig, Informationsmanagement, ABWL, Abt-Jerusalem-Str. 7, Braunschweig, D38106, Germany, stefan.voss@tu-bs.de

1) Expansion of Reliable Internet Protocol Networks with Performance Guarantees, ***Steven Chamberland***, Ecole Polytechnique de Montreal/CRT, Electrical & Comp. Eng. Dept., CP 6079, Succ. Centre-ville, Montreal, Quebec, H3C 3A7, Canada

We propose a modeling framework for the expansion problem of reliable internet protocol networks with performance guarantees. The model takes into account the failure scenarios of interest to the network planner as well as the routing mechanisms used in the network. Since the model is NP-hard, a tabu search algorithm is proposed. Results are presented.

2) SteinLib: An Updated Library on Steiner Tree Problems in Graphs, ***Stefan Voss***, Technische Universitaet Braunschweig, Informationsmanagement, ABWL, Abt-Jerusalem-Str. 7, Braunschweig, D38106, Germany, stefan.voss@tu-bs.de, ***Thorsten Koch***, ***Alexander Martin***

We present SteinLib, a library of data sets for the Steiner tree problem in graphs. SteinLib extends former libraries on Steiner problems by many new interesting and difficult instances. We survey the difficulty of these problem instances by giving references to state-of-the-art software for solving these instances.

3) Overview of Computational Approaches for Discrete Cost Multi- Commodity Network Optimization Problems, ***Michel Minoux***, University of P. et M. Curie, Lab d'Informatique de Paris 6, 4 place Jussieu, Paris Cedex, F-75252, France, michel.minoux@lip6.fr

We provide an overview of some computational approaches to the exact solution of minimum cost multi-commodity network flow problems with arbitrary step increasing cost functions on the links. We also report on some recent work on approximate solution methods together with the case where survivability constraints have to be taken into account.

4) Designing Capacity: Efficient Survivable Networks with Failure Flow Patterns, ***Alper Atamturk***, University of California, Dept. of IE/OR, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, atamturk@ieor.berkeley.edu, ***Deepak Rajan***

We discuss an MIP model for survivable capacitated network design and routing that uses specific failure flow patterns. We give a column generation algorithm and discuss the complexity of the pricing problems. Finally, we present a computational study that illustrates the effectiveness of the algorithm.

SC07 Metaheuristics for Transportation Applications

Sponsor: Computing
Sponsored Session

Chair: Michel Gendreau, DIRO/Universite de Montreal, CRT, CP 6128, succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, michelg@crt.umontreal.ca

1) An Adaptive Method for Map Reconstruction, ***Necati Aras***, McGill University, Faculty of Mgmt., 1001 Sherbrooke St. West,

Montreal, Quebec, H3A 1G5, Canada, aras@management.mcgill.ca, *Kuban Altinel, John Oommen*

Distance estimation problem deals with the determination of a good intercity distance estimator as a function of city coordinates. Map reconstruction does the reverse, i.e., given the (actual) intercity distances it tries to locate each city to a point in the 2-dimensional space. We propose an adaptive method based on the Kohonen's self-organizing map to locate the cities.

2) Exploiting Knowledge about Future Demands for Real-Time Vehicle Dispatching using a Tabu Search Approach, ***Soumia Ichoua***, Universite de Montreal, CRT/DIRO, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, soumia@crt.umontreal.ca, ***Michel Gendreau, Jean-Yves Potvin***

We study the benefits that can be gained in real-time dispatching systems by exploiting information about future demands. More precisely, we propose and analyze a strategy that introduces dummy customers (representing forecasted requests) in vehicle routes to provide a good coverage of the territory. The intent is to meet forecasted needs efficiently. Our analysis is based on a series of computational experiments performed in a simulated pick-up only environment. computational experiments performed in a simulated pick-up only environment.

SC08 DO-02

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Anuj Mehrotra, University of Miami, 417K Jenkins Bldg., Coral Gables, FL 33124, anuj@sba.miami.edu

1) A Branch & Cut Approach for Cardinality Constrained Optimization Problems, ***Ismael Regis de Farias, Jr.***, CORE, UCL, Voie du Roman Pays 32, Louvain la Nueve, 1348, Belgium, defarias@core.ucl.ac.be, ***Ellis L. Johnson, George L. Nemhauser***

A cardinality constraint is one in which at most a given number of variables is positive. Cardinality constraints abound in real-life applications, such as portfolio selection and vehicle routing. We obtain new polyhedral results and a B&C approach without binary variables for CCOPs. We present computational results.

2) The Multi-Stage, Uncapacitated Stochastic Lot-Sizing Problem: Algorithms & Polyhedral Structure, ***Andrew J. Miller***, CORE, 34 Voie du Roman Pays, Louvain-la-Neuve, 1348, Belgium, miller@core.ucl.ac.be, http://core4ux.core.ucl.ac.be/~miller, ***Shabbir Ahmed***

We discuss algorithms for and the complexity of SLP, and present valid inequalities for SLP that define the convex hull of structured relaxations. Subject to progress, computational results will be provided. Our contributions could prove fundamental both in solving lot-sizing problems under uncertainty and in solving structured stochastic mixed integer programs.

3) Conservation vs. Consumption: Designing Marine Reserves for Fishery Management, ***Anuj Mehrotra***, University of Miami, 417K Jenkins Bldg., Coral Gables, FL 33124, anuj@sba.miami.edu, ***Geoffrey A. Meester, Jerald S. Ault, Edward K. Baker***

We propose a suite of methodologies for designing marine reserves in spatially heterogeneous ocean environments. Our research utilizes data from the Florida Keys National Marine Sanctuary and provides insight into the strategic use of varying configurations of reserves to increase productivity and sustainability of coral reef fish stocks.

SC09 DO-15

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Rekha R. Thomas, University of Washington, Dept. of Math., 438 Padelford, Box 345350, Seattle, WA 98195, thomas@math.washington.edu

1) Supernormal Vector Configurations, ***Serkan Hosten***, San Francisco State, serkan@math.sfsu.edu

A supernormal configuration is a Hilbert-basis H where any cone generated by a subset of H has its Hilbert basis in H. This provides a generalization of unimodular configurations. In particular, we prove that the chamber complex of H is equal to the Groebner fan of associated integer programs.

2) Algebraic Unimodular Counting, ***Jesus Deloera***, University of California, Davis, CA, deloera@math.ucdavis.edu

For a unimodular matrix A and an integral vector b, we consider the counting function phi_A(b)= {x : Ax=b x>=0 } . The functions phi_A(b) appear in statistics (contingency tables) and polyhedral combinatorics (Birkhoff's polytope). We discuss different algebraic representations of the counting function phi_A(b) and how they help to efficiently compute concrete answers.

3) Polynomial Function Minimization & SDP, ***Pablo A. Parrilo***, California Institute of Technology, Control & Dynamical Systems, MS 107-18, Pasadena, CA 91125-8100, pablo@cds.caltech.edu, ***B. Sturmfels***

We compare algorithms for global optimization of multivariate polynomials. We demonstrate that existing algebraic methods, i.e., Grobner bases, resultants, homotopy methods, etc., are dramatically outperformed by convex relaxation techniques, involving sums of squares and SDP. We conclude that relaxations are surprisingly effective in achieving the exact optimum. This opens up the possibility of using SDP relaxations...

SC10 Tutorial: Complementarity Problems - Applications & Algorithms

Cluster: Complementarity & Related Problems
Sponsor: Optimization
Sponsored Session
Chair: Stephen C. Billups, University of Colorado, Dept. of Math., CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

1) Tutorial: Complementarity Problems - Applications & Algorithms, ***Stephen C. Billups***, University of Colorado, Dept. of Math., CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

SC11 Applications of Graph Theory to Integer Programming

Cluster: Networks & Graphs
Invited Session
Chair: Earl R. Barnes, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., 312 Groseclose Bldg., Atlanta, GA 30332, ebarnes@isye.gatech.edu

1) Clique Inequalities & their Use in Solving DNA Sequencing Problems, ***Eva K. Lee***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, eva.lee@isye.gatech.edu, ***Todd Easton***

We construct graphs related to certain DNA sequencing problems and prove that feasible solutions are characterized by the solution of a node-packing problem in a complete graph. Computational results involving clique inequalities will be discussed.

2) A Branch & Bound Procedure for the Maximum Clique Problem, ***Dawn Strickland***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, dawn.strickland@isye.gatech.edu, ***Earl R. Barnes***

We will focus on a B&B algorithm for finding the maximum weighted and unweighted clique in a graph. The efficiency of the algorithm is demonstrated on the DIMACS benchmark graphs as well as on a few random graphs.

3) Computing the Lovasz Theta Number of a Graph, ***Samuel Burer***, Georgia Institute of Technology, School of Mathematics, Atlanta, GA 30332, burer@math.gatech.edu, ***Renato D. C. Monteiro***

We discuss the practical challenges of computing the Lovasz theta number of a given graph and then describe an efficient implementation based on solving a semidefinite programming problem. Computational results are also presented.

SC12 Tabu Search & Military Logistics Problems

Cluster: Combinatorial Optimization
Invited Session
Chair: J. Wesley Barnes, University of Texas, Grad. Program in OR/IE, Austin, TX 78712, wbarnes@mail.utexas.edu

1) A Reactive Group Theoretic Tabu Search Approach to the Aerial Fleet Refueling Problem, ***Victor D. Wiley***, University of Texas & USAF, Grad. Program in OR, Austin, TX 78712, vicwiley@mail.utexas.edu, ***J. Wesley Barnes***

In the aerial fleet refueling problem, we desire to determine the optimal use of a known fleet of tanker aircraft to support the deployment of combat and transport aircraft to a foreign theater. We describe the modeling, implementation and results of a method for the solution of this problem.

2) Solving the Theater Distribution Multiple Trip Multiple Service Vehicle Routing & Scheduling Problem with Group Theoretic Tabu Search, ***John R. Crino***, AFIT/ENS, Op. Sci. Grad.

Sch. Eng./Mgmt., 2950 P St., WPAFB, OH 45433-7765, john.crino@afit.edu, ***James T. Moore***, ***William Nanry***

The military theater distribution problem can be solved as a VRSP. A group theoretic tabu search approach is presented that determines the routing and scheduling of multi-modal theater transportation assets and solves the multiple-trip, multiple-service instance of the theater distribution problem.

3) The Tanker Crew Scheduling Problem, ***Todd E. Combs***, USAF, AFIT/ENS, Op. Sci. Grad. Sch. Eng./Mgmt., 2950 P St., WPAFB, OH 45433-7765, todd.combs@afit.af.mil, ***James T. Moore***, ***J. Wesley Barnes***

We present a group theoretic tabu search approach to solving the US Air Force tanker crew scheduling problem that arises in a force deployment to a foreign theater of operations. This problem is directly associated with the aerial fleet refueling problem.

4) Using Conjugator Simplices to Construct Search Neighborhoods of Defined Structure & Density, ***David Neuway***, University of Texas, Grad. Program in OR, Austin, TX 78712, ***J. Wesley Barnes***

We describe how group theory can be used to design metaheuristic search neighborhoods of predefined form for partitioning and ordering problems where the solution space has a known structure.

SC13 Tutorial: A New Look at Linear Optimization

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Tamas Terlaky, McMaster University, Dept. of Computing & Software, 1280 Main St. West, Hamilton, Ontario, L8S 4L7, Canada, terlaky@mcmaster.ca

1) Tutorial: A New Look at Linear Programming, ***Robert J. Vanderbei***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, rvdb@princeton.edu

SC14 Tutorial: Interior-Point Methods & Semi-Definite Programming

Invited Session

Chair: Yin Zhang, Rice University, Dept. of CAAM, Houston, TX 77005, yzhang@caam.rice.edu

1) Tutorial: Interior-Point Methods & Semi-Definite Programming, ***Yin Zhang***, Rice University, Dept. of CAAM, Houston, TX 77005, yzhang@caam.rice.edu

SC15 Operations Mangement VI

Contributed Session

Chair: John Jackman, Iowa State University, 2019 Black Engineering, Ames, IA 50011, jkj@iastate.edu, http://www.ecl.imse.iastate.edu/jackman/jackman.html

1) Modeling Product Development Processes, ***Yi-Chiuan Lai***, Iowa State University, 2019 Black Engineering, MB 49, Ames, IA 50011, ylai@iastate.edu, http://www.eng.iastate.edu/~ylai/, ***John Jackman***

Using IDEF0 to represent a product development process, we show how a generic simulation model can be developed based on IDEF0. This mapping between IDEF0 and the model can be easily extended to a variety of simulation languages.

2) Optimization of Gas Field Operations, ***Wafik H. Iskander***, West Virginia University, IMSE Dept., PO Box 6070, Morgantown, WV 26506-6070, whiskander@mail.wvu.edu, ***Majid Jaraiedi***

Statistical methods are applied to predict the production of wells in a gas field as a function of their geological properties and other controllable parameters. Optimization techniques are then used to determine the optimal values of the controllable parameters such that the cumulative production of a well is maximized.

3) Some Analytic Results for a Periodic Review Lost Sales Problem, ***Ganesh Janakiraman***, Cornell University, Dept. of OR/IE, 287 Rhodes Hall, Ithaca, NY 14853, ganesh@orie.cornell.edu, ***John A. Muckstadt***

A single-item, single-location, periodic review inventory procurement problem is studied. Demand is modeled as a continuous time stochastic process. The lead time is between 0 and the length of a period. Demand that cannot be satisfied with inventory on hand is lost. Properties of the optimal ordering policy are the main focus. We also consider the class of order-up-to-S policies...

4) Comparing Process-Based Costing Methods: A Trade-Off between Accuracy & Data Intensity, ***Randolph E. Kirchain***, MIT, CTPID-MSL, 77 Mass Ave., Rm. E40-212, Cambridge, MA 02139, kirchain@mit.edu, ***Francisco M. Veloso***, ***Richard Roth***

We analyze the trade-offs between data intensity and accuracy of manufactured part cost estimates. Process-based costing methods utilizing different levels of data requirements were compared using an example from the automotive industry. Preliminary results indicate that reasonable estimates can be obtained based on minimal descriptive data.

SC16 Cross-Trained Labor: Models of Workforce Agility

Sponsor: MSOM
Sponsored Session

Chair: Mark P. Van Oyen, Loyola University, Dept. of ISOM, 25 East Pearson St., Chicago, IL 60611-2196, mvanoye@luc.edu

1) Scheduling of an Agile Worker in a Serial Production Process, ***Seyed Iravani***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., C210 Tech., Evanston, IL 60208, iravani@iems.nwu.edu, ***Morton J. M. Posner***, ***John A. Buzacott***

We study the scheduling of a cross-trained worker in a serial production process. Considering switching and holding costs, we show that very close to optimal solution can be obtained by solving a shortest path problem.

2) Bucket Brigades with Varying Worker Speeds, ***Dieter Armbruster***, Arizona State University, Dept. of Math, Tempe, AZ 85287, dieter@source.la.asu.edu, ***Esma S. Gel***

We study the effect of worker speed on the dynamics of bucket brigades. We consider 2 workers with different productivities for different tasks. We augment the bucket brigade rules such that it balances to either a stable fixed point or a period 2 orbit, regardless of initial positions and for all worker speeds.

3) Dynamic Line Balancing & Variability Buffering via Cross-Training, ***Eylem Tekin***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, eylem@iems.nwu.edu, ***Wallace J. Hopp***, ***Mark P. Van Oyen***

We define D-skill chaining (DSC), a particular pattern of cross-training that assigns D skills to each worker. We discuss the line balancing properties of DSC. Considering variability, we identify effective heuristic worker coordination policies and use them to demonstrate the efficiency and robustness of this approach to labor-constrained production.

SC17 Complex, Stochastic Production/Inventory Systems

Sponsor: MSOM
Sponsored Session

Chair: Geert-Jan van Houtum, Eindhoven University of Technology, Fac. of Tech. Mgmt., PO Box 513, Eindhoven, 5600 MB, The Netherlands, g.j.v.houtum@tm.tue.nl

1) withdrawn 10/12: Managing Manufacturing Risks by using Capacity Options, ***Baris Tan***, Koc University, Grad. Sch. of Business, Rumeli Feneri Yolu, Sariyer, Istanbul, Turkey, btan@ku.edu.tr, ***Soundouss Bouhia***, ***Frederick H. Abernathy***

2) Single Index Policies for Inventory Systems with Dual Supply Modes, ***Alan Scheller-Wolf***, Carnegie Mellon University, 319 Posner Hall, 5000 Forbes Ave., Pittsburgh, PA 15213, awolf@andrew.cmu.edu, ***Geert-Jan van Houtum***

We examine a retailer facing stochastic demand who can obtain stock from two supply modes having different static leadtimes and unit costs. As optimal policies are complex, we introduce a basestock like heuristic. We obtain parameters and costs for our heuristic, and compare these with those of other policies.

3) Inventory Control with Advance Orders & Limited Capacity, ***Ozalp Ozer***, Stanford University, 335 Terman, Stanford, CA 94305-4026, ozalp.ozer@stanford.edu

We incorporate advance orders into a single-item, periodic review inventory model with a finite production capacity. After establishing an optimal control policy, we characterize its behavior with respect to advance orders and capacity. We illustrate how advance orders can be used to mitigate the shortfall of limited capacity.

4) Multi-Echelon Production/Inventory Systems with a Given Reorder Interval per Stage, ***Geert-Jan van Houtum***, Eindhoven University of Technology, Fac. of Tech. Mgmt., PO Box 513, Eindhoven, 5600 MB, The Netherlands, g.j.v.houtum@tm.tue.nl, ***Alan Scheller-Wolf***, ***Jinxin Yi***

We consider the Clark & Scarf (1960) model with a given reorder interval per stage. With the latter, one obtains a form of batching that may be more appropriate for production environments than what is obtained by (R,nQ)-policies. We show the optimality of basestock policies and how to compute the optimal basestock levels.

SC18 ERP: Extensions

Cluster: Enterprise Resource Planning
Invited Session

Chair: Ashok K. Soni, Indiana University, Kelley Sch. of Bus., Bloomington, IN 47405, soni@indiana.edu

1) Enterprise Resource Planning: Excuse Me?, ***Jamison Day***, Indiana University, Kelley Sch. of Bus., Operations & Dec. Tech. Dept., Bloomington, IN 47405, jday@indiana.edu, ***F. Robert Jacobs***

We explore a new enterprise process-modeling framework that maps directly to a flexible centralized enterprise resource tracking information system. These tools provide for consolidation of organizational information, but unlike ERP, will not require companies to succumb to "best practices" and forfeit competitive advantages since customization is nearly effortless.

2) ERP Integration through Legacy Rejuvenation, ***Irma Becerra-Fernandez***, Florida International University, Dept. of DS/IS, BA250, Coll. of Bus. Admin., Miami, FL 33199, becferi@fiu.edu, ***Dominick Parlapiano***, ***Joyce Elam***

ERP systems and SCM software are useful in optimizing machine-to-machine interactions. Although the literature touts advantages of implementing ERP systems, evidence also points to implementation failures that have resulted in considerable losses. We describe a technology that can be used to rejuvenate and retool legacy systems into modern web-based ERP applications.

3) The Value of Sharing Lead-Time Information in Custom Production, ***Edieal Pinker***, University of Rochester, Simon Sch., Rochester, NY 14627, pinker@simon.rochester.edu, ***Gregory Dobson***

The widespread adoption of ERP systems has increased the ability of firms to share operational data with customers. Factors that determine whether or not lead-time informaion sharing benefits firms are analyzed using a stochastic model of a custom production environment with pricing where customers have differing tolerances for waiting.

4) Environmental Management in Enterprise Resource Planning Systems, ***Deanna H. Matthews***, Carnegie Mellon University, Civil & Environ. Eng., Pittsburgh, PA 15213, dhm@cmu.edu, ***Antje Januschkowetz***

Environmental management systems such as ISO 14001 do not require data collection and reporting for long-term environmental strategy planning. We discuss the limitations of current EMS frameworks in assisting decision makers and consider enterprise resource planning systems as a means to effectively and efficiently provide relevant environmental performance information.

SC19 Logistics III

Contributed Session

Chair: Eleni Pratsini, IFOR, ETH Zurich, Clausiusstrasse 47, Zurich, CH, 8092, Switzerland, pratsini@ifor.math.ethz.ch

1) Modeling of a Distribution Logistics System, ***Eleni Pratsini***, IFOR, ETH Zurich, Clausiusstrasse 47, Zurich, CH, 8092, Switzerland, pratsini@ifor.math.ethz.ch, ***Martin Bugmann***

A modeling framework of the distribution network within a firm's supply chain is presented. The elements and their characteristics are divided into various echelons that facilitate the representation and analysis of the network. The framework is applied to the distribution network of an international company and the results are discussed.

2) Integrated Logistics Network Planning, ***Jean-Francois Cordeau***, University of Montreal, Ecole des HEC, 3000 Cote-Ste-Catherine, Montreal, Quebec, H3C 2A7, Canada, jean-francois.cordeau@hec.ca, www.crt.umontreal.ca/~cordeau, ***Guillaume Hamer-Lavoie***, ***Federico Pasin***

We describe the model and the solution methodology developed to solve the logistics network design problem of a grocery distributor. The model is used to locate warehouses, choose their type and capacity and determine the flows of goods in the network. Preliminary computational results are reported.

3) A Flow Path Design for Trip Based Material Handling Systems, ***Ardavan Asef-Vaziri***, University of Houston, Dept. of IE, Houston, TX 77204-4812, asefvaziria@mu.edu, ***Maged Dessouky***, ***Chelliah Sriskandarajah***

We develop an integer programming formulation to design a flow path for trip-based material handling systems. The model simultaneously determines the design of the circular flow path and the location of the input and output stations. To solve the problem, we concentrate on developing a better formulation for the LP sub-problem, pre-processing, identifying the appropriate set of LP/IP routines in CPLEX and developing an efficient B&B solution procedure.

4) withdrawn 10/12: A New Class of Control Policies for Recovery Systems with Different Lead Times, ***Gudrun P. Kiesmuller***, Technische Universiteit Eindhoven, PO Box 513, Eindhoven, 5600 MB, The Netherlands, g.p.kiesmueller@tm.tue.nl

SC20 Technology Management Education & Experiential Learning

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session

Chair: David Wilemon, Syracuse University, Innovation Mgmt. Program, Sch. of Mgmt., Ste. 400, Syracuse, NY 13244, dwilemon@som.syr.edu

1) Graduate Management of Technology Education Programs: Issues & Trends, ***Satish Nambisan***, RPI, Lally Sch. of Mgmt., 110 & 8th St., Troy, NY 12180, ***David Wilemon***

An area of recent rapid growth in many colleges and universities has been MOT programs. We focus on a recently concluded global study on the current state of graduate MOT educational programs. Trends, research emphasis, curriculum themes, sponsorship and future developments are examined.

2) Corporate Venturing: Learning from Experience & Hard Knocks, ***David Wilemon***, Syracuse University, Innovation Mgmt. Program, Sch. of Mgmt., Ste. 400, Syracuse, NY 13244, dwilemon@som.syr.edu

An area in innovation and corporate strategy that has created considerable interest is the concept of corporate venturing. Unfortunately, the promise of venture teams and venturing as an organizational process has frequently failed to produce the expected results. We examine what we have learned from corporate venturing and its potential role in shaping enterprises of the future.

3) Strategic Implications of Technological Innovations that are Hard to Sell, ***Stephen Luxmore***, SUNY, Sch. of Bus., Oswego, NY 13126, luxmore@oswego.edu, ***Kenneth Shaw***

Considering the last decades' success, the rate of innovation in the biotechnology industry is expected to remain high. It is reasonable to surmise that in addition to corporate and personal goals, an intended outcome of biotechnological research is to benefit society. Yet how should companies react in the face of public scrutiny and often resulting mistrust for technological innovation? We examine the strategic implications of researching, developing and bringing to market technology that is hard to sell.

SC21 Flexible Assembly Systems

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: Kathryn E. Stecke, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) Optimization of Operator Work Paths in a Mixed-Model Assembly Line, ***Erica Z. Klampfl***, Ford Motor Co., E-Tech. Research Dept. SRL Bld, 2101 Village Rd., MD 2122, Dearborn, MI 48124, eklampfl@ford.com, ***Celestine Aguwa***, ***Gene Coffman***, ***Oleg Gusikhin***

We address optimization of operator work paths to perform a set of tasks in a paced mixed-model assembly line. The work path depends on the arrangement of parts within a work cell as well as the sequence of steps necessary to perform the tasks subject to a given product mix.

2) Analytical Performance Evaluation of Kanban Systems using a New Approximation for Fork/Join Stations, ***Ananth Krishnamurthy***, University of Wisconsin, Ctr. for Quick Response Mfg., 1513 University Ave., Madison, WI 53706-1572, akrishna@cae.wisc.edu, ***Rajan Suri***, ***Mary Vernon***

We present an analytical method based on parametric decomposition for the performance evaluation of kanban systems. Using new 2-moment approximations for fork/join stations, closed queueing network models of kanban systems are analyzed. We discuss the computational advantages of the approach and compare our results to simulation.

3) Balancing & Scheduling of Surface Mount Technology Lines, ***Tadeusz J. Sawik***, University of Mining & Metallurgy, Dept. of Comp. Integrated Mfg., Al. Mickiewicza 30, Krakow, 30-059,

Poland, ghsawik@syf-kr.edu.pl

MIP formulations are proposed for balancing and scheduling SMT lines. An SMT line consists of processing stages, separated by finite buffers. Each stage has 1 or more parallel machines. The objective is to determine an assignment of components to feeder slots at placement stations and the shortest schedule for a mix of boards.

SC22 Strategic Issues in Supply Chain Management

Cluster: Supply Chain Management
Invited Session

Chair: Jovan Grahovac, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70125, jgrahov@tulane.edu, jovan.grahovac@tulane.edu

1) Managing Technological Disruptions during Application Services Provision, ***Nitin Joglekar***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu, ***P. R. Balasubramanian***

ASPs are used in the IT industry to overcome service gaps caused by both labor shortages and technology migration delays. We model the effects of service customization, capacity and know-how accumulation on the desirability of outsourcing, subject to disruption in the technical perforamnce of the base application.

2) The Effect of Supply Chain Glitches on Shareholder Wealth, ***Kevin B. Hendricks***, University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St. North, London, Ontario, N6A 3K7, Canada, khendriskc@ivey.uwo.ca, ***Vinod R. Singhal***

We investigate the stock market reaction around the time when firms publicly announce that they are experiencing supply chain glitches that are causing production or shipping delays. The results are based on a sample of 861 supply chain glitch announcements made during 1989-1998. We estimate that supply chain glitches are associated with a market-adjusted decrease in shareholder value of 8.62%.

3) Collaboration & Inventory Allocation: Is Time Really Worth More than Money?, ***M. Eric Johnson***, Dartmouth College, Tuck Sch. of Bus. Admin., Hanover, NH 03755, m.eric.johnson@dartmouth.edu

Exchanges in many industries have focused on collaboration, providing information visibility to multiple supply chain partners. Sharing future demand information is a key component of many such collaborative supply chain relationships. We examine how information sharing and allocation policies can impact order fullfilment.

4) Configuring the Supply Chain: Impact of Product & Process Modularity on Outsourcing Decisions, ***Jovan Grahovac***, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70125, jgrahov@tulane.edu, jovan.grahovac@tulane.edu, ***Geoffrey G. Parker***

We investigate how the ability to separate a product or process module from the whole, combined with the costs and risks of maintaining the expertise and other assets necessary.to produce the module, impacts outsourcing decisions and the structure of the supply chain.

SC23 Addressing Bidding & Winner-Determination Complexity in High-Dimensional, Uncertain & Dynamic Environments

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: David C. Parkes, University of Pennsylvania, Dept. of CIS, Philadelphia, PA, dparkes@unagi.cis.upenn.edu

1) Slot Trading in Collaborative Ground Delay Programs, ***Thomas Vossen***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, tvossen@rhsmith.um.edu, ***Michael O. Ball***

The introduction of collaborative decision making, a new paradigm for air traffic management, has had a significant effect on resource allocation procedures in ground delay programs. We discuss concerns of the FAA and airlines in this highly dynamic environment and propose new mechanisms for arrival slot trading in this setting.

2) Explicit Tractability Reasoning in Multi-Agent Systems during Negotiation of Insecure Multi-Dimensional Contracts, ***Peyman Faratin***, MIT, Ctr. for Coord. Sci., Sloan Sch., 77 Mass. Ave., Cambridge, MA 02139, peyman@mit.edu, ***Mark Klein***

The problem of interest is the design of protocols and tractable decision algorithms for autonomous computational trading agents operating in uncertain domains. Uncertainty results in an ill defined and intractable local optimization problem. A proposed solution is to explicitly reason about the complexity of optimization using heuristic decision rules conditioned on uncertain events.

3) Integer Programming for Evaluation of Bids for Coordinated Tasks, ***John Collins***, University of Minnesota, Dept. of CSE, jcollins@mail.cs.umn.edu, ***Maria Gini***

We extend the IP models proposed by Nisan & Andersson for winner determination in combinatorial auctions to the problem of evaluating bids for coordinated task sets. This requires relaxing the free disposal assumption and the encoding of temporal constraints in the model. We show how this model is used for bid evaluation in a MAGNET negotiation agent.

SC24 Supply Chain Management III

Contributed Session

Chair: Wooseung Jang, University of Missouri, E3437 Engineering Bldg. East, Columbia, MO 65211, jangw@missouri.edu

1) Optimal Pricing Strategy in a Coordinated Supply Chain, ***Wooseung Jang***, University of Missouri, E3437 Engineering Bldg. East, Columbia, MO 65211, jangw@missouri.edu, ***Cerry M. Klein***

We develop 2-stage supply chain models to analyze the impact of information sharing. The chain consists of one manufacturer with non-linear production cost and multiple non-homogeneous distributors. Under this scenario, we find optimal pricing strategies for the manufacturer and the entire chain.

2) Encouraging Suppliers to Launch New Models Early, ***Richard K. Cho***, University of Waterloo, Dept. of MS, 200 University Ave. West, Waterloo, Ontario, N2L 3G1, Canada, k2cho@engmail.uwaterloo.ca, www.eng.uwaterloo.ca/~k2cho/, ***Yigal Gerchak***

We assume a retailer and 2 vendors operating in a competitive market that determines the retail price. Market demand is assumed to be deterministic, but depends on the launching time. We use a principal-agent framework to develop a scheme by which the retailer can maximize its profit without any investment.

3) A Theory of Supply Chains with Empirical Evidence from the Automobile Industry, ***Mihkel M. Tombak***, Queen's University, School of Bus., Kingston, Ontario, K7L 3N6, Canada, mtombak@business.queensu.ca

The conditions under which a supply chain of independent manufacturers can compete with vertically integrated firms are examined. Market characteristics such as competition, bargaining power as well as firm conditions such as efficiency are studied. The theory is tested with empirical results from the automobile industry.

4) Coordination Strategies for Products with a Short Life Cycle in a Capacitated Channel, ***Binling Lu***, Purdue University, Krannert Grad. Sch. of Mgmt., West Lafayette, IN 47907, binling_lu@mgmt.purdue.edu, ***Kwei Tang***

We address the issue of determining the order commitment time. It is assumed that the distributor uses an information gathering process to improve the demand forecast accuracy over time. In addition, the manufacturer's production capacity is explicitly considered as a decision factor.

SC25 Recent Advances in Scheduling

Cluster: Scheduling
Invited Session

Chair: Marc E. Posner, Ohio State University, Dept. of IE, 1971 Neil Ave., Columbus, OH 43210-1271, posner.1@osu.edu

1) Performance Guarantees of Algorithms for Scheduling Advertisements on a Web Page, ***Chelliah Sriskandarajah***, University of Texas at Dallas, Sch. of Mgmt., Richardson, TX 75083-0688, chelliah@utdallas.edu, ***Milind W. Dawande***, ***Subodha Kumar***

Advertising revenue is critical for many websites providing free services to users. Two problems, MINSPACE and MAXSPACE, of scheduling advertisements on a web page are considered. We develop approximation algorithms as they are shown to be strongly NP-hard.

2) Facts & Questions about the Maximum Deviation Just-in-Time Problem, ***Nadia Brauner***, Universite Piere Mendes France, Laboratoire Leibniz, 46 avenue Felix Viallet, Grenoble Cedex, 38031, France, nadia.brauner@imag.fr, ***Yves Crama***

We revisit a production sequencing model motivated by JIT scheduling approaches. This model aims at minimizing, at every instant, the maximum deviation from an ideal productivity target. We provide new insights into the complexity of the model, discuss properties of a few special cases and propose questions for further investigation.

3) On the Asymptotic Optimality of an On-Line Algorithm for the Stochastic Single Machine & Flow Shop Average Weighted Completion, ***Cheng-Feng Chou***, Northwestern University, Dept. of IE/MS, cfchou@mit.edu, ***Hui Liu***, ***Maurice Queyranne***, ***David Simchi-Levi***

We consider stochastic single-machine and non-permutation flow shop expected average weighted completion time problems with release dates. Before a job is completed, only its weight and expected, not actual, processing time(s) are known. Under some assumptions, we show that a simple on-line algorithm is asymptotically optimal for both problems.

4) Models for Minimally Disruptive Scheduling, ***Nicholas G. Hall***, Ohio State University, Dept. of MS, 2100 Neil Ave., Columbus, OH 43210-1144, hall.33@osu.edu, ***Chris N. Potts***

We describe models that can be used to reschedule a set of existing jobs when several new jobs, some with higher priorities, arrive. The objectives considered are various definitions of classic scheduling cost plus a disruption cost for moving previously scheduled jobs. Efficient algorithms are described for many cases.

SC26 Issues on Uncertainty in Project Management

Cluster: **Project Management**
Invited Session

Chair: Unver Cinar, Sabanci University, Grad. Sch. of Mgmt., Orhanli, Tuzla, Istanbul, 81474, Turkey, unver@sabanciuniv.edu

1) withdrawn 10/10: Fuzzy Issues in Software Project Management, ***Maciej Hapke***, Poznan University of Technology, Piotrowo 3a, Poznan, 60-965, Poland, hapke@cs.put.poznan.pl

2) Performance Measurements for Technology Project Tracking & Coordination, ***Savas Ozatalay***, Widener University, 1 University Place, Chester, PA 19013-5792, savas.ozatalay@widener.edu

Technology-related projects differ from others by having less defined objectives and being subject to greater risks. This necessitates development of technology project specific performance criteria. We propose a performance measure development process for technology-related projects by integrating organizational, functional, operational and external readiness questions.

3) An Approach to Integrate Concepts of Evolutionary Acquisition & Project Management, ***Unver Cinar***, Sabanci University, Grad. Sch. of Mgmt., Orhanli, Tuzla, Istanbul, 81474, Turkey, unver@sabanciuniv.edu

We offer an approach to reduce uncertainty in the management of projects that are amenable to evolutionary acquisition. Evolutionary acquisition is used for projects where final requirements, hence, alternative solutions can not be specified in advance, creating problems in the generation of time, resource and cost estimates.

SC27 Process Monitoring & Quality Improvement

Cluster: **Quality Management**
Invited Session

Chair: Paul Zantek, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, pzantek@rhsmsith.umd.edu

1) Theory of Constraints: A Missing Link in Your Quality Improvement Effort, ***Thomas Hsiang***, Sensient Technologies Corporation, 777 East Wisconsin Ave., Ste. 1100, Milwaukee, WI 53202-5304, tom.hsiang@sensient-tech.com

Whether we are talking about quality/process improvement, Six Sigma or any improvement effort, I believe that the concept of TOC must be at the heart of the coordination of improvements activities. We focus on the application of TOC to quality improvement efforts. Real cases are presented.

2) Design & Analysis of a New Multivariate Quality Control Chart, ***Frank B. Alt***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, falt@rhsmith.umd.edu, ***Paul Zantek***

We propose a multi-variate procedure for simultaneous monitoring of several quality variables. We discuss the design of the procedure, i.e., choice of control limits, and then evaluate its performance using simulation. The procedure's performance is compared with that of existing monitoring procedures, including the multi-variate exponentially weighted moving average chart.

3) Monitoring Process Quality in Manufacturing Systems with Correlated Stages, ***Paul Zantek***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, pzantek@rhsmsith.umd.edu

Manufacturing systems typically contain processing and assembly stages whose output quality is significantly affected by the output quality of preceding stages in the system. We propose and evaluate a new CUSUM control chart procedure for monitoring process quality in manufacturing systems with correlated stages. Performance results will be given.

SC28 MCDM Approaches to Portfolio Selection

Cluster: **Multi-Criteria Decision Making**
Invited Session

Chair: H. Roland Weistroffer, Virginia Commonwealth University, Sch. of Bus., PO BOx 844000, Richmond, VA 23284-4000, hrweistr@vcu.edu

1) A Multiple Criteria Portfolio Problem, ***Pekka J. Korhonen***, Helsinki School of Economics, Runeberginkatu 22-24, PO Box 1210, Helsinki, 00101, Finland, korhonen@hkkk.fi, www.hkkk.fi/~korhonen

We deal with an extension of a classic portfolio selection problem. The problem consists of one quadratic, but several linear, objectives and a set of linear constraints. The multi-objective NLP problem can be transformed into a linear form by applying linear complementarity formulation and then to solve by using a modified reference direction approach.

2) Pharmaceutucal Portfolio Optimization in Silico, ***Samuel Holtzman***, Stanford University/Entelos, Inc., Dept. of MSE, Stanford, CA 94305-4026, holtzman@entelos.com

Pharmaceutical R&D faces daunting odds. R&D consumes more than 20% of sales, expenditures are doubling every 5 years and 80% of clinical trials fail. In Silico, drug discovery and development provides solutions to dramatically strengthen portfolio management and increase portfolio value through breakthrough insights and reliable predictions of success and failure.

3) A Framework for Modeling & Solving Portfolio Selection Problems, ***Charles H. Smith***, Virginia Commonwealth University, Sch. of Bus., PO Box 4000, Richmond, VA 23284-4000, chsmith@vcu.edu, ***H. Roland Weistroffer***, ***Subhash C. Narula***

We will classify various types of portfolio problems, describing solution methods and applications. Special cases of portfolio selection problems have been analyzed using approaches such as goal programming, DA & GAs. We organize existing knowledge about portfolio selection problems based on their key structural characteristics.

SC29 Reliability I

Sponsor: **QSR**
Sponsored Session

Chair: Jayant Rajgopal, University of Pittsburgh, Dept. of IE, Pittsburgh, PA 15261, rajgopal@engrng.pitt.edu

1) Vague Coherent Systems, ***Nozer D. Singpurwalla***, George Washington University, 707 22nd St. NW, Washington, DC 20052, nozer@research.circ.gwu.edu, ***Kimberley Sellers***

Vague coherent systems are those systems whose component states and system states cannot be precisely classified. Ironically, most real life systems fall in this category. We articulate on vagueness and describe ways of dealing with the reliability of such systems. Central to our discussion is the role of consistency profiles.

2) Multi-Criteria Optimization of Reliable Networks, ***Abdullah Konak***, Auburn University, Dept. of IE, Auburn, AL 36849-5346, akonak@eng.auburn.edu, ***Alice E. Smith***

Cost, performance and reliability are the most important design criteria in telecommunication network design. Interest in network reliability has increased greatly as the telecommunication networks become vital for organizations and individuals. We present a multi-criteria GA approach to design reliable telecommunication networks. In addition, network reliability measures and their efficient evaluation are addressed.

3) Implications of Obvious vs. Silent Failures in Multi-State Markovian Deterioration Systems, ***Lisa M. Maillart***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48105, maillart@umich.edu

We discuss the impact of "obvious" or "self-announcing" failures on the analysis of maintenance policies for multi-state Markovian deterioration systems. These types of failures can complicate the analysis due to their effect on the steady state and transient behavior of the Markov chain.

4) Stochastic Reliability Models with Secure Back-ups, ***Songkyoo Kim***, Florida Institute of Technology, OR Dept., 150 West University Blvd., Melbourne, FL 32901, songkyoo@fit.edu, ***Jewgeni H. Dshalalow***

We deal with stochastic reliability systems that include a repair facility and 3 types of "unreliable" machines: the main facility of working and reserve machines and an auxiliary facility of "super-reserve" machines. Working machines break down exponentially and are immediately replaced by reserve machines available. Defective machines line up for repair, whose durations are arbitrarily distributed...rbitrarily distributed...

SC30 Risky Decision Making

Sponsor: Decision Analysis
Sponsored Session

Chair: Don N. Kleinmuntz, University of Illinois, Bus. Admin. Dept., 208 Wohlers, 1206 South Sixth St. MC-706, Champaign, IL 61820, dnk@uiuc.edu

1) The Effect of Medium on Choice under Uncertainty, ***Christopher Hsee***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, chris.hsee@gsb.uchicago.edu

When people try to achieve outcomes, often the immediate payoff is some "medium," which can be traded for desired outcomes, e.g., points, stocks and even money. When the relationship between effort and the (ultimate) outcome is uncertain, the medium creates an illusion of certainty, leading people to exert more effort.

2) Learning in Detection of Regime Shifts, ***George Wu***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, george.wu@gab.uchicago.edu, ***Cade Massey***

In previous research, we have documented a systematic pattern of over- and under-reaction that can be explained by a system neglect hypothesis. We extend these tests to situations in which subjects may be able to learn from feedback and find evidence of learning, but continued system neglect.

3) Risk Attitudes, Risk Perceptions, Revealed Preferences & the Use of Derivatives, ***Joost M. E. Pennings***, Wageningen University, Mktg./Consumer Behavior Group, Hollandseweg 1, Wageningen, 6706 KN, The Netherlands, joost.pennings@alg.menm.wau.nl, ***Don N. Kleinmuntz***

We investigate and compare the risk attitudes and risk perceptions of decision makers from the financial service industries (insurance, banking) and private investors. Different elicitation methods were compared and validated against stated preferences for particular futures and options contracts, as well as actual behavior (use of derivative contracts).

4) Investment Valuation & Disclosure of Market Risk: An Experimental Investigation, ***Don N. Kleinmuntz***, University of Illinois, Bus. Admin. Dept., 208 Wohlers, 1206 South Sixth St. MC-706, Champaign, IL 61820, dnk@uiuc.edu, ***Thomas J. Linsmeier***

U.S. companies must make quantitative disclosures of market risk exposures using 1 of 3 methods: tabular, sensitivity analysis or value-at-risk. We compare risk perceptions and valuations using these and several related methods for disclosure. Implications for corporate risk management and financial reporting are discussed.

SC31 Decision Theory

Sponsor: Decision Analysis
Sponsored Session

Chair: Robert F. Nau, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, robert.nau@duke.edu

1) The Enterprise as a Network of Relationships: A New Approach to Employee Performance Evaluations, ***Miguel S. Lobo***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120

As firms move away from strictly hierarchical structures, existing performance evaluation systems become limited in their information usage, and inadequate in their incentives. We present a new methodology, where evaluations from higher-ranked employees are given more confidence. We discuss probability models, applicability of network analysis tools and trial results.

2) Structural Properties of Stochastic Dynamic Programs, ***James E. Smith***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, jes9@mail.duke.edu, ***Kevin F. McCardle***

We present several fundamental results for establishing properties, i.e., monotonicity, convexity, supermodularity, etc., of value functions for stochastic dynamic programs. The results are "meta theorems" showing that the value functions satisfy property P if the reward functions satisfy property P and the transition probabilities satisfy a stochastic version of P.

3) Uncertainty Aversion with Second-Order Probabilities & Utilities, ***Robert F. Nau***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, robert.nau@duke.edu

The Ellsberg and Allais paradoxes can be parsimoniously explained by a simple model of smooth, partially-separable non-expected utility preferences in which the decision maker is seemingly uncertain about her decision model and is averse to the uncertainty. Equivalently, she displays different risk attitudes toward bets on "ambiguous" and "non-ambiguous" events.

4) Joint Coherence: The Continuous Case, ***Kevin F. McCardle***, UCLA, Anderson Grad. Sch. of Mgmt., Westwood Plaza, Ste. D520, Los Angeles, CA 90095-1481, kmccardl@anderson.ucla.edu

We continue the development of joint coherence (Nau '92, Nau & McCardle '90, '91), a no-arbitrage condition on the joint behavior of a group of decision makers, by extending to the case where the decision makers have a continuum of strategies. Applications are considered.

SC32 Finance: Theory & Empirics II

Contributed Session

Chair: Yildiray Yildirim, Cornell University, Dept. of Statistical Sci., 116 Malott Hall, Ithaca, NY 14850, yy39@cornell.edu, http://www.people.cornell.edu/pages/yy39

1) Estimating Default Probabilities Implicit in Equity Prices, ***Yildiray Yildirim***, Cornell University, Dept. of Statistical Sci., 116 Malott Hall, Ithaca, NY 14850, yy39@cornell.edu, http://www.people.cornell.edu/pages/yy39, ***Robert A. Jarrow***, ***Tibor Janosi***

We use a reduced form model to estimate default probabilities implicit in equity prices. Four general conclusions can be drawn from this investigation. First, equity prices can be used to infer a firm's default intensities. Second, due to the noise present in equity prices, the point estimates of the default intensities that are obtained are not very precise...

2) Stochastic Programming for Integrated Market & Credit Risk Portfolio Management, ***Norbert J. Jobst***, Brunel University, Dept. of Math. Sci., Cleveland Rd., Uxbridge, UB8 3PH, UK, norbert.jobst@brunel.ac.uk, ***Gautam Mitra***, ***Stavros A. Zenios***

We present stochastic optimization models for portfolios of market and credit risk sensitive securities. Credit risk pricing models are extended for scenario generation purposes. Numerical results are presented for a model that is used to track corporate bond indices at both a tactical and strategic level.

3) Applying Stochastic Programming Bounds to Mean-Variance & Mean-Variance & Skewness Efficient Frontiers, ***Steftcho P. Dokov***, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712, steftcho@mail.utexas.edu, ***David P. Morton***

We consider a portfolio allocation model with a target-shortfall penalty and develop 2 approximations of that model using second- and third-order bounds on the model's objective function. The original model has MV efficient optimal solutions and the 2 proxy models possess MV and MV&S efficient optimal solutions.

SC33 OR & Breast Cancer I

Sponsor: Women in OR/MS/Health Applications
Sponsored Session

Chair: Janny M. Y. Leung, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, Hong Kong, janny@se.cuhk.edu.hk

1) Automated Breast Cancer Prognosis, ***Nick Street***, University of Iowa, MS Dept., S232 PBB, Iowa City, IA 52242, street@dollar.biz.uiowa.edu, nick-street@uiowa.edu

We will discuss new techniques for breast cancer prognosis that have arisen from the Xcyt project. This inter-institutional research uses image analysis and machine learning methods to create accurate, individualized prognostic models. Our goal is to reduce the reliance on lymph node dissection for breast cancer staging.

2) Discrete Event Simulation: A Vehicle for Understanding Adjuvant Breast Cancer Treatment Trials, ***Tillal Eldabi***, Brunel University, Dept. of IS & Computing, Uxbridge, Middlesex, UB8 3PH, UK, tillal.eldabi@brunel.ac.uk, ***Ray J. Paul***

We report on using discrete event simulation in modeling an RCT for adjuvant breast cancer treatment. The aim is to help identify the key factors in the RCT. It can be shown that simulation is useful for understanding the problem and enhancing systematic debate between the stakeholders.

3) A Maintenance Model for Breast Cancer Detection & Treatment, ***Julie E. Simmons Ivy***, University of Michigan, Business Sch., 701 Tappan St., Ann Arbor, MI 48109-1234, jsimmons@umich.edu

Maintenance models are traditionally applied to manufacturing problems dealing

with machine failure and replacement. We apply this framework to medical decision making for breast cancer treatment. We use a POMDP to determine when to have mammograms and given the information provided by the mammogram, the appropriate course of action.

4) Surviving Breast Cancer with OR/MS Tools, ***Sophie D. Lapierre***, Ecole Polytechnique de Montreal, CRT, CP 6079, Succ. Centre-ville, Montreal, Quebec, H3C 3A7, Canada, sophiel@crt.umontreal.ca

I will relate my own experience through treatments after being diagnosed with inflammatory breast cancer while 33 weeks pregnant. My story is structured around OR/MS tools such as queuing theory, statistical analysis, productivity and information systems.

SC34 Information Integration for Network Traffic Management

Sponsor: TSS
Sponsored Session
Chair: Wei Hua Lin, University of Arizona, SIE Dept., Tucson, AZ 85721

1) Real-Time Consistent-Normative Traveler Information Supply Strategies: Applications to Network Traffic Management, ***Khaled F. Abdelghany***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78751, kfaissal@mail.utexas.edu, ***Hani S. Mahmassani***

A mathematical formulation and solution algorithm for the problem of generating real-time consistent-normative information to users are presented. The formulation seeks to provide users with predicted link travel time information which induces route choice decisions that achieve system wide objectives (better spatial and temporal traffic distribution in the network), while at the same times minimizing inconsistency between supplied and experienced travel times.

2) A Coordination Scheme of Incident Management using Telematics Devices, ***Henry X. Liu***, University of California, California PATH, ATMIS Ctr., Inst. of Transport Studies, Irvine, CA, ***Rachel R. He***, ***Bin Ran***

Currently, many incident management strategies focus on diverting traffic through roadside devices such as CMS, traffic signal and ramp control. With the fast-growing telematics market and maturing traffic information services, telematics devices provide another feasible means to manage incidents more efficiently. An integrated coordination scheme for incident management is developed and evaluated using Paramics simulation.

3) Multicriteria Network Equilibrium Modeling with Variable Weights for Decision-Making in the Information Age, ***Anna Nagurney***, University of Massachusetts, Isenberg Sch. of Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu, ***June Dong***, ***Patricia L. Mokhtarian***

We develop a multicriteria network equilibrium framework for modeling decision-making in the information age. The decisions take place on a network in which the links can be either physical as in the case of transportation or virtual. We apply the modeling schema to teleshopping and telecommuting.

4) An On-Line Algorithm for Characterizing Non-Recurrent Congestion, ***Wei Hua Lin***, University of Arizona, SIE Dept., Tucson, AZ 85721

We consider a methodology for distinguishing non-recurrent congestion from recurrent congestion based on transformed occupancy information from loops. The method is capable of detecting the occurrence of an incident and estimating the magnitude of the incident. It requires little effort for calibrating its parameters and can be readily implemented on-line.

SC35 Dynamic Modeling of Common Carriers

Sponsor: TSS
Sponsored Session
Chair: Warren B. Powell, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, powell@princeton.edu

1) Flight Delays, Cancellations & the Impact on Airline Passengers, ***Stephane Bratu***, MIT, Ctr. for Transport. Studies, Cambridge, MA 02139, sbratu@mit.edu, ***Cynthia Barnhart***

As part of the Global Airline Industry Program at MIT, we investigate the impact of aircraft flight delays and cancellations on passenger service. Using operations and passenger booking data, we analyze the effects of schedule design and disruption, recovery strategies and policies, and load factors. We describe a case study using data from the airline service quality performance database and from major US airlines.

2) Dynamic Management of a Flexible Transit System, ***Teodor Gabriel Crainic***, University of Montreal, CRT, CP 6128, Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, theo@crt.umontreal.ca, ***Federico Malucelli***, ***Maddalena Nonato***

We study a transit system where several lines may be operated to respond to dynamically posted passenger requests. In a flexible environment, buses are detourred to pick up and drop off passengers who made explicit requests. The system must determine the actual itinerary for each passenger, as well as the resulting routing and schedule. We will discuss modeling and algorithmic issues, as well as implementation challenges in a dynamic setting.

3) A Multi-Agent Approach for Stochastic Multicommodity Flow Problems with Applications in Fleet Management, ***Huseyin Topaloglu***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, topalglu@princeton.edu, ***Warren B. Powell***

Problems in empty car distribution (railroads) and container management can be formulated as stochastic, integer multicommodity flow problems. We show that when we use nonlinear functional approximations in a multiagent setting, the problem reduces to sequences of pure networks. Numerical experiments demonstrate the effectiveness of the method.

SC36 Airline Operations Control

Sponsor: Aviation Applications
Sponsored Session
Chair: Michael D. Clarke, Sabre, Inc., 1 East Kirkwood Blvd., MD 7390, Southlake, TX 76092, michael.clarke@sabre.com

1) withdrawn 10/10: A Hub & Aircraft Recovery Model, ***Beniamino Paoletti***, Alitalia, Operational Research Dept., Viale A. Marchetti, Rome, 120-00148, Italy, paoletti.beniamino@alitalia.it, ***Susanna Cappelletti***, ***Simona Falcomata***, ***Camilla Lenner***

2) The Departure Enhanced Planning & Runway/Taxiway Assignment System: A A Fast Near-Term Departure Runway Scheduling Model for HAIA, ***Glenn Foster***, MITRE/CAASD, 1820 Dolley Madison Blvd., MS W196, McLean, VA 22102-3481, glennf@mitre.org, ***Wayne Cooper***, ***Michael Mills***, ***Satish Mohleji***

At major airports such as Atlanta, air traffic controllers must direct departures into a balanced traffic flow across multiple runways, with departure demand often exceeding runway throughput capacity. DEPARTS is a prototype MIP-based model that schedules departures in the next 30 minutes, maximizing the use of runway capacity and minimizing taxi times.

3) An Integrated Airline Legality & Cost Evaluation System for Crew & Fleet Management, ***Bo Vaaben***, Carmen Consulting, Fruebjergvej 3, Kobenhavn, DK 2100, Denmark, bov@carmen.se, ***Sergey Tiourine***

We present a concept for integration of the legality and cost evaluation of the different crew and fleet management systems of an airline. This integration proves particular valuable during operations control where fast and consistent evaluation is crucial.

SC37 Applications of Pricing in Transportation

Sponsor: Revenue Management & Pricing
Sponsored Session
Chair: Georgia Perakis, MIT, Sloan Sch. of Mgmt., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu

1) Computational Methods for Congestion Toll Pricing Models, ***Donald W. Hearn***, University of Florida, Ctr. for Applied Opt., ISE Dept., 303 Weil Hall, Gainesville, FL 32611, hearn@ise.ufl.edu, ***Li Hui Bai***, ***Mehmet Bayram Yildirim***

A toll pricing framework for congestion pricing has been developed for both fixed and elastic demand traffic assignment models as an alternative to traditional marginal social cost pricing. We will report the results of recent computational experiments on methods designed for various toll pricing objectives.

2) Congestion Pricing on a Large Urban Road Network, ***David E. Boyce***, University of Illinois, Dept. Civil & Materials Eng., 842 West Taylor St., Chicago, IL 60606-7023, dboyce@uic.edu, ***Frederik Noeth***

Solutions of the system-optimal and user-optimal road network assignment problem are presented for a multi-class, variable demand, multi-modal model. More limited road pricing options pertaining to tolling of express lanes of freeways and tolling of all freeways are then examined and compared to

classical marginal cost road pricing.

3) The "Price" of Traffic Delays in Dynamic Transportation Networks, ***Georgia Perakis***, MIT, Sloan Sch. of Mgmt., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu, ***Soulaymane Kachani***

Traffic congestion has become acute in recent years. A key question for understanding it is determining the "price" of delay in dynamic transportation systems. We present 2 macroscopic fluid dynamics models for analytically determining travel delays. These models incorporate the reaction of drivers to upstream and downstream congestion and link interaction effects.

SC38 Panel: Current Rail Issues I

Sponsor: RASIG
Sponsored Session
Chair: Bruce W. Patty, Kingsley Group, Inc., 44 Montgomery St., Ste. 3850, San Francisco, CA 94104, bpatty@kingsley-group.com

1) Roundtable Panel: Getting Ready for the Next Round of Mergers I, ***Bruce W. Patty***, Kingsley Group, Inc., 44 Montgomery St., Ste. 3850, San Francisco, CA 94104, bpatty@kingsley-group.com

Freight railroads in North America have been dramatically impacted by a number of mergers over the past decade. In reaction to the service impacts of these mergers, the Surface Transportation Board imposed a moratorium that culminated with a new set of guidelines. We will review how past processes used OR tools to support mergers, review what worked well and what didn't and discuss implications of the recent STB Ruling on Mergers.

SC39 Nicholson Student Paper Prize Competition II

Prize Session
Chair: Maurice Queyranne, University of British Columbia, Fac. of Commerce & Bus. Admin., Vancouver, BC, V6T 1Z2, Canada, maurice.queyranne@commerce.ubc.ca

1) Nicholson Student Prize Competition

This session features selected finalists in the Nicholson Student Paper Prize Competition. It represents an opportunity for faculty, professionals and other students to see some of the best research being performed by students. All are welcome.

SC40 Pricing & Operating Decisions in Energy Markets

Cluster: Energy
Sponsor: ENRE
Sponsored Session
Chair: Chonawee Supatgiat, Enron Corporation, 1400 Smith St., Houston, TX 77002, chonawee.supatgiat@enron.com

1) Current Trends in Energy Risk Management, ***Kevin Kindall***, Risk Analytics, FPL Energy, 11770 US Hwy One North, Palm Beach, FL 33408, kevin.kindall@fpl.com

The risk management function continues to rapidly evolve within the energy industry. We examine the evolution of the risk management function and highlight current trends that are of particular interest to practitioners. A variety of tools and techniques will be presented to address several of the current industry needs.

2) Strategic Pricing when Electricity is Storable, ***Alfredo Garcia***, The Brattle Group, 1133 20th St. NW, Ste. 800, Washington, DC 20036-3408, alfredo_garcia@brattle.com, ***James D. Reitzes***, ***Ennio Stacchetti***

We develop a dynamic Bertrand model of competition among hydroelectric generators. Unlike other competitors in electricity generation markets, hydro generations' current pricing decisions affect their future productive capacity through their impact on available water reserves. Our model assumes that each player uses a Markov strategy based on the current state of water reserves and water replenishment is governed by a stochastic process...

3) Equilibrium of Multi-Control Area Electricity Systems, ***Olivier Daxhelet***, Electrabel RD Energy Markets, Louvain-la-Neuve, B-1348, Belgium, olivier.daxhelet@electrabel.com, ***Yves Smeers***

We consider stylized models of an electricity market consisting of different control areas in interaction. Access to the network is organized according to different paradigms in each CA. Cross border trade takes place by auctioning "transfer capacities." The problem is handled as an equilibrium problem subject to equilibrium constraints.

4) Operating Generation Assets with Load Commitment Contracts in Electricity Markets, ***Chonawee Supatgiat***, Enron Corporation, 1400 Smith St., Houston, TX 77002, chonawee.supatgiat@enron.com

An agent operates a portfolio of generators to satisfy load commitment contracts. Under transmission capacity limitation, the agent can trade power with the market at bid-ask market prices. The loads, electricity prices, and fuel prices are stochastic. This large stochastic integer program is solved using Benders decomposition and Lagrangian relaxation.

SC41 Opportunities for Decision Making in an Aviation Maintenance Supply Chain

Cluster: Unsolved OR Problems in Industry
Invited Session
Chair: Maximilian M. Etschmaier, United Technologies Research Center, 411 Silver Lane, MS 129-55, East Hartford, CT 06108, etschmmm@utrc.utc.com

1) Opportunities for Decision Making in an Aviation Maintenance Supply Chain, ***Maximilian M. Etschmaier***, United Technologies Research Center, 411 Silver Ln, MS 129-55, East Hartford, CT 06108, etschmmm@utrc.utc.com

Significant efficiencies can be uncovered in any supply chain by exploiting inherent flexibilities. Airlines have been very successful in exploiting such flexibilities in their maintenance operations and associated supply chains. We characterize the entire aviation maintenance supply chains as dynamical systems, put past work into context and identify opportunities for future work on decision making modeling.

SC44 Telecommunications II

Contributed Session
Chair: Fotios C. Harmantzis, University of Toronto, ECE Dept., 10 King's College Rd., Toronto, Ontario, M5S 3G4, Canada, fotios@comm.toronto.edu, www.comm.toronto.edu/~fotios/

1) Network Traffic Modeling using Fractionally Autoregressive Integrated Moving Average Processes with Heavy-Tailed Innovations, ***Fotios C. Harmantzis***, University of Toronto, ECE Dept., 10 King's College Rd., Toronto, Ontario, M5S 3G4, Canada, fotios@comm.toronto.edu, www.comm.toronto.edu/~fotios/, ***Dimitrios Hatzinakos***

We propose the FARIMA process with stable innovations, for traffic modeling in broadband networks. Stable FARIMA is a linear traffic model that captures short- and long-range dependences as well as heavy-tailed behavior. We reduce the complexity of calibrating the model, introducing a 3-step algorithm.

2) A Lagrangian Relaxation for the Design of Cellular Networks with Diversity & Capacity Constraints, ***Elder M. Macambira***, Federal University of Rio de Janeiro, Cidade Universitaria PESC, PO Box 68511, Rio de Janeiro, 21945-970, Brazil, elder@cos.ufrj.br, www.cos.ufrj.br/~elder, ***Nelson F. Maculan***

We address the problem of designing partially survivable networks for cellular telecommunication systems. The objective is to find the assignment of cells to hubs that meets demand as well as survivability requirements at minimum cost. We are solving this problem by a Lagrangian relaxation based solution algorithm. The algorithm yields good quality solutions.

3) Node Placement & Sizing for Copper Broadband Access Networks, ***David F. Shallcross***, Telcordia Technologies, 445 South St., McC 1J306B, Morristown, NJ 07960, davids@research.telcordia.com, ***Tamra Carpenter***, ***Martin I. Eiger***, ***Paul D. Seymour***

We consider a node placement and sizing problem that arises in certain broadband telecommunications access architectures. We formulate 3 realistic variants of the problem that become progressively more restrictive. We present a dynamic programming algorithm to solve the 2 most practical variants of the problem and provide computational results.

4) Non-Dominated Solutions of Cost-Time Trade-Off Three Axial Sums' Transportation Problems, ***Lakshmisree Bandopadhyaya***, University of Delhi, Deshhandhu Coll., Kalkaji, Dept. of Math., New Delhi, 110019, India, lakshmisree_b@hotmail.com

An efficient method has been suggested to obtain all the non-dominated solutions of cost-time trade-off 3-axial sums' transportation problems. In order to obtain the non-dominated solutions, it is shown that one has to solve few standard 3-axial sums' problems. The number of these standard problems to be solved is at the most one more than the number of non-dominated solutions.

SC45 Operations Management IX

Contributed Session

Chair: Erol A. Pekoz, Boston University, 595 Commonwealth Ave., Boston, MA 02215, pekoz@bu.edu, http://people.bu.edu/pekoz/

1) Reducing System Variability via Arrival Process Smoothing: Application to an Intensive Care Unit, ***Erol A. Pekoz***, Boston University, 595 Commonwealth Ave., Boston, MA 02215, pekoz@bu.edu, http://people.bu.edu/pekoz/

Typical intensive care units have more variability in the arrival process of patients coming from elective surgery than of patients coming from the emergency room. This leads to unnecessary cost, medical errors and staff shortages. Using a queueing model we study the impact smoothing elective schedules would have.

2) Joint Price & Capacity Decisions under Repeated Interaction, ***Joseph M. Hall***, Dartmouth College, Tuck Sch., 100 Tuck Hall, Hanover, NH 03755, joseph.m.hall@dartmouth.edu, ***Evan L. Porteus***

We study optimal price and capacity decisions in a setting where customers repeatedly seek a good or service from a firm. Current demand for the good or service is assumed to depend on both current and past prices and service levels.

3) Further Experiments in Scatter Search for the Vehicle Routing Problem with Time Windows, ***Wen-Chyuan Chiang***, University of Tulsa, Op Mgmt. Dept., 600 South College Ave., Tulsa, OK 74104, wen-chiang@utulsa.edu, ***Robert A. Russell***

We continue our experiments in scatter search applied to solving the VRP with time windows. We examine issues such as reference set size, quantity vs. quality and other search strategies. Computational results will be reported.

4) Generalized Model for Single-Level Capacitated Multi-Item Lot Sizing with Backorders, Shelf-Life Limits, Setup Times & Setup Carryovers, ***Harvey H. Millar***, Saint Mary's University, Sobey Fac. of Commerce, Halifax, Nova Scotia, B3H 3C3, Canada, harvey.millar@stmarys.ca, http:/mingus.stmarys.ca/

We present a generalized formulation for the capacitated multi-item lot sizing problem capable of incorporating features such as setup times, setup carryovers, backorders and inventory shelf-life limits, in an effective and efficient manner. We examine the performance of the different variations of the generalized model with respect to LP bounds and the computational effort required for solving problems to optimality...

SC46 Marketing II

Contributed Session

Chair: Jerome Baray, University of Rennes I, 7 rue de Soissons, Paris, 75019, France, jbaray@noos.fr

1) Delineating & Analyzing Trade Areas through Filtering & Convolution, ***Jerome Baray***, University of Rennes I, 7 rue de Soissons, Paris, 75019, France, jbaray@noos.fr, ***Gerard Cliquet***

We develop a new framework based on the concept of filtering and convolution for a practical and fast delineation of trade areas. The process also enables to get the main geometrical and marketing features of the zones shaping a trade area.

2) Estimating Non-Ignorable Missing Response for Surveys that Measure Total Sales Calls, ***Lewis W. Coopersmith***, Rider University, 2083 Lawrenceville Rd., Lawrneceville, NJ 08648-3099, coopersmith@rider.edu

The number of physician sales calls for a pharmaceutical company can be measured using sales call frequency data. When a physician gets no call for a company during the sampling interval, the frequency response is missing. Methods for estimating this non-ignorable missing frequency response are described.

3) Selective Service Strategies: The Impact of Transaction Costs on Optimal Service Levels, ***Steven M. Shugan***, University of Florida, 2030 NW 24th Ave., Gainesville, FL 32605-2939, sms@ufl.edu, http://www.cba.ufl.edu/facstaff/profiles/shugan.htm, ***Sonja Radas***

When transaction costs are present, service providers should often serve fewer customers than capacity allows and prioritize service across customers. Our empirical analysis estimates transaction costs in 3 different product categories. Approximately, 18 - 56% of total effort is expended on transaction costs before a sale is made.

4) Tourism Marketing in Developing Countries, ***Marcelo B. Barrios***, Universidad Argentina de la Empresa, Lima 717, Buenos Aires, 1073, Argentina, mbarrios@uade.edu.ar

We propose a model summarizing the key drivers of customer loyalty for one of the most important tourism destinations of Argentina: Mar del Plata. We then outline the issues related to the quality-value-loyalty chain specifically for a tourism destination in a developing country.

Sunday 14:45-15:45

SO47 Omega Rho: Engineering Frontiers & the New Engineering Leader: Opportunities & Challenges for the OR/MS Profession

Plenary Session

Chair: Richard M. Soland, George Washington University, Dept. of EMSE, School of Eng., Washington, DC 22052, soland@seas.gwu.edu

1) Omega Rho Lecture: Engineering Frontiers & the New Engineering Leader: Opportunities & Challenges for the OR/MS Professional, ***Thomas L. Magnanti***, MIT, Sch. of Engineering, Rm. 1-201, Cambridge, MA 02139-4307, magnanti@mit.edu

In the last hundred years, engineers conceived, designed and implemented major scientific and technological innovations that transformed our lives. They will do so again in the next hundred years. But the context of engineering differs today from the past with emerging opportunities in fields such as bioengineering, engineering systems, tiny technologies, information, computation and communication and new educational technologies. These opportunities create needs for new knowledge and for a new breed of engineer/leader and the engineer/entrepreneur. This presentation will summarize some of these emerging themes and their potential implications for engineering education, research, and practice and for the OR/MS profession.

Sunday 16:00-17:30

SD03 Techniques for Scalable Data Mining

Cluster: Data Mining

Invited Session

Chair: Johannes Gehrke, Cornell University, Dept. of CS, 4108 Upson Hall, Ithaca, NY 14853, johannes@cs.cornell.edu

1) On the Effective Design of High Dimensional Data Mining Algorithms: Issues & Research Directions, ***Charu C. Aggarwal***, IBM TJ Watson Research Center, Yorktown Heights, NY 10598, charu@us.ibm.com

In recent years, the problem of mining high dimensional data has generated considerable interest because of the curse of dimensionality. Beginning with the CLIQUE method, a variety of methods has been proposed in recent literature for high dimensional applications. We will begin with a brief overview of some of the important results in this area...

2) LOGML for Web Usage Mining, ***Mohammed J. Zaki***, RPI, Dept. of CS, 110 8th St., Troy, NY 12180-3590, zaki@cs.rpi.edu, ***John Punin***, ***Mukkai Krishnamoorthy***

Web usage mining refers to the discovery of interesting information from user navigational behavior as stored in web access logs. While extracting simple information from web logs is easy, mining complex structural information is very challenging. Data cleaning and preparation constitute a very significant effort before mining can even be applied. We will describe log markup language, LOGML...

3) Software Infrastructure for Large-Scale Data Mining & Information Retrieval on the Web, ***Torsten Suel***, Polytechnic University, CIS Dept., 6 Metro Tech Ctr., Brooklyn, NY 11201, suel@poly.edu

The Web provides a great source of large-scale data mining applications. However, a major challenge arises from the huge size of the data, which contains billions of pages. We discuss the software infrastructure that enables data mining and IR on terabyte web collections, including data acquisition, storage, indexing and querying.

4) Resource & Location Aware Data Mining, ***Srinivasan Parthasarathy***, Ohio State University, CIS Dept., Dreese Lab 395, Columbus, OH 43210, srini@cis.ohio-state.edu

Data mining algorithms executing on a shared network of workstations often suffer from unpredictable performance due to the constraints imposed by sharing common resources, i.e., network, processors, disks, etc. We will describe how such algorithms can adaptively adjust to such constraints with appropriate systems support: resource-monitoring, novel quality-of-service mechanisms and location-aware load balancing.

5) Efficient & Tunable Similar Set Retrieval, ***Dimitrios Gunopulos***, University of California, Dept. of CSE, Riverside, CA 92521, dg@cs.ucr.edu

Set value attributes are a concise and natural way to model complex data sets. Modern object relational systems support set value attributes and allow various query capabilities on them. Set value attributes are now part of SQL3, a fact that is likely to increase their use in commercial applications. We initiate a formal study of indexing techniques for set value attributes based on similarity...

SD05 Recent Advances in Global Optimization

Cluster: Global Optimization
Invited Session

Chair: Nick Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 South Mathews Ave., Urbana, IL 61801, nikos@uiuc.edu

1) Analyzing Hard vs. Easy Discrete Optimization Problems using Local Search Algorithms, ***Derek E. Armstrong***, University of Illinois, Simulation & Optimization Lab., Dept. of MIE, Urbana, IL 61801-2906, ***Sheldon H. Jacobson***

We examine the P vs. NP question in terms of problem structure. The complexity of solving a discrete optimization problem is related to the effectiveness of simple local search algorithms on the problem, where simple local search algorithms use problem data independent and polynomially-sized neighborhood functions.

2) Domain Reduction in Global Optimization of Mixed-Integer Nonlinear Programs, ***Mohit Tawarmalani***, Purdue University, Krannert Mgmt. Sch., West Lafayette, IN 47907, mtawarma@mgmt.purdue.edu, http://icdweb.cc.purdue.edu/~mtawarma, ***Nick Sahinidis***

We develop a unifying framework for domain reduction that applies to mixed integer nonlinear programs. As a result, we construct new techniques for identifying sub-optimal regions. Through computational experience on various application problems, we demonstrate that the developed techniques significantly improve the convergence of global optimization methods.

3) Energy Function Parameter Estimation by Global Optimization, ***Andrew T. Phillips***, University of Wisconsin, Dept. of CS, 131 Phillips Science Hall, Eau Claire, WI 54702-4004, www.cs.uwec.edu/~phillips/

Many important problems in computational biology require the computation of the global minimum of a function with many local minima. Such functions contain parameters that must be adjusted so that the computed and known global minima coincide. A new energy function parameter optimization algorithm for this problem will be discussed.

SD06 Tradeoffs in Network Design & Operation

Sponsor: Telecommunications
Sponsored Session

Chair: Neil Keon, SMU, Cox Sch. of Bus., Dallas, TX 75275

1) Network Capacity Planning & Pricing, ***Karthik Balasubramaniam***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Rm. 293, Philadelphia, PA 19104-6315, karthikb@seas.upenn.edu, ***G. Anandalingam***

With the advent of bandwidth trading, it is anticipated there will be dramatic decreases in the size of bandwidth traded, the contract periods and the provisioning time. In this context, the paper develops mathematical models to simultaneously analyze the problems of capacity planning and bandwidth pricing for a network provider.

2) Optimizing the Location of Base Stations for Wireless Communication, ***Roger M. Whitaker***, Cardiff University, Ctr. for Mobile Comm., CS Dept, Queens Bldg., The Parade, Cardiff, CF24 3Xf, Wales, UK, r.m.whitaker@cs.cf.ac.uk, ***Stuart M. Allen***, ***Steve Hurley***

Locating transmission infrastructure for wireless communication is a complex engineering task involving many conflicting objectives. For example, in cellular networks, area coverage and call capacity requirements need to be met while minimizing the number of base stations. We show how heuristic techniques can be used in this planning process.

3) A New Power Control Algorithm for Wireless Data Services based on Utility, ***Danlu Zhang***, University of Michigan, Dept. of Elect. Eng. & CS, Ann Arbor, MI 48109, danlu@eecs.umich.edu

We show in general the Nash equilibrium in the non-cooperative power control game is not Pareto optimal. Our new algorithm minimizes the total received power while guaranteeing each user a pay-off no less than that of the Nash equilibrium. The new algorithm can be easily implemented in a distributed manner.

4) withdrawn 10/12: Effects of Long Holding Times on Alternate Access Systems, ***V. Ramaswami***, AT&T Labs - Research, 180 Park Ave., Rm. E-233, Florham Park, NJ 07932, vram@research.att.com

5) Wavelength Translation in WDM Networks: Optimization Models & an Empirical Analysis, ***Jeffery L. Kennington***, SMU, Eng. Mgmt., Info & Systems, Dallas, TX 75275-0122, jlk@engr.smu.edu, ***Eli V. Olinick***

We present integer programming models and empirical results for the WDM wavelength routing and assignment problem with and without wavelength translation. This investigation presents an empirical study that examines the computational viability and potential benefits from using optimization models that permit wavelength translation at various subsets of the network nodes.

SD07 Computational issues for Integer Programs

Sponsor: Computing
Sponsored Session

Chair: John W. Chinneck, Carleton University, Systems & Computer Eng., Ottawa, Ontario, K1S 5B6, Canada, chinneck@sce.carleton.ca

1) Solving Sets of Discrete Optimization Problems, ***Sheldon H. Jacobson***, University of Illinois, Dept. of MIE, 1206 West Green St., MC 244, Urbana, IL 61801, shj@uiuc.edu, www.staff.uiuc.edu/~shj/shj.html, ***Diane E. Vaughan***

We introduce a mathematical framework for simultaneously addressing a set of related discrete optimization problems using local search algorithms. The resulting algorithms, known as simultaneous generalized hill climbing algorithms, can be applied to a wide variety of sets of related manufacturing, military and service industry discrete optimization problems.

2) Computational Experience with an Evolutionary Search Procedure for MINLPs in Structural Optimization, ***Rex K. Kincaid***, College of William & Mary, Dept. of Mathematics, 126 Jones Hall, Williamsburg, VA 23187-8795, rrkinc@math.wm.edu, ***Michelle Griffith***, ***Jaroslaw Sobieszczanski-Sobieski***

The performance of an evolutionary search, similar in spirit to $(\mu + \mu)$ evolutionary strategies and evolutionary programs, is examined for hub designs. Decisons include beam type, number, thickness and height. Constraints are nonlinear and the objective is to find a design of minimum weight.

3) Fast Algorithms for the Maximum Feasibility Problem, ***John W. Chinneck***, Carleton University, Systems & Computer Eng., Ottawa, Ontario, K1S 5B6, Canada, chinneck@sce.carleton.ca

Given an infeasible set of linear constraints, what is the largest feasible subset? This maximum feasibility problem, while NP-complete, has numerous practical applications. Fast heuristics for solving this problem are presented.

SD08 DO-06

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session

Chair: Eva K. Lee, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, eva.lee@isye.gatech.edu

1) T-Space & Cutting Planes, ***Ralph Gomory***, Sloan Foundation, gomory@sloan.org, ***Ellis L. Johnson***

T-space refers to the space of non-basic variables in a basic LP-solution. We use subadditive functions p on the unit interval to get cuts for pure or mixed integer problems. Properties and examples of functions p, which are extreme valid inequalities to an infinite dimensional polyhedron, are developed.

2) Facets for Cyclic Group & Knapsack Polyhedra, ***Ellis L. Johnson***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ejohnson@isye.gatech.edu, ***Lisa Evans***

The main reason for interest in cyclic group problems is that any pure integer program can be relaxed to a cyclic group problem. We will discuss several classes of facets for the cyclic group problem. Additionally, the connection to the master knapsack partitioning problem will be explained and we will give several classes of facets for this problem. Finally, some facets for the master knapsack covering problem will be described, as well as their relationship to the previous two problems.

3) Facets for Independent Set Polytopes, ***Eva K. Lee***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, eva.

lee@isye.gatech.edu

We describe facets and strong valid inequalities for independent sets obtained from hypergraphs. Issues related to separation algorithms will be described. Preliminary computational results will be presented.

SD09 Tutorial: Constraint Programming & its Relationship to Mathematical Programming

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Irv Lustig, ILOG, 25 Sylvan Way, Short Hills, NJ 07078-1379, ilustig@ilog.com

1) Tutorial: Constraint Programming & its Relationship to Mathematical Programming, ***Irv Lustig***, ILOG, 25 Sylvan Way, Short Hills, NJ 07078-1379, ilustig@ilog.com

Arising from research in the computer science community, constraint programming is a relatively new technique for solving optimization problems. For those familiar with mathematical programming, there are a number of language barriers that make it difficult to understand the concepts of constraint programming. This talk, which assumes a minimal background in linear and integer programming, is a short tutorial on constraint programming...

SD10 Recent Advances in Complementarity Problems

Cluster: Complementarity & Related Problems
Sponsor: Optimization
Sponsored Session
Chair: Michael Ulbrich, Technische Universitaet Muenchen, Zentrum Mathematik, Muenchen, D-80290, Germany, mulbrich@ma.tum.de

Co-Chair: Michael Hintermuller, Universitat Graz, Institut Fur Mathematik, Heinrichstr. 36, Graz, A-8010, Austria, michael.hintermueller@kfunigraz.ac.at

1) Symmetric Matrix Functions with Applications to Semidefinite Complementarity Problems, ***Paul Y. Tseng***, University of Washington, Dept. of Math., Box 354350, Seattle, WA 98195, tseng@math.washington.edu, ***Xin Chen***, ***Houduo Qi***

For any real-valued function of one real variable, we define a mapping on the space of real symmetric matrices by applying the function to the eigenvalues of the spectral decomposition. We study properties of such mapping and its applications to solving semidefinite complementarity problems.

2) Degenerate Nonlinear Programming with Unbounded Lagrange Multiplier Sets, ***Mihai Anitescu***, University of Pittsburgh, Dept. of Math., Thackeray 301, Pittsburgh, PA 15260, anitescu@math.pitt.edu

We show that SQP algorithms with elastic mode safeguards can solve nonlinear programs with unbounded Lagrange multiplier sets. In particular, this approach is suitable for solving the generic nonlinear program with complementarity constraints.

3) The Primal-Dual Active Set Strategy as a Semi-Smooth Newton Method, ***Michael Hintermuller***, Universitat Graz, Institut fur Mathematik, Heinrichstr. 36, Graz, A-8010, Austria, michael.hintermueller@kfunigraz.ac.at, ***Kazafumi Ito***, ***Karl Kunisch***

The primal-dual active set strategy (PDAS) for complementarity problems motivated by constrained optimal control problems is addressed. Based on a generalized differentiability concept in function spaces, it is shown that PDAS can be interpreted as a semi-smooth Newton method. Conditions for convergence with q-order greater than 1 are also discussed.

SD11 Telecommunication Networks

Cluster: Networks & Graphs
Invited Session
Chair: Richard T. Wong, Telcordia Technologies, 33 Knightsbridge Rd., PY4-4N316, Piscataway, NJ 08854, rwong1@telcordia.com

1) ADM Selection & Routing in Ring Networks, ***Anant Balakrishnan***, Pennsylvania State University, 303 Beam Bldg., University Park, PA 16802-1913, anantb@psu.edu, ***Thomas L. Magnanti***, ***Joel S. Sokol***

Given a predetermined network of SONET rings, we consider the joint problem of placing ADMs and routing traffic. We present a capacitated network design formulation for the problem, introduce valid inequalities and design a heuristic that solves real-life instances of the problem to within a few percent of optimality.

2) On the Diameter-Constrained Minimum Spanning Tree Problem, ***Luis Gouveia***, Universidade de Lisboa, DEIO-CIO, Faculdade de Ciencias, Lisboa, 1749-016, Portugal, lgouveia@fc.ul.pt, ***Thomas L. Magnanti***, ***Cristina Requejo***

The diameter constrained minimum spanning tree problem seeks a least cost spanning tree subject to a bound imposed on the number of edges in the tree between any node pair. We compare several modeling approaches for solving the case when diameter parameter D is odd, which seems to be harder to solve than the case with D even. These approaches are based on different and equivalent properties of a tree which has diameter no more than an odd integer D.

3) Improvement Strategies for Routing Path-Based Telecommunication Networks, ***Richard T. Wong***, Telcordia Technologies, 33 Knightsbridge Rd., PY4-4N316, Piscataway, NJ 08854, rwong1@telcordia.com, ***Hanan Luss***

We address the problem of improving the routing of path-based telecommunication networks, e.g., ATM and IP networks, due to perturbations from the initially planned routing strategies. We present integer programming models for various versions of the problem and discuss some possible solution techniques.

SD12 Integer & Combinatorial Optimization Applications in Supply Chain Management

Cluster: Combinatorial Optimization
Invited Session
Chair: Joseph B. Mazzola, Georgetown University, McDonough Sch. of Bus., 37th & O St. NW, Washington, DC 20008, mazzolaj@georgetown.edu

1) Optimizing Third-Party Logistics Operations, ***Philip M. Kaminsky***, University of California, IEOR Dept., 4135 Etcheverry Hall, Berkeley, CA 94720-1777, kaminsky@ieor.berkeley.edu, www.ieor.berkeley.edu/~kaminsky, ***Alexandra M. Newman***, ***Candace A. Yano***

A third-party logistics provider must plan deliveries for multiple customers over a multi-period horizon, selecting vehicle routes and deciding delivery quantities to satisfy demands at the final destinations. We present a solution method and computational results for the problem of minimizing total vehicle routing and inventory costs.

2) The Multiobjective Vehicle Replacement Problem, ***Darby Grande***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109, dgrande@umich.edu, ***James C. Bean***

We address the life-cycle evaluation of a vehicle replacement problem, including economic, energy and emissions criteria. For each of the conflicting life-cycle objectives, we solve a single objective problem in which the remaining objectives are formulated as constraints. Efficient solutions are found by sensitivity analysis on these constraints.

3) Modeling the Order Picking Function in Supply Chain Systems: Formulation, Experimentation & Insights, ***Natalie C. Simpson***, SUNY, Sch. of Mgmt., Dept. of MS & Systems, Buffalo, NY 14260-4000, nsimpson@buffalo.edu, ***S. Selcuk Erenguc***

Order picking is found at the interface of production and distribution networks within supply chain systems. The order picking function is modeled to explore its role with respect to inventory deployment and centralized distribution planning in the presence of production economies-of-scale and deterministic demand. Numerical experiment results will be presented.

SD13 Computational SDP & SOCP I

Cluster: Linear & Conic Linear Optimization
Invited Session
Chair: Gabor Pataki, University of North Carolina, Dept. of OR, Smith Bldg., CB 3180, Chapel Hill, NC, gabor@unc.edu, http://www.or.unc.edu/~pataki

1) Incorporating Krylov-Subspace Methods in Interior-Point Methods for Semidefinite Programs, ***Kazuhide Nakata***, University of Tokyo, Dept. of Applied Physics, 7-3-1 Hong-Bunkyo, Tokyo, 113-8565, Japan, nakata@zzz.t.u-tokyo.ac.jp, ***Shao-Liang Zhang***

When one uses interior-point methods for semi-definite programs, one needs to solve linear systems whose coefficient matrices are fully dense. We exploit the Krylov-subspace methods such as the conjugate gradient method and the conjugate residual method in interior-point methods for semi-definite programs.

2) Benchmarking SDP & SOCP Codes, ***Hans D. Mittelman***, Arizona State University, Dept. of Math, Box 871804, Tempe, AZ 85287-1804, mittelmann@su.edu

With the Seventh DIMACS Implementation Challenge, we have added benchmarking of SDP and SOCP codes to our ongoing effort in the evaluation of optimization software. We have collected new and interesting test examples in the mean time as well as latest, partly experimental, versions of the codes will be considered.

3) Solving SDPs & SOCPs via Interior-Point Methods for Nonlinear Programming, ***Hande Y. Benson***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, hyurttan@princeton.edu

We present reformulations for expressing SDPs and SOCPs as smooth convex NLP problems. Computational results with several NLP solvers will be provided.

4) New Problem Sets in the DIMACS Library of Semidefinite-Quadratic- Linear Programs, ***Gabor Pataki***, University of North Carolina, Dept. of OR, Smith Bldg., CB 3180, Chapel Hill, NC, gabor@unc.edu, http://www.or.unc.edu/~pataki, ***Stefan Schmieta***

The above-mentioned library was assembled for the 7th DIMACS Challenge and it aims to be an up-to-date testing environment for researchers in computational SDP and SOCP. We describe several new problem sets along with the used modeling techniques.

SD14 SDP & its Applications in Non-Convex Optimization

Cluster: **Linear & Conic Linear Optimization**
Invited Session

Chair: Shuzhong Zhang, Chinese University of Hong Kong, Dept. of SE/EM, Clear Water Bay, Shatin NT, Hong Kong, zhang@se.cuhk.edu.hk

1) An Approximation Algorithm for the Two-Parallel Machines Scheduling Problem with Capacity Constraints, ***Jiawei Zhang***, University of Iowa, Dept. of MS, Tippie Coll. of Bus., Iowa City, IA 52242, jiazhang@blue.weefg.uiowa.edu, ***Heng Yang***, ***Yinyu Ye***

The problem is scheduling n independent jobs on 2 identical parallel machines, the number of jobs assignable to a machine is limited. The goal is to minimize the total weighted completion time. We study an SDP-based approximation algorithm for solving this problem. The algorithm has a worst case ratio at most 1.1626.

2) Sums of Squares, Real Algebra & SDP Relaxations, ***Pablo A. Parrilo***, California Institute of Technology, Control & Dynamical Systems, MS 107-18, Pasadena, CA 91125-8100, pablo@cds.caltech.edu

We explore many connections between real algebra (the study of polynomial equations and inequalities) and SDP and present a convex optimization-based framework for semi-algebraic problems. The key elements in our approach are the interaction of concepts in real algebraic geometry (sum of squares decomposition and the Positivstellensatz) and semi-definite programming.

3) On Conès of Nonnegative Quadratic Functions, ***Shuzhong Zhang***, Chinese University of Hong Kong, Dept. of SE/EM, Clear Water Bay, Shatin NT, Hong Kong, zhang@se.cuhk.edu.hk, ***Jos F. Sturm***

We derive LMI-characterizations of certain matrix cones which are generated by a given set using co-positivity. We arrive at a generalization of Yakubovich's S-procedure result. As an application, we show that optimizing a general quadratic function over the intersection of an ellipsoid and a half-plane can be formulated as SDP.

SD15 Models for Supply Chain Contracting & Coordination

Sponsor: **MSOM**
Sponsored Session

Chair: Zuo-Jun Shen, University of Florida, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, shen@ise.ufl.edu

1) On the Effects of Demand Randomness in a Price/Quantity Setting Firm, ***Qing Li***, University of British Columbia, Fac. of Commerce & Bus. Admin., 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, qing.li@commerce.ubc.ca, ***Derek Atkins***

We study the effects of demand uncertainty in a firm that performs 2 functions: inventory and consumer pricing. These 2 decisions can either be jointly made by headquarters or separately by different units in the firm. We examine the impacts from increasing the demand shock variability on price, inventory, profit and operating cost.

2) Coordination in Decentralized Assembly Systems with Uncertain Component Yields, ***Haresh B. Gurnani***, HKUST, Dept. of ISMT, Clear Water Bay, Kowloon, Hong Kong, Hong Kong, mnharesh@ust.hk, ***Yigal Gerchak***

We consider a decentralized assembly system with random component yields and discuss the use of incentive alignment control mechanisms to achieve channel coordination. In contrast to traditional shortage penalty contracts, we show how the firm can retain all above-reservation level channel profits by using an additional penalty contract

3) The Role of Channel Structure in Product Differentiation Decisions, ***Stephen M. Gilbert***, University of Texas, McCombs Sch. of Business, Dept. of Mgmt., Austin, TX 78712, steve.gilbert@bus.utexas.edu

We examine how the structure of a firm's channels of distribution affects its product differentiation decisions. Specifically, we examine the how product-line and non-product-line pricing in the channel affects the optimal amount of differentiation and the resulting channel profits.

4) Revenue Sharing in Supply Chain Coordination & Contracting, ***Zuo-Jun Shen***, University of Florida, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, shen@ise.ufl.edu, ***Li Jiang***, ***Yunzeng Wang***

We study a revenue sharing contract where the retailer faces price-sensitive demand and orders from a single supplier. The retailer decides the proportion of the revenue he/she will get from the sale and the supplier chooses the sale price and quantity. We propose several mechanisms and provide conditions based on which channel coordination can be achieved.

SD16 E-Business Operations Problems

Sponsor: **MSOM**
Sponsored Session

Chair: Lawrence M. Wein, MIT, Sloan Sch. of Mgmt., 30 Wadsworth St., Rm. E53-343, Cambridge, MA 02142-1347, lwein@mit.edu

1) Optimal Dynamic Auctions for Revenue Management, ***Gustavo Vulcano***, Columbia University, Grad. Sch. of Bus., New York, NY 10027, ***Garrett J. van Ryzin***

We consider a revenue management problem in which buyers act strategically and bid for units of a fixed capacity over time. We prove that dynamic versions of the classic first and second price auction mechanisms maximize the sellers revenue and show explicitly how to conduct these optimal auctions. We then compare the optimal mechanisms to traditional pricing mechanisms.

2) Achieving Collaborative Enterprise-Wide Optimization using Web-Architected Software, ***Sridhar Tayur***, Carnegie Mellon University, Pittsburgh, PA 15213, estayur@grobner.gsia.cmu.edu

We report an actual implementation that led to collaborative optimization between 3 functional silos at a large distributor/retailer. We describe the software and solution architecture, the advanced OR models, such as stochastic JRP with quantity discounts, that we developed and imbedded in the modules and the overall enterprise wide implementation that led to the collaborative active planning.

3) Several Modeling & Optimization Issues in Internet Business Operations, ***David D. Yao***, Columbia University, IEOR Dept., 302 Mudd Bldg., New York, NY 10027-6699, yao@ieor.columbia.edu

Business operations on the Internet have brought forth new issues and new challenges to OR. Here, we highlight some of these issues and challenges through 2 applications: a configure-to-order system in PC manufacturing and dynamic pricing: the stochastic knapsack revisited. Based on joint work with colleagues at IBM Research.

4) An Inverse-Optimization-Based Auction Mechanism to Support a Multi-Attribute RFQ Process, ***Lawrence M. Wein***, MIT, Sloan Sch. of Mgmt., 30 Wadsworth St., Rm. E53-343, Cambridge, MA 02142-1347, lwein@mit.edu, ***Damian R. Beil***

We construct a multi-round open-ascending mechanism for a multi-attribute procurement auction. The auctioneer announces a different scoring rule in each round, using inverse optimization to learn the suppliers' cost functions from their submitted bids in the early rounds and determining an utility-maximizing scoring function in the last round.

SD17 Facility Design Research

Sponsor: **MSOM**
Sponsored Session

Chair: Bryan A. Norman, University of Pittsburgh, 1033 Benedum Hall, Dept. of IE, Pittsburgh, PA 15261, banorman@engrng.pitt.edu

1) The Multiple Criteria Decision Making Facility Re-Layout Problem, ***Po-Chaun Pan***, Case Western Reserve University, SMIE, Elect. Eng. & CS Dept., Olin 611, Cleveland, OH 44106, ***Behnam Malakooti***

We present the conceptual and mathematical formulation of the multiple criteria decision making facility re-layout problem. Some heuristics and exact methods for solving the problem and the relation to other classes of layout problems such as dynamic layout problems are presented. Some examples and computational experiments are reported.

2) The Engineering-Complex Layout Problem: Algorithms & Strategies, ***David S. Kim***, Oregon State University, Dept. of IME, Corvallis, OR 97331-2407, david.kim@orst.edu, ***Russell D. Meller***

We will discuss the engineering-complex layout problem and compare and contrast it with the well-known manufacturing facility layout problem. In addition to an algorithm to solve the Greenfield version of the problem, we will also discuss maintenance and repair issues for layouts in these environments.

3) Analytical Modeling of Closed-Loop Conveyors, ***Yavuz A. Bozer***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109, yauz.bozer@umich.edu, ***Ying-Jiun Hsieh***

Closed-loop conveyors have been studied and are being used in a variety of settings. However, research interest has been relatively weak. We present closed-form analytical results to show throughput performance of a closed-loop conveyor system serving a user-specified set of stations with intermixed load/unload stations.

4) Establishing Aisle Structures in Block Layout Design, ***Oguzhan Alagoz***, University of Pittsburg, 1048 Benedum Hall, Dept. of IE, Pittsburg, PA 15261, oga1+@pitt.edu, ***Bryan A. Norman***, ***Alice E. Smith***

We consider the problem of determining a block layout for a facility that contains good aisle structures. We consider problems where an initial block layout has been determined and also show how to incorporate our ideas into a block layout design strategy. We demonstrate our methodology on several test problems.

SD18 Enterprise Applications: The Future

Cluster: Enterprise Resource Planning
Invited Session

Chair: Vincent A. Mabert, Indiana University, Kelley Sch. of Bus., Bloomington, IN 47405

1) Future Enterprise Applications: A Vendor's Perspective, ***Sinan Tumer***, SAP America, Philadelphia, PA, sinan.tumer@sap.com, ***Daniel C. Pantaleo***

SAP, as a leader of innovation in new disruptive ITs such as m-business, e-learning, e-business, internet and mobile computing, will discuss the future of enterprise applications. They will also discuss how collaborative research teams leverage intellectual capital to introduce new mission critical ideas to application and technology domains.

2) Enterprise Applications: An Academic Perspective, ***Vincent A. Mabert***, Indiana University, Kelley Sch. of Bus., Bloomington, IN 47405, ***Ashok K. Soni***, ***M. A. Venkataramanan***

We will provide an overview of both teaching and research in the ERP/enterprise applications area and discuss how academia can contribute to these 2 areas in the future.

3) Future Enterprise Applications: A Consultant's Perspective, ***David Duray***, PriceWaterhouseCoopers, david.duray@us.pwcglobal.com

No abstract supplied.

SD19 Tutorial: Emerging Developments in Adaptive Dynamic Programming for Stochastic Resource Management

Invited Session

Chair: Warren B. Powell, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, powell@princeton.edu

Co-Chair: Huseyin Topaloglu, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, topalglu@princeton.edu

1) Tutorial: Emerging Developments in Adaptive Dynamic Programming for Stochastic Resource Management, ***Warren B. Powell***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, powell@princeton.edu, ***Huseyin Topaloglu***

SD20 Information-Based Extended Product Development I

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session

Chair: Nitin Joglekar, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu

1) Studying the Impact of Integration Technologies on Collaborative Product Development, ***Manuel Sosa***, Oculus Technologies Corp., 16 TGrowbridge St., # 44, Cambridge, MA 02138, msosa@alum.mit.edu

Product development organizations are facing the challenge of working across organizational, geographic and operational boundaries to integrate the benefits of installed, heterogeneous and distributed computer tools. We build upon several case studies to evaluate how various integration technologies impact product development performance.

2) Software Product Development Decisions, ***Wenge Zhu***, University of Texas, CBA 4.202, 21st & Speedway, Austin, TX 78712, zwenge@mail.utexas.edu, ***Vish V. Krishnan***

We study product development decisions in the context of information/software products. Specifically, we examine the dilemmas facing a monopolist with limited resources and interested in improving multiple dimensions of quality. We find that the software firm's product launch strategy is different from that of non-information goods and that it in part explains the monopoly power in packaged software industry.

3) Information Hiding during Product Development: The Design Churn Effect, ***Ali A. Yassine***, MIT, Cambridge, MA 02139, yassine@mit.edu, ***Nitin Joglekar***

Many development projects suffer from persistent recurrence of problems (termed as the design churn) such that progress oscillates between being on schedule to falling behind. We develop a dynamic model of work transformation to show that the design churn is an unintended consequence of information hiding due to local and system task decomposition.

SD21 FMS Issues

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: Kathryn E. Stecke, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) Quality Prediction for Reconfigurable Manufacturing Systems, ***Weiping Zhong***, University of Michigan, 1210 Dow, 2300 Hayward, Ann Arbor, MI 48109, zwp@umich.edu, ***S. Jack Hu***

Recently, RMSs have drawn interest from academia and industry. Quality prediction and analysis in terms of geometric variation is an important aspect of RMS research. We present new methodologies and software currently being developed at the University of Michigan on this topic.

2) withdrawn 10/11: A 3-D Web-Based Flexible Manufacturing & Demanufacturing Knowledge Management Model, ***Paul G. Ranky***, NJIT, Multilifecycle Eng. Res. Ctr., Dept. of IME, Newark, NJ 07102, ranky@njit.edu

3) Dynamic Job & Tool Scheduling using a Rolling Horizon Approach in FMSs with Large Variability in Machine Downtime Distribution, ***Jie Chen***, Virginia Polytechnic Institute & State University, 702 Appalachian Dr., #12, Blacksburg, VA 24060, jichen7@vt.edu, ***Frank F. Chen***

An integrated approach is proposed to allow 2 levels of hierarchical, dynamic scheduling of jobs and tools in an FMS. It decomposes the overall problem into a series of static subproblems for each scheduling window and handles machine breakdown uncertainties by estimating operation completion time based on machine availability analysis.

4) Modularity as a Principle of Organizational Design, ***Steven J. Spear***, Harvard Business School, Morgan Hall T13, Boston, MA 02163, sspear@hbs.edu

We present organizational management rules that generate the benefits of modularity normally associated with complex technical system design. These include feature selection, flexibility and compatible simultaneous local and system experimentation. Organizational and technical design both contain tension between local and global optimization that can be addressed with common design principles.

SD22 New Directions in Supply Chain Management

Cluster: Supply Chain Management
Invited Session

Chair: Edward G. Anderson, University of Texas, Mgmt. Dept., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu

1) Informing Strategic Mental Models of Extended Supply Chains: A Simulation-Based Experiment of ERPs & the Balanced Scorecard, ***James L. Ritchie-Dunham***, University of Texas, 3615 Aspen Creek Parkway, Austin, TX 78749, jimrd@sdsg.com

To inform strategic resource allocation in a supply chain, theory suggests what information to use and how to process it. Does this information strengthen the decision maker's mental model of the supply chain? We show the results of a simulator-based experiment with 100 MBA students that tests this.

2) Modeling Mixed Build-to-Order & Build-to-Stock Systems in the Automotive Industry, ***Genaro J. Gutierrez***, University of Texas, Mgmt. Dept., CBA 4.202, Austin, TX 78712, genaro.gutierrez@bus.utexas.edu, ***Edward G. Anderson***, ***Aaron Dennington***, ***Robert Flake***

Automotive assemblers are attempting to move to a Dell-like build-to-order model. However, while the current build-to-order and future build-to-stock models are well understood, the transition phase between them is not. We build an analytic model to examine this combined build-to-stock and build-to-order transition phase and present results.

3) An Empirical Study of Learning & Incentives for Knowledge Workers, ***Geoffrey G. Parker***, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, gparker@tulane.edu

In an exploratory and confirmatory study, we explore how knowledge-workers align their learning in response to firm incentives and technology choices. Survey responses from scientists and engineers are analyzed to show how firms differ in technology and performance incentives and how employees align their learning in response to these factors.

4) Contracts & Spot Markets: Finding the Optimal Mix towards E-Commerce in the Presence of Knowledge Uncodifiability, ***Moti Levi***, Tulane University, Freeman Sch. of Mgmt., 7 McAlister Dr., New Orleans, LA 70118, mlevi@tulane.edu, ***Paul R. Kleindorfer***, ***D. J. Wul***

The last few years have seen an explosion in the number of e-marketplaces and exchanges but with trade levels much lower than expected. Behind this lies a relatively unnoticed drive, namely knowledge codifiability. We find the optimal mix of contracting vs. spot markets and show codifiability as a key driver.

SD23 Risk Management in Supply Chains: Concepts

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: William Grey, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598

Co-Chair: Dailun Shi, IBM Tj Watson Research Center, PO Box 218, Yorktown Heights, NY 10598

1) Derivatives in the Supply Chain, ***Dailun Shi***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, ***Richard L. Daniels***, ***William Grey***

We present a framework to study supply chain options. We show the value of options for supply chain efficiency, provide an affirmative argument for hedging supply chain risks and demonstrate the feasibility of creating supply chain derivatives exchanges and insurance products.

2) The Price of Risk, ***Vipul Agrawal***, NYU, Stern Sch. of Bus., New York, NY 10012, ***Sridhar Seshadri***, ***Cagri Haksoz***

The price of holding inventory in a supply chain is investigated. Assuming that customers have certain preferences for timeliness of delivery, the price of inventory is computed for different supply chain configurations. Implications for supply chain design are discussed.

3) Risk-Based Asset Allocation in the Supply Chain, ***Kaan Katircioglu***, IBM TJ Watson Research Center, PO Box 218, Rte. 314, Yorktown Heights, NY 10598, kaan@us.ibm.com, ***William Grey***, ***Dailun Shi***

Our objective is to describe a methodology for aligning investments in supply chain assets with the overall financial objectives of the firm. Investments are selected based on a risk-adjusted return framework. A number of assets are considered, including inventory and capacity.

SD24 Perspectives on Designing & Managing the Integrated Supply Chain

Cluster: Perspectives on Designing/Managing Integrated Supply Chain
Invited Session

Chair: Amy Z. Zeng, Worcester Polytechnic Institute, Dept. of Mgmt., Worcester, MA 01609, azeng@wpi.edu

1) Metrics for Supply Chain Integration, ***Jack C. Hayya***, Pennsylvania State University, Dept. of MS/IS, University Park, PA 16802, jch@psu.edu, ***Chao-Hsien Chu***, ***Dean C. Chatfield***, ***Xin J. He***

In designing information architecture for integrated supply chains, it is necessary to provide metrics for assessing the performance of the different components of the system. We show, for example, that the metrics for enterprise modeling, database schema, security, GUI, the hardware and software may not be generic.

2) Designing a Remanufacturing System, ***Sharon A. Johnson***, Worcester Polytechnic Institute, Dept. of Mgmt., Worcester, MA 01609, sharon@wpi.edu

The design of an effective remanufacturing system is examined, based on a case study of a consumer good manufacturer. Issues considered include determining appropriate decision rules for when to refurbish returned products, reacting to uncertain product returns and managing flows as part of a larger supply chain.

3) A Framework for Designing & Managing Global Sourcing Process, ***Amy Z. Zeng***, Worcester Polytechnic Institute, Dept. of Mgmt., Worcester, MA 01609, azeng@wpi.edu, ***Christian Rossetti***

As global sourcing becomes an inevitable component of supply chain management, the ability to assess the outsourcing process is in great need. We rely on a couple of industry examples to create a framework that addresses various aspects of designing and evaluating the transfer process.

SD25 Methods for Data Generation

Cluster: Scheduling
Invited Session

Chair: Nicholas G. Hall, Ohio State University, Dept. of MS, 2100 Neil Ave., Columbus, OH 43210-1144, hall.33@osu.edu

1) RanGen: A Random Activity-on-the-Node Network Generator, ***Erik L. Demeulemeester***, Catholic University of Leuven, Dept. of Applied Econ., Op. Mgmt., Naamsestraat 69, Leuven, 3000, Belgium, erik.demeulemeester@econ.kuleuven.ac.be, ***Mario Vanhoucke***, ***Willy S. Herroelen***

We describe a new random network generator, RanGen, for generating AoN networks. The objective is to construct random networks that satisfy preset values of the parameters of the network topology used to control the hardness of a problem instance. Some of the shortcomings of previous network generators are overcome.

2) Strategies for Selecting Optimization Approaches, ***Nicholas G. Hall***, Ohio State University, Dept. of MS, 2100 Neil Ave., Columbus, OH 43210-1144, hall.33@osu.edu, ***Marc E. Posner***

Researchers often look for the best method to solve optimization problems. By basing the selection on the given data set, the efficiency of the solution process can be increased. We describe data characteristics that make a particular method work well or poorly. Ways to quantify these characteristics are examined.

3) Generating Test Data for Scheduling Algorithms using Factory Simulation Models, ***Karthik Sourirajan***, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907-1287, uzsoy@ecn.purdue.edu, ***Reha Uzsoy***, ***Cheng-Shuo Wang***

We consider the use of factory simulation models to develop test data sets for global scheduling algorithms. The state of the system at a particular instant is used to obtain realistic WIP distributions. Computational results from a semiconductor wafer fabrication facility are reported.

4) Scheduling Cutting Machines in the Clothing Industry, ***Alessandro Agnetis***, Universita di Siena, Dipt. di Ingegneria & Info., Siena, 53100, Italy, ***Paolo Detti***

In a clothg industry, clothes are produced by assembling fabric cutouts. Fabric rolls on a line and is cut by automated machines along the line. A set-up time

occurs when switching from one cutout to another. The problem of assigning and scheduling cutting tasks on the machines is addressed.

SD26 Military Application

Contributed Session

Chair: Charles A. Weber, Institute for Defense Analyses, 1801 North Beauregard St., Alexandria, VA 22311, cweber@ida.org

1) A Strategic Model for Optimizing Major Systems' Production Scheduling, ***Charles A. Weber***, Institute for Defense Analyses, 1801 North Beauregard St., Alexandria, VA 22311, cweber@ida.org, ***David E. Hunter***, ***Stephen J. Balut***

Major acquisition programs are typically planned and their production scheduled over a very long planning horizon. OUSD (AT&L) employed the Institute for Defense Analyses to develop a long-term, strategic planning optimization model that minimizes the cost of procuring major systems. The model finds the minimum-cost schedules over an 18-year period that meets user-defined demand for systems, annual budgets and production capacity restrictions.

2) Limiting Design Criteria of an Air & Missile Defense with Respect to Communication Latency, ***Rolando Quintana***, University of Texas, 500 West University Dr., El Paso, TX 79968-0512, quintana@me.utep.edu, ***Charles T. Vrahnos***

Delays in the transfer of messages can hinder an AMD task force. We identify the limiting design criteria of AMD communication, which includes the communication device, network type and method of control, that can best counter the effects of communication latency and provided the best performance effectiveness for an AMD task force.

3) Performance Analysis in the Selection of Imagery Intelligence Satellites, ***Roger C. Burk***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, roger-burk@usma.edu, ***Carolina Deschapelles***, ***Karl Doty***, ***Jonathan E. Gayek***, ***Thomas Gurlitz***

The National Reconnaissance Office used quantitative performance analysis in a source selection for a new generation of intelligence satellites. A large and diverse set of metrics were developed and combined in a multi-attribute value decomposition to reflect the diverse needs of the community of intelligence users.

4) Military Operations on Urban Terrain, ***Scott Crino***, TRADOC Analysis Center, PO Box 8692, Monterey, CA 93943, crinos@trac.nps.navy.mil

The US military's involvement in urban conflict and peacekeeping missions has escalated significantly over the past several years. Though modeling and simulation has played a large role in the development and refinement of Army tactics, techniques and procedures, current model research for military operations in urban terrain is fragmented and inadequately resourced. New research is underway to address these shortfalls.

SD27 Reliability

Contributed Session

Chair: Tolga Tezcan, Georgia Institute of Technology, Atlanta, GA 30332, tezcantolga@yahoo.com

1) A Modified k-out-of-n Reliability Structure, ***Huseyin Sarper***, University of Southern Colorado, 2200 Bonforte Blvd., Pueblo, CO 81001, sarper@uscolo.edu, ***Tolga Tezcan***

In spacecraft landing, a failed engine may require that the opposite engine is shut off to maintain vehicle balance. The need to shut off the opposite engine presents a unique version of the classic k-out-of-n reliability structure. The new problem is solved using order statistics and simulation.

2) Models of Repair Allocation in Discrete Time, Asymptotic Analysis, ***Michael N. Katehakis***, Rutgers University, 180 University Ave., Newark, NJ 07102-1895, mnk@andromeda.rutgers.edu, ***Kemal Gursoy***

We consider problems of optimal allocation of repair to failed components of a system of known structure. It is assumed that the components' lifetimes and repair times are geometrically distributed with parameters that may depend on the individual component. The components are assumed to be stochastically independent, that repaired components restart as good as new and that preemption of repair is allowed...

3) An Extended Block Replacement Policy with Shock Models & Used Items, ***Shey-Huei Sheu***, National Taiwan University of Science & Technology, No. 43, Section 4, Keelong Rd., Taipei, 106, Taiwan, shsheu@im.ntust.edu.tw

We consider an extended block replacement policy with shock models and used items. A system is subject to shocks that arrive according to a non-homogeneous Poisson process. As shocks occur, a system has 2 types of failures. Type I failure (minor failure) is removed by a minimal repair, whereas type II failure (catastrophic failure) is removed by an unplanned (or unscheduled) replacement...

4) Assessment of Systems Reliability & Safety using Petri Nets, ***Angela Adamyan***, University of Illinois, Dept. of Mech. Eng., 1024 ERF, Chicago, IL 60607, aadamy1@uic.edu, ***David W. He***

Although promising, current methods in combining Petri net with fault tree analysis for determining system failure rates assume that the failure rates of the basic events in a system are the same and the Petri net model of the system consists of simple structures. These assumptions do not reflect the real industrial applications in system failure analysis...

SD28 Philosophical Approaches to MCDM

Cluster: Multi-Criteria Decision Making

Invited Session

Chair: David L. Olson, Texas A&M University, Info. Dept., College Station, TX 77843-4217, dolson@tamu.edu

1) Assumptions of Multiple Criteria Decision Models, ***John Buchanan***, University of Waikato, Dept. of Mgmt. Systems, Private Bag 3105, Hamilton, 2001, New Zealand, jtb@waikato.ac.nz, ***Jim Corner***, ***Mordecai I. Henig***

All decisions are modeled; some more intutitively with a tacit model and some more analytically with an explicit model. All models are necessarily based on certain assumptions. We investigate the fundemental assumptions of decision models, particularly the distinction between subjective and objective approaches and prescriptive and descriptive models.

2) Using Burrell & Morgan's Framework to Explore Problem Structuring in MCDM, ***Jim Corner***, University of Waikato, Dept. of Mgmt. Systems, Private Bag 3105, Hamilton, 2001, New Zealand, jcorner@waikato.ac.nz, ***John Buchanan***, ***Mordecai I. Henig***

We use Burrell & Morgan's (1979) framework of research paradigms (functionalism, interpretivism and critical theory) to classify current problem structuring methods for multiple objective decisions. Suggestions as to the requirements for problem structuring methods in the most neglected of these paradigms, critical theory, will be made.

3) Subjective Inputs in MCDM, ***David L. Olson***, Texas A&M University, Info. Dept., College Station, TX 77843-4217, dolson@tamu.edu

Inputs to MCDM methods can involve subjectivity. We propose that subjective inputs are needed for human preference input and may also provide a more accurate expression of value functions on performance scores over criteria in some contexts.

SD29 Design & Analysis of Computer Experiments

Sponsor: QSR

Sponsored Session

Chair: Kurt Palmer, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, kpalmer@usc.edu

1) Space-Filling Designs for Nonrectangular Experimental Regions, ***Michael W. Trosset***, College of William & Mary, Dept. of Math, PO Box 8795, Williamsburg, VA 23187-8795, trosset@math.wm.edu

One approach to designing computer experiments chooses "space-filling" design sites. The maxi-min distance principle suggests a way of accomplishing this for any experimental region specified by inequalities. We discuss several formulations of maxi-min distance design problems, describe several computational strategies for solving these problems, and present some numerical results.

2) Sequential Optimization of Integrated Responses for Computer Experiments, ***Brian Williams***, RAND, Statistics Group, PO Box 2138, Santa Monica, CA 90407-2138, brianw@rand.org

Computer experiments involving two classes of input variables, control and environmental, are employed by scientific applications including hip prosthesis design. We introduce a sequential sampling strategy for constrained optimization of unobserved objectives obtained by averaging responses over a known environmental variable probability distribution. The approach utilizes an expected improvement algorithm.

3) A Comparison of Three Methods for Sensitivity Analysis of Computer Models, ***Kurt Palmer***, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, kpalmer@usc.edu

It is of interest to determine the variability of outputs from a computer model

due to fluctuations in the input variables. We demonstrate the use of 2-level fractional factorial designs for sensitivity analysis. Their performance is compared to that of Monte Carlo and Latin hypercube sampling.

SD30 Practioners' Award Competition

Sponsor: Decision Analysis
Sponsored Session
Chair: Detlof von Winterfeldt

1) Practitioners' Award Competition, ***Detlof von Winterfeldt***

Each year, the Decision Analysis Society of INFORMS presents an award for the best application of decision analysis. The finalists for the award will each present a summary of their work with the winner announced in the afternoon awards session.

2) Choosing a Development Strategy for a New Product at Amgen, ***Phil Beccue***

No abstract supplied.

3) Risk Assessment & Management for Chemical Weapons Disposal, ***Gary Boyd, Greg St. Pierre***

No abstract supplied.

4) Doxil Life-Cycle Strategy Analysis, ***Eric Johnson, Howie Rosen***

No abstract supplied.

SD31 Logistics

Contributed Session
Chair: Joseph Bukchin, Virginia Tech., Grado Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, bukchin@vt.edu

1) Dynamic Lot-Sizing with Multi-Mode Replenishments, ***Wikrom Jaruphongsa***, Texas A&M University, Dept. of IE, College Station, TX 77843-3131, wikrom@tamu.edu, ***Chung-Yee Lee, Sila Cetinkaya***

We consider a dynamic lot-sizing problem with two replenishment modes. Each mode has a different cost structure including a multiple set-ups cost. We provide polynomial-time algorithms for computing the optimal solution. Some practical applications arising in the context of expedited deliveries and LTL and FTL shipments are also discussed.

2) Optimization of Car Rental Logistics, ***Andreas Fink***, Braunschweig University of Technology, Abt-Jerusalem Str. 7, Braunschweig, 38106, Germany, a.fink@tu-bs.de, www.winforms.phil.tu-bs.de/staff/afink/e_afink.htm

We consider the deployment of cars in car rental networks. On the basis of detailed demand forecasts, which are based on reservations, we schedule the transfer of cars between stations and/or depots. The problem is modeled and solved by using a network flow formulation.

3) Scheduling Periodical Deliveries to Minimize Fleet Size, ***Jiyin Liu***, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, Hong Kong, jyliu@ust.hk, ***Aiying Rong***

We study the problem in which a distribution centre delivers goods to customers periodically using trucks. In each period, every customer requires a given number of deliveries. We use a routing then scheduling approach to solve the problem for minimizing the fleet size. The performance of the solution is analyzed.

4) A Dynamic Policy for the Loading of Multiple Products on a Vehicle with Different Compartment Sizes, ***Joseph Bukchin***, Virginia Tech., Grado Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, bukchin@vt.edu, ***Subhash C. Sarin***

We address a loading problem in which a vehicle consists of multiple compartments, each can contain only one product during each shipment and is used to transfer multiple products, having stationary demands. No shortages are permitted and the objective is to minimize the required number of shipments per time unit, assuming that the inventory holding cost is significantly lower than the delivery cost.

SD32 Multi-Stage Investment Models

Cluster: Financial Engineering
Invited Session
Chair: John M. Mulvey, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, mulvey@princeton.edu

1) Global Asset Liability Management, ***Michael Dempster***, University of Cambridge, Judge Inst. of Mgmt. Studies, m.dempster@jims.cam.ac.uk

Multistage stochastic programming has found wide application in the solution of financial problems characterized by a large number of state variables and a generally low number of decision stages. We present the CALM model, which has been designed to deal with uncertainty affecting both assets (portfolio or market) and liabilities.

2) withdrawn 10/9: Large Risk Measures for Multistage Financial Decision Problems & Associated Optimization Problems, ***Georg Pflug***, University of Vienna, Dept. of Stats. & DSS, Wien-Vienna, Austria, georg.pflug@univie.ac.at

3) Optimizing Investment Strategies for Hedge Funds, ***John M. Mulvey***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, mulvey@princeton.edu

Leading institutional investors, especially university endowments, have greatly benefited by investing in alternative asset classes: hedge-funds, private-equity and venture capital. Many popular hedge-fund strategies can be posed as optimizing a set of prescribed decision rules. An analysis of hedge-funds shows the benefit of this viewpoint for multi-stage investment models.

SD33 OR & Breast Cancer II

Sponsor: Women in OR/MS/Health Applications
Sponsored Session
Chair: Janny M. Y. Leung, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, Hong Kong, janny@se.cuhk.edu.hk

1) Mammographic Screening of Women in their Forties: Why Couldn't We Agree on an Answer?, ***Eric Wolman***, George Mason University, 7806 Hidden Meadow Terrace, Potomac, MD 20854-1792, eric.wolman@erols.com

Much is known but experts disagree passionately, as shown by vociferous conflict at 1997 Consensus Conference. We summarize many conflicting issues in cancer biology, screening-tests and data interpretation that make policy formulation difficult. The "answer" depends more on human values than on science, but this may change.

SD34 OR/MS Methods in Infrastructure Management

Sponsor: TSS
Sponsored Session
Chair: Samer Madanat, University of California, Dept. of Civil & Environ. Eng., 114 McLaughlin Hall, Berkeley, CA 94720, madanat@ce.berkeley.edu

1) Infrastructure State Transition Probability Computation using Duration Models, ***Rabi Mishalani***, Ohio State University, Dept. of Civil & Environ. Eng., Columbus, OH 43210, mishalani.1@osu.edu, ***Samer Madanat***

State-based infrastructure deterioration models consist of transition probabilities capturing the evolution of condition over time. Current methods for determining such probabilities suffer from several serious limitations. An alternative approach is presented where time-based duration models are used. The methodology is demonstrated using a reinforced concrete bridge deck data set. methodology is demonstrated using a reinforced concrete bridge deck data set.

2) Determining the Value of the Air Traffic Infrastructure, ***Robert B. Rovinsky***, Federal Aviation Administration, 800 Independence Ave. SW, Washington, DC 20591, robert.rovinsky@faa.gov

The Civil Engineering Society recently rated the nation's air traffic control infrastructure as poor. Since airspace availability exceeds 99.9%, justifying additional funding is difficult. The FAA is connecting its infrastructure to services and determining "derived value," thus creating a business case to modernize and evolve its infrastructure.

3) Transportation Asset Management under Uncertainty, ***Jeffrey Fine***, Northwestern University, IEMS Dept., Evanston, IL 60208, j-fine@northwestern.edu, ***Thanasis Ziliaskopoulos***

Transportation infrastructure problems, in particular physical assets, are modeled effectively as capital investment problems. We discuss issues of uncertainty of the value of the asset, of increasing uncertainty with respect to time, the use of assets as insurance, present and future values/utilities associated with the asset, multiple time/exercise opportunities, and risk-neutral/averse assumptions. Financial models are fundamentally concerned with long-term results and the long-term behavior of assets...

4) Optimal Infrastructure Facility Maintenance & Repair Policies under Uncertainty in Deterioration: An Adaptive Control Approach, ***Pablo L. Durango-Cohen***, University of California, IEOR Dept., Berkeley, CA 94720-1777, durango@ieor.berkeley.edu, ***Samer Madanat***

Agencies must often develop infrastructure M&R policies with limited information about facility deterioration. We will present 2 AC models that explicitly account for the uncertainty in characterizing a facility's actual deterioration rate. These methods use infrastructure condition data obtained during operation of a facility to improve the characterization over a finite planning horizon through Bayesian updating. We show that economic benefits can be achieved.

SD35 Inventory Routing

Sponsor: TSS
Sponsored Session
Chair: Ann Melissa Campbell, University of Iowa, Tippie Coll. of Bus., 108 Pappajohn Bus. Bldg., Iowa City, IA 52242-1000, ann-campbell@uiowa.edu

1) Separable Pricing for Stochastic Inventory Systems, ***Dan Adelman***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, dan.adelman@gsb.uchicago.edu, ***Anton J. Kleywegt***

We study a general class of stochastic inventory management problems that includes the inventory routing problem. We derive and implement a math program whose optimal prices yield the "best" (in a certain sense) separable functional approximation to the dynamic programming optimal value function.

2) The Dynamic Inventory Routing Problem, ***Chi-Guhn Lee***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, chiguhn.lee@umich.edu, ***Yavuz A. Bozer***, ***Chelsea C. White, III***

We develop a heuristic, based on simulated annealing and LP, for a deterministic dynamic inventory routing problem involving multiple suppliers and one plant. The objective is to minimize the sum of transportation and inventory holding costs. Numerical results suggest the heuristic is computationally efficient and provides a high quality solution.

3) The Deterministic Repeatable Inventory Routing Problem, ***Charles E. Noon***, University of Tennessee, 613 Stokes Mgmt. Ctr., Knoxville, TN 37996, cnoon@utk.edu, ***Anurag Agarwal***

The DRIRP seeks a minimum cost-per-unit solution of routes and delivery (pickup) amounts for servicing customers with deterministic consumption (production) rates and limited storage. Solution repeatability is achieved by constraining the initial and final vehicle locations and inventory positions to be identical. We present computational results from a cutting-plane approach.

4) The Vehicle Routing Problem with Flexible Quantities, ***Ann Melissa Campbell***, University of Iowa, Tippie Coll. of Bus., 108 Pappajohn Bus. Bldg., Iowa City, IA 52242-1000, ann-campbell@uiowa.edu

We examine extensions of the vehicle routing problem where flexibility exists in the delivery quantity to the customers. When delivery volume varies within a range or is time dependent, we study how research on the VRP can be modified for these new problems and the savings this additional flexibility offers.

SD36 Airline Operations

Sponsor: Aviation Applications
Sponsored Session
Chair: Michael D. Clarke, Sabre, Inc., 1 East Kirkwood Blvd., MD 7390, Southlake, TX 76092, michael.clarke@sabre.com

1) Analysis of Minimum Data Predictability Needed for Near-Term Departure Scheduling using DEPARTS, ***Wayne Cooper***, MITRE/CAASD, 1820 Dolley Madison Blvd., MS W196, McLean, VA 22102-3481, wcooper@mitre.org, ***Glenn Foster***, ***Michael Mills***, ***Satish Mohleji***

Decision support tools that optimize the use of future departure runway capacity and minimize taxi times require predictable inputs to be useful. We have developed a simulation-based approach, using the DEPARTS optimization model, to study the relationship between achievable taxi-out time improvements and the predictability of gate departure times and other factors.

2) Airline Planning, ***Eduardo F. Soares***, Universidade Federal Fluminense, filizola@esquadro.com.br, ***Marcos Caldas***

Airline planning has had a great highlight in operations research and logistic studies due to the necessity of reduction of operational costs in the airlines' enterprises. Planning can not allow aircraft with empty places or spill (passenger surplus) and it has to try to minimize the number of aircraft utilized.

3) Assessing the Vulnerability of Air Networks: A Case Study of Seattle, ***Peter Chen***, University of Illinois, Dept. of Civil & Environ. Eng., Urbana, IL 61801, pschen@uiuc.edu, ***Hank Hsing***

Seattle's earthquake of February 28, 2001 had tremendous impact on Sea-Tac and Boeing Field airports, both in flight operations and traveler services. We discuss the results of an impact assessment study using previously developed evaluation model for the airport systems in the Mid-America earthquake region. evaluation model for the airport systems in the Mid-America earthquake region.

SD37 Internet Auctions

Sponsor: Revenue Management & Pricing
Sponsored Session
Chair: Dimitris Bertsimas, MIT, Sloan Sch. of Mgmt., Rm. E53-363, Cambridge, MA 02139, dbertsim@mit.edu

1) Internet Pricing & the History of Communications, ***Andrew Odlyzko***, AT&T Labs - Research, 180 Park Ave., Bldg. 103, Rm. C225, PO Box 971, Florham Park, NJ 07932-0971, amo@research.att.com

The historical pattern of numerous communication technologies is that quality rises, prices decrease and usage increases, while prices become simpler. This suggests that the Internet will evolve in a similar way. The schemes that aim to provide differentiated service levels and sophisticated pricing schemes are unlikely to be widely adopted.

2) Design of Multi-Period On-Line Auctions, ***Edieal Pinker***, University of Rochester, Simon Sch., Rochester, NY 14627, pinker@simon.rochester.edu, ***Abraham Seidmann***, ***Yaniv Vakrat***

On-line auctions are a popular sales venue. Given an initial inventory, we use dynamic programming to determine the optimal number of auctions and their lot sizes. Price is determined endogenously by the auction mechanism. We also model learning about the customer from one auction to the next using Bayesian updating.

3) Optimal Bidding in On-Line Auctions over the Internet, ***Jeff Hawkins***, MIT, OR Ctr., 1 Amherst St., Cambridge, MA, jhawkins@mit.edu, ***Dimitris Bertsimas***, ***Georgia Perakis***

In recent years online auctioning over the internet has become an effective method of doing business. We study the design and control of auctions by designing bidding strategies from a B2C point of view. We use dynamic optimization and optimal control ideas to propose algorithms for optimal bidding and test our results using real world data.

SD38 Panel: Current Rail Issues II

Sponsor: RASIG
Sponsored Session
Chair: Bruce W. Patty, Kingsley Group, Inc., 44 Montgomery St., Ste. 3850, San Francisco, CA 94104, bpatty@kingsley-group.com

1) Roundtable Panel: Getting Ready for the Next Round of Mergers II, ***Bruce W. Patty***, Kingsley Group, Inc., 44 Montgomery St., Ste. 3850, San Francisco, CA 94104, bpatty@kingsley-group.com

In the second session of the roundtable, we will conduct a panel discussion on the next Round of mergers, addressing such questions as: What will the next round of mergers look like? What is necessary to provide OR support for the next round of mergers? Are there new tools needed in order to help avoid the problems associated with mergers?

SD40 OR/MS for Recycling

Cluster: Energy
Sponsor: ENRE
Sponsored Session
Chair: Julie Ann Stuart, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907, stuart@ecn.purdue.edu

1) Managing Reverse Logistics Channels with Data Envelopment Analysis, ***David A. Haas***, Kutztown University, Coll. of Bus., Kutztown, PA, ***Richard A. Lancioni***, ***Frederic H. Murphy***

We apply DEA to help logistics managers manage even more complex systems - reverse logistics systems. We apply DEA to the reverse flows involved in municipal solid waste management systems to determine if the method could be utilized to aid reverse logistics channel managers in better managing their

distribution systems. We demonstrate that DEA is an effective analytical tool...

2) Decision Tools for High Quantities of Low Value Product Returns, ***Taylor Rich***, Norfolk Southern, IE/OR, 600 W Peachtree St., Ste. 900, Atlanta, GA 30303, taylor_rich@excite.com, ***Julie Ann Stuart***

We present a math programming model to test the allocation of returned products to classes based on likelihood of reuse. Using our optimization results, we show how a decision rule-driven database spreadsheet can assign part disposition automatically.

3) A Short-Term Production Planning Model for an Electronic Bulk Recycling Center, ***Qin Lu***, Ohio State University, IWSE, 210 Baker Systems Bldg., 1971 Neil Ave., Columbus, OH 43210-1271, lu.102@osu.edu, ***Julie Ann Stuart***

We developed a MIP model to address 3 short-term production planning decisions in bulk recycling. Our model determines what product to accept, when to process the products accepted and to what extent to process and reprocess the products. We use a greedy heuristic to find a lower bound for a B&S approach to solve the problem.

4) Competition in Remanufacturing (Procurement & Sales), ***Pranab Majumder***, University of Rochester, Simon Sch. of Bus., Rochester, NY 14627, majumderpr@simon.rochester.edu, ***Harry Groenevelt***

We continue our research on different competitive models of remanufacturing by examining a 2-period game of competition. An OEM and a local remanufacturer compete both for procurement of used items, and for customers in the sales market. This allows us to further examine the players' incentives and its effects on remanufacturing activity.

SD41 Data Quality: An OR Problem or a Problem for OR?

Cluster: Unsolved OR Problems in Industry
Invited Session

Chair: Zahir Balaporia, Schneider Logistics, Inc., 3101 South Packerland Dr., Green Bay, WI 54313, balaporiaz@slxi.com

1) Data Quality: An OR Problem or a Problem for OR?, ***Zahir Balaporia***, Schneider Logistics, Inc., 3101 South Packerland Dr., Green Bay, WI 54313, balaporiaz@slxi.com

When estimating the cost of OR solutions, the cost of maintaining the quality of input data is often ignored. If garbage in still equals garbage out, then data quality programs are essential to the success of OR in integrated enterprises. We cover some approaches to tackling the problem while raising awareness.

SD43 Education I

Sponsor: INFORMED
Sponsored Session

Chair: Thomas A. Grossman, University of Calgary, Fac. of Mgmt., Calgary, Alberta, T2N 1N4, Canada, grossman@ucalgary.ca

1) A Set-by-Step Procedure for Optimization Modeling, ***Thomas A. Grossman***, University of Calgary, Fac. of Mgmt., Calgary, Alberta, T2N 1N4, Canada, grossman@ucalgary.ca, ***Stephen G. Powell***

Modeling - the process of creating a model - is essential for OR/MS. It is an art that is difficult to learn. We attempt to formalize this art via a procedure that students (or anyone) can follow when modeling an unstructured business situation. We discuss open research questions around modeling and the use of models.

SD44 Telecommunications III

Contributed Session

Chair: Yupo Chan, University of Arkansas, 2801 South University, Little Rock, AR 72204-1099, yxchan@ualr.edu

1) A Game-Theoretic Model for Secure International Communications, ***Yupo Chan***, University of Arkansas, 2801 South University, Little Rock, AR 72204-1099, yxchan@ualr.edu, ***Jeffrey Del Vecchio***, ***Keith Bruso***

An international telecommunications network service provider (NSP) can be selected with the help of game theory and multicriteria decision making. These techniques determine the desirable coalition for a particular NSP, considering both monetary rewards and information security. The NSP's hardening strategy and the adversary's tampering strategy are identified in the model.

2) withdrawn 9/14: Capacity Requirements for Node and Arc Survivable Networks, ***Eric Rosenberg***, AT&T Labs., 200 South Laurel Ave., Rm. C2-3D24, Middletown, NJ 07748, ericr@att.com

3) Robust Capacity Assignment for Telecommunications Networks, ***Adam Ouorou***, France Telecom R&D, 38-40 rue du General Leclerc, Issy les Moulineaux, 92794, France, adam.ouorou@francetelecom.com

We propose some models for capacity assignment in telecommunications networks with uncertain demands in the framework of robustness approach proposed by Kouvelis & Yu. We develop some cutting plane based algorithms to solve these models. Our preliminary computational experiments show the effectiveness of this approach.

4) Probabilistic Scenarios to Support Decision Making in Telecommunications, ***Bartolomeo Sapio***, Fondazione Ugo Bordoni, Via Baldassarre Castiglione 69, Rome, 00142, Italy, bsapio@fub.it, ***Isabella Maria Palombini***, ***Quirino Brindisi***

Probabilistic scenarios can be built with the help of optimization methods and used in strategic planning along different guidelines, such as focusing attention on the most probable scenario, protecting oneself in the light of the most menacing scenarios or proactively influencing future developments in the sector up to the establishment of a favorable scenario...

5) The Formulation & Implementation of Telecommunications Strategy, ***Steven R. Powell***, California State Polytech University, CIS Dept., 3801 West Temple Ave., Pomona, CA 91768, srpowell@csupomona.edu

Effective strategic planning requires a strategy that is both well-formulated and well-executed. Telecommunications strategic planning is no exception. We describe a methodology for ensuring the proper formulation and implementation of telecommunications strategy.

SD45 Operations Management VII

Contributed Session

Chair: Stefan Spinler, WHU, Otto-Beisheim GSM, Burgplatz 2, Vallendar, 56179, Germany, sspinler@whu.edu

1) Capacity Options & Applications in the Transportation Industry, ***Stefan Spinler***, WHU, Otto-Beisheim GSM, Burgplatz 2, Vallendar, 56179, Germany, sspinler@whu.edu, ***Arnd Huchzermeier***, ***Paul R. Kleindorfer***

A framework to price capacity options in a setting with a contract and a spot market is presented, where the buyer faces state-contingent utility, the seller state-contingent costs. Upon determining optimal bidding strategies we show that the introduction of a contract market is Pareto improving and discuss implications for the transportation industry.

2) The Multiple U-Line Balancing Problem, ***Timothy L. Urban***, University of Tulsa, Op. Mgmt. Dept., 600 South College Ave., Tulsa, OK 74104, urbantl@utulsa.edu, http://www.cba.utulsa.edu/qm_tlu/, ***Wen-Chyuan Chiang***, ***Panos Kouvelis***

The multiple u-line balancing problem is a generalization of existing approaches that allows redundant lines. This provides greater flexibility and improved efficiency, while allowing each line to have a backup in case of breakdowns. Methods are presented to identify the optimal solution for type I, type II and cost-minimization problems.

3) Modeling Lateral Transshipments, ***Stefan Vidgren***, Lund University, Ind. Mgmt. & Logistics Dept., PO Box 118, Lund, 22100, Sweden, stefan.vidgren@iml.lth.se

We consider an inventory system with a number of installations. All installations face a Poisson demand and they are helping each other with lateral transshipments. Replenishments are one-for-one. We provide a method to find an "upper" and "lower" inventory level for lateral transshipments and the transfer probabilities.

4) Limits of Time-Based Competition: Strategic Sourcing Decisions in Make-to-Stock Manufacturing, ***Joseph D. Blackburn***, Vanderbilt University, Owen Grad. School of Mgmt., Nashville, TN 37203, joe.blackburn@owen.vanderbilt.edu

We develop a methodology for valuing changes in the speed of response for make-to-stock manufacturing. We show that the marginal value of time is greater under non-optimal inventory management and establish limits to time-based competition: a "1% rule" that bounds the cost of a 1-week change in the lead-time.

SD46 Marketing III

Contributed Session

Chair: Shuba Srinivasan, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, shuba.srinivasan@ucr.edu

1) Who Benefits from Store Brand Entry?, *Shuba Srinivasan*, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, shuba.srinivasan@ucr.edu, ***Koen Pauwels***

Store brand entry into a category may change both consumer and competitive response. We apply modern multi-variate time-series analysis to 7 years of multi-category data and assess the long-run implications of store brand entry on category and selective demand, retailer and manufacturer revenues and retailer category margins.

2) Building a Profit-Maximizing Reverse Auction Site based on Customers' Optimal Bidding Strategies, *Min Ding*, Pennsylvania State University, Mktg. Dept., 701A BAB, Smeal College, State College, PA 16802, mqd9@psu.edu, ***Jehoshua Eliashberg***

We examine an individual's bidding behavior in reverse auction. By incorporating both behavioral and economic theories, we generated some interesting insights on the bidding strategies of new (potential) customers, the dynamic bidding behavior of existing customers and managerial implications for the reverse auction sites.

3) A Test of Neologism-Proofness in Cheap-Talk Games, *Amy Kallianpur*, Michigan State University, Dept. of Mktg., N302-NBC, East Lansing, MI 48824, amy.kallianpur.wp99@wharton.upenn.edu

Standard equilibrium refinements that try to curtail outcomes do not guarantee meaningful communication in cheap-talk games. The neologism-proof equilibrium in these games is one in which a neologism is sent with 0 probability in that equilibrium. We test the neologism-proofness refinement.

4) A Decision Support System for Direct Mailing Decisions, *Nanda Piersma*, Erasmus University Rotterdam, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, piersma@few.eur.nl, http://www.few.eur.nl/few/people/piersma/, ***Jedid-Jah J. Jonker***, ***Rob Potharst***

For establishing a profitable long-term relationship with individual customers it is important to carefully decide on the number of mailings. We present a decision support model that allows the user to segment the customers and to study different mailing scenarios based on preferred segments. This DSS is applied in fundraising.

Monday 08:15-09:45

MA01 Evolutionary Algorithms: Theory & Applications

Sponsor: Artificial Intelligence
Sponsored Session

Chair: Jackie Rees, Purdue University, 1310 Krannert GSM, West Lafayette, IN 47907-1310, jrees@mgmt.purdue.edu

1) The Diffusion of New Technological Products: A Simple Genetic Algorithm Approach, *Wei T. Yue*, Purdue University, 1310 Krannert GSM, West Lafayette, IN 47907-1310, wei_yue@mgmt.purdue.edu, ***Jackie Rees***

Many technological products exhibit "winner takes all" characteristics. Network externalities and price externalities are the main attributes of this outcome. The diffusion of such products is examined by applying genetic algorithms in an agent-based simulation. Results are presented based on the market factors word of mouth and mass media.

2) The Task-Structure Approach to Component-Based Software Engineering: A Guide of Component Specifications, *Roman Wong*, Barry University, Andreas Sch. of Bus., 11300 NE Second Ave., Miami Shores, FL 33161-6695, rwong@mail.barry.edu

An important issue in component-based software engineering is component specification for portability across application tasks and designers. We demonstrate the application of the task-structure approach to provide a task-level specification for system components. We then demonstrate the approach by studying a task-specific architecture using generic problem-solving components.

3) Agents & E-Commerce, *Mukul Gupta*, Purdue University, 1310 Krannert GSM, West Lafayette, IN 47907-1310, mukul_gupta@mgmt.purdue.edu

E-commerce offers the industry great opportunity to grow but it also exposes businesses to security risks from agents such as hackers, terrorists, foreign governments, organized crime and internal disgruntled employees. We intend to assess the impact of these agents on the businesses by modeling these irrational agents using GAs.

4) Genetic Algorithm Parameter Estimation Validation, *Jackie Rees*, Purdue University, 1310 Krannert GSM, West Lafayette, IN 47907-1310, jrees@mgmt.purdue.edu

GAs can be viewed as a metaphor for physical and social evolutionary processes. Using this approach, we compute parameter settings given observed populations of such processes. Mathematical models are used that exactly capture expected behavior and sampling distributions relevant to this estimation problem are explored using an experimental approach.

MA02 OR Models & Practice

Cluster: Operations Research: In Honor of Saul I. Gass
Invited Session

Chair: Moshe Dror, University of Arizona, Coll. of Bus. & Public Admin., Dept. of MIS, Tucson, AZ 85721, mdror@bpa.arizona.edu

1) A Least Squares Primal-Dual Algorithm for Solving Linear Programs, *Ellis L. Johnson*, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ejohnson@isye.gatech.edu, ***Earl R. Barnes***, ***Victoria C. P. Chen***, ***Balaji Gopalakrishnan***

A non-negative least squares, primal-dual algorithm is given. It is impervious to degeneracy, has good numerical properties and seems to have low iteration count. A dual procedure is given and compared to primal simplex.

2) Solving Nonconvex NLPs and MINLPs using OptQuest/GRG, *Leon S. Lasdon*, University of Texas, Austin, TX 78712-1175, lasdon@mail.utexas.edu, ***Zsolt Ugray***, ***John C. Plummer***, ***Manuel Laguna***

OQ/GRG solves problems with many constraints and variables. It uses OptQuest, a global optimizer, to provide starting points for GRG, a local NLP solver. GRG seeks a local solution from a subset of these points, holding discrete variables fixed. We describe recent improvements and computational results.

3) Innovations in Engineering Education: Using Technology to Enhance Teaching & Learning, *Thomas L. Magnanti*, MIT, Sch. of Engineering, Rm. 1-201, Cambridge, MA 02139-4307, magnanti@mit.edu

In the 1998-99 academic year, the University of Maryland named Saul Gass one of 5 Distinguished Scholar-Teachers. The announcement for the award cited his "constant interest in learning about new ideas and approaches," his "use of PC-based software packages and the "introduction of state-of-the-art software." In keeping with his commitment to enriching education, we will highlight several innovations in educational engineering, focusing on approaches being developed by MIT and Microsoft in an applied collaborative research project called "I-Campus."

4) OR/MS Resurgence in Health Care Delivery, *William P. Pierskalla*, UCLA, Anderson Sch., 110 Westwood Plaza, Ste. B411, Los Angeles, CA 90095-1481, william.pierskalla@anderson.ucla.edu

The American health care system will undergo fundamental change over the next 10 years. Quality gaps are everywhere and costs are projected to increase at near double-digit rates. Waste is extensive and delivery systems are outmoded. We will discuss the strategic redesign of care processes to produce high quality mass customization of services focusted on the patient...

MA03 Data Mining for Business Problems: Methods & Applications

Cluster: Data Mining
Invited Session

Chair: Paul Zantek, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, pzantek@rhsmsith.umd.edu

1) Intelligent Assistance for the Knowledge Discovery Process, *Foster Provost*, NYU, Dept. Info, Ops. & MS, Stern Sch. of Bus., 44 W 4th, New York, NY 10012-1126, fprovost@stern.nyu.edu, ***Abraham Bernstein***

Data mining is a multi-step process: preprocessing, induction, post-processing, etc. However, analysts typically consider few possible options. We present a system that assists analysts, based on an explicit ontology of data-mining techniques. Results demonstrate the composition of non-trivial KD-process plans and ranking based on expected accuracy, speed, comprehensiblity, etc.

2) Decision Support for E-Commerce Acquisition at merckmedco.com, *Moshe B. Rosenwein*, Merck-Medco, 100 Parsons Pond Rd., Franklin Lakes, NJ 07417, moshe_rosenwein@merck.com

Merck-Medco developed a suite of Customer Relationship Management decision support tools in support of its Internet site. The site processes more than

100,000 online prescriptions per week, yielding $500 million in annual revenues. Among the tools is a predictive scoring model that optimizes the allocation of communication resources.

3) An Intelligent Recommendation System for Customer Targeting, ***YongSeog Kim***, University of Iowa, Dept. of MS, S232 PBB, Iowa City, IA 52242, yskim@blue.weej.uiowa.edu, ***Nick Street***

One of the key problems in database marketing is to identify households that are most likely to respond to a particular product campaign. Using ANNs guided by GAs, we not only identify the most promising households but also determine the optimal campaign size with maximized profit.

4) An Association Mining-Based Product Recommender, ***Ayhan Demiriz***, Verizon, E-Commerce Dept., 919 Hidden Ridge M03D64, Irving, TX 75038, ayhan.dermiz@verizon.com

Often customers on the web cannot find what they look for or receive promotion messages what they dislike. To increase the quality of customer service, recommender systems are becoming a necessity and a common feature at the e-commerce sites rather than a novelty. They are particularly important to ease catalog browsing, to cross-sell and to increase the customer loyalty. We will introduce an association mining-based solution for product recommendation.

MA04 Multi-Attribute Negotiation Support on E-Markets

Cluster: **Auctions**
Invited Session

Chair: Jayant Kalagnanam, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, jayant@us.ibm.com

1) Multi-Agent Negotiation Algorithms for Insecure Multi-Dimensional Contracts, ***Peyman Faratin***, MIT, Ctr. for Coord. Sci., Sloan Sch., 77 Mass. Ave., Cambridge, MA 02139, peyman@mit.edu

The problem of interest is the design of protocols and tractable decision algorithms for autonomous computational trading agents operating in uncertain domains. Multi-dimensional trading decisions involve both the identification of the dimensions of exchange as well as strategies for proposing multi-dimensional e-contracts given a set of dimensions and protocol.

2) Multi-Attribute Matchmaking on Bond Markets, ***Christof Weinhardt***, Universitat Karlsruhe, Lehrstuhl Informations, Englerstrabe 14, Karlsruhe, 76131, Germany, christof.weinhardt@iw.uni-karlsruhe.de, ***Carsten Holtmann***, ***Dirk Neumann***, ***Daniel Veit***

In bond markets, trades are commonly conducted over the counter. Innovative trading systems must meet the special requirements of the investors by providing matchmaking methods on additional parameters but only the price. Based on the framework of parameter specific multi-attribute matchmaking, we apply domain specific distance functions to resolve price as well as partner and product matching.

3) Iterative Multi-Attribute Auctions, ***Jayant Kalagnanam***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, jayant@us.ibm.com

A fundamental issue in iterative multi-attribute auctions is providing feedback to the bidders without completely revealing the utility function of buyer/seller running the auction. We show that providing local gradient information is sufficient to guide the bidding to an optimal outcome, provided the bidders follow myopic best response.

4) Individual Bidding Behavior in Electronic Multi-Dimensional Auctions, ***Otto Koppius***, Erasmus University of Rotterdam, Dept. of DIS, F1-32, Box 1738, Sch. of Mgmt., Rotterdam, 3000, The Netherlands, ***Eric van Heck***

Developments in IT have made more complex market mechanisms possible, one of which is the auction. The cognitive complexity of multi-dimensional auctions for the bidders requires attention to several design parameters of markets. Of particular importance is the information architecture, which determines what information is or becomes available to the bidders during the auction. We report results from experiments with this information architecture...

MA05 Stochastic Global Optimization

Cluster: **Global Optimization**
Invited Session

Chair: Graham Wood, Massey University, Institute of IST, Private Bag 11 222, Palmerston North, New Zealand, g.r.wood@massey.ac.nz

1) Random Search with Interval Bounds for Global Optimization, ***Birna P. Kristinsdottir***, University of Iceland, MIE Dept., Hjardarhaga 4, Reykjavik, 107, Iceland, birnap@hi.is, ***Zelda B. Zabinsky***

A hybrid algorithm for global optimization that combines random search methods and interval methods in a B&B-type algorithm is presented. The algorithm is tested on several global optimization test functions that are frequently used in the literature and its performance is compared to other methods.

2) Pure Random Search for Noisy Objective Functions, ***Stephen Baumert***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109, sbaumert@engin.umich.edu, ***Robert L. Smith***

Pure random search is an abstract model of the simplest stochastic algorithm for global optimization. Although computationally impractical, it provides important insights into the challenges of global optimization. We extend pure random search to the case of noisy, i.e. stochastic, objective functions and assess implications for global optimization.

3) Convergence Rates of Stochastic Adaptive Search Algorithms, ***Graham Wood***, Massey University, Institute of IST, Private Bag 11 222, Palmerston North, New Zealand, g.r.wood@massey.ac.nz, ***David Alexander***

A range of idealized stochastic adaptive search algorithms, from pure adaptive search to hesitant adaptive search to backtracking adaptive search, have been defined in the literature and their convergence analyzed. These, and others, will be reviewed and related and their role in answering the question, "How long should we run a stochastic adaptive algorithm?" discussed.

4) The Performance Graph of a Stochastic Global Optimization Method, ***Bill Baritompa***, University of Canterbury, Dept. of Math & Statistics, Christchurch, NewZealand, b.baritompa@math.canterbury.ac.nz

What is a good way to compare various methods? The performance graph associated with a stochastic global optimization method provides a realistic means of comparing the practical usefulness of various methods. For backtracking adaptive search, the connection between the performance graph and the bettering, hesitation and worsening functions is explored.

MA06 Pricing & Economic Analysis of Telecommunications

Sponsor: **Telecommunications**
Sponsored Session

Chair: Joseph Bailey, University of Maryland, Smith Sch. of Bus., Van Munching Hall, College Park, MD 20742-1815, jbailey@rhsmith.umd.edu

1) Pricing DiffServ Networks & Max-Min Fairness, ***Peter Marbach***, University of Toronto, Dept. of CS, 10 King's College Rd., Toronto, Ontario, M5S 3G4, Canada, marbach@cs.toronto.edu

We consider a DiffServ architecture where users are charged according to the service classes that they use. We assume that each user allocates traffic to service classes to maximize its own net benefit. Using game theory, we show that the resulting allocation is max-min far.

2) BOP: A "Bourse of Packets" Approach to Internetwork Resource Control, ***Kostas G. Anagnostakis***, University of Pennsylvania, Dept. of CIS, 200 South 3rd St., Philadelphia, PA 19104, anagnost@dsl.cis.upenn.edu, ***Jonathan M. Smith***

To address key problems with the resource control model of the Internet, BOP enables dynamic placement of control agents inside the network and uses economic incentives to guide them towards efficient use of resources. We describe the BOP architecture and pricing models and present experiments with congestion control and routing.

3) Optimal Resource Allocation & Routing with Quality of Service Requirements in Integrated-Service Connection-Oriented Networks, ***Tudor M. Stoenescu***, University of Michigan, Dept. of EECS, Ann Arbor, MI 48109-2122, ***Demosthenis Teneketzis***

We present an approach to the admission control, resource allocation and routing problem in multi-service, connection-oriented networks with quality of service requirements, where the objective is to maximize the sum of the users' utilities. We describe a market mechanism that achieves the above objective and satisfies the network's informational constraints.

4) Ex-Post Internet Charging Models, ***Joseph Bailey***, University of Maryland, Smith Sch. of Bus., Van Munching Hall, College Park, MD 20742-1815, jbailey@rhsmith.umd.edu, ***S. Raghavan***

We present 2 ex-post Internet charging models that charge for utilization and burstiness: an effective bandwidth model and a moment-based model. We describe how the models give users incentives to design and manage their networks more effectively to minimize their charge and in turn, impose less congestion on other Internet users.

MA07 IT-Based Teaching within OR/MS

Sponsor: Computing
Sponsored Session
Chair: Stefan Voss, Technische Universitaet Braunschweig, Informationsmanagement, ABWL, Abt-Jerusalem-Str. 7, Braunschweig, D38106, Germany, stefan.voss@tu-bs.de

1) Teaching POM with the Production Management Trainer, ***Horst Tempelmeier***, University of Cologne, Produktionswirtschaft, tempelmeier@wiso.uni-koeln.de

We present an educational software package, Production Management Trainer, that we use in classroom to teach quantitative models and algorithms in production and operations management, such as forecasting, MRP, inventory management, etc. The software is also used by several companies and consultants in the area of supply chain optimization.

2) Customizing Interactive Learning Methods for the Internet, ***Leena Suhl***, University of Paderborn, DS & OR Lab., Rm. E2.116, Warburger Str. 100, Paderborn, 33098, Germany, suhl@upb.de, ***Hans Georg Brunn***, ***Christine Frank***, ***Lili Tan***

OR/MS is an interdisciplinary subject including knowledge of algorithms, modeling, software, business applications, project management, etc. Education of OR/MS has to include interactive learning methods in order to build modeling and problem solving skills. We discuss the possibilities of supporting interactive learning over the Internet, in particular, animations, simulations, case studies and assessment will be addressed...

3) Internet-Based Exercises in Operations Research, ***Brigitte Werners***, Ruhr-University Bochum, Inst. of Mgmt. & OR, Bochum, 44780, Germany, brigitte.werners@ruhr-uni-bochum.de

Internet-based exercises in OR are used successfully at Ruhr University Bochum. They have proven to be a valuable supplement to increase the quality of teaching and education in an university. Now this approach is integrated into virtual OR/MS. The goals, requirements, realization and experiences are presented.

4) Teaching Meta-Heuristics through Interactive Learning over the Internet, ***Torsten Reiners***, Technical University of Braunschweig, Informationsmanagement, Abt-Jerusalem-Str. 7, Braunschweig, 38106, Germany, treiners@tu-bs.de, ***Stefan Voss***

Modern education of OR/MS will include interactive learning methods in order to build and develop modeling and problem solving skills. We discuss the possibilities of supporting the teaching of meta-heuristics such as tabu search or the pilot method through interactive learning. Ideas incorporate the use of HOTFRAME, a heuristic optimization framework.

MA08 DO-07

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Eva K. Lee, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, eva.lee@isye.gatech.edu

1) Solution of a Min-Max Vehicle Routing Problem, ***Sanjeeb Dash***, Rice University, sanjeebd@caam.rice.edu, ***David Applegate***, ***William J. Cook***, ***Andre Rohe***

We use a B&B based search method to verify the optimality of the winning solution in a 1996 vehicle routing competition, called the Whizzkids '96 contest. Our algorithmic framework combines the LP-based traveling salesman code of Applegate, Bixby, Chvatal & Cook, with specialized cutting planes and a staged search algorithm, allowing the use of a heterogeneous, geographically distributed, computing network.

2) An Exponential Potential Function Method for the Held-Karp TSP Bound, ***Andrew Hutchings***, Cornell University, ahutchin@orie.cornell.edu, ***D. Shmoys***

A standard method to compute the Held-Karp bound for the TSP is to use subgradient optimization to find optimal multipliers. Plotkin, Shmoys & Tardos gave a provably efficient procedure, based on an exponential potential function reduction technique. These ideas also appear to have practical merit, and we shall present empirical results based on this approach.

3) Discrete Lot-Sizing & Convex Integer Programming, ***Andrew J. Miller***, CORE, 34 Voie du Roman Pays, Louvain-la-Neuve, 1348, Belgium, miller@core.ucl.ac.be, http://core4ux.core.ucl.ac.be/~miller, ***Laurence Wolsey***

We study the polyhedral structure of discrete lot-sizing problems viewed as special cases of CIP. In studying CIP we develop results for mixed integer sets that are used to model integer convex objective functions. Our results help signicantly to solve test cases from the industrial application motivating this research.

MA09 DO-10

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Robert Weismantel, Otto-von-Guericke University of Magdeburg, Dept. of Math/IMO, Universitatsplatz 2, Magdeburg, D-39106, Germany, weismant@saturn.math.uni-magdeburg.de

1) The Price of Robustness, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., Rm. E53-363, Cambridge, MA 02139, dbertsim@mit.edu, ***Melvyn Sim***

Robust convex optimization has been proposed by several researchers recently. While promising, these methods lead to conservative solutions that are sometimes nontrivial to compute. We propose a new methodology based entirely on linear optimization that provides a quantifiable tradeoff between solution quality and robustness and extends to discrete optimization.

2) Exponential Irreducible Neighborhoods for Combinatorial Optimization Problems, ***Robert Firla***, Magdeburg, Germany, ***Robert Weismantel***

Irreducible neighborhoods serve as a tool to improve feasible solutions. We introduce exponential neighborhoods based on alternating cycles for the classical TSP that correspond to irreducible augmentation vectors and extend these neighborhoods to other combinatorial problems, like the ATSP or the sequential ordering problem, a precedence constraint variant.

3) On Unions of Polytopes, ***Laurence Wolsey***, CORE, wolsey@core.ucl.ac.be, ***Egon Balas***, ***A. Bockmayr***, ***N. Pisaruk***

Balas' classic result on disjunctions of polyhedra gives an extended formulation whose projection is the convex hull of the disjunction. We attempt to model such disjunctions in the original space of variables. General results are provided for the union of polytopes in disjoint spaces generalizing results of Hooker and Yan on cardinality rules, and new results on the unions of polymatroids on the same ground set generalizing results of Conforti and Laurent. Results on separation are also examined.

MA10 Solving Mathematical Programs Efficiently

Cluster: Complementarity & Related Problems
Sponsor: Optimization
Sponsored Session
Chair: Georgia Perakis, MIT, Sloan Sch. of Mgmt., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu

1) Approximating Nonconvex Quadratic Optimization by SDP Relaxation, ***Paul Y. Tseng***, University of Washington, Dept. of Math., Box 354350, Seattle, WA 98195, tseng@math.washington.edu

We give new approximation bounds for nonconvex quadratic optimization by SDP relaxation. For m ellipsoid constraints, 1/O(m)-optimal solution is found. If the ellipsoids have common center, 1/m-optimal solution is found. For $m < 11$, this gives the best known bound.

2) Computation of All Solutions of a System of Polynomial Equations via Polyhedral Homotopy, ***Yang Dai***, Tokyo Institute of Technology, Dept. of Math. & CS, Japan, dai@is.titech.ac.jp, ***Masakazu Kojima***, ***Akiko Takeda***, ***Sunyoung Kim***

Polyhedral homotopy continuation methods have proven to be reliable for computing numerically approximations to all isolated solutions of polynomial systems. The efficiency of the methods depends on the construction of a start system that allows to compute all isolated solutions of a given polynomial system. Some problems related to the choice of the start system can be formulated as combinatorial and LP problems...

3) Interior Point Variations on the Frank-Wolfe Method, ***Georgia Perakis***, MIT, Sloan Sch. of Mgmt., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu, ***Marina Zaretsky***

We consider the Frank-Wolfe method for solving variational inequality problems. To make this method more efficient and avoid zigzagging, we consider interior point versions of the method. We also present variations of this method that include cuts as well as long and short steps.

4) Semidefinite Cuts in the Analytic Center Cutting Plane Method, ***Mohammad Oskoorouchi***, McGill University, 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1W5, Canada, oskoorom@management.mcgill.ca, www.crt.umontreal.ca/

~shahram, *Jean Louis Goffin*

The ACCPM is an efficient technique for solving min-max problems. In practice, when applying the ACCPM to minimize a maximum eigen-value function, the oracle returns a semi-definite cut if the maximum eigen-value has multiplicity more than one. We apply the ACCPM algorithm to the eigen-value optimization arising from the combinatorial problems...

MA11 Some Recent Deterministic & Stochastic 0-1 Program Algorithmic Developments

Cluster: Integer Programming
Invited Session

Chair: Laureano F. Escudero, Universidad Miguel Hernandez, Ctr. de Investigacion-Op., Avda del Ferrocarril, Elche, Alicante, 03202, Spain, escudero@umh.es

1) A Dynamic Programming-Based Reduction Procedure for the Multidimensional 0-1 Knapsack Problem, *Arnaud Freville*, Universite de Valenciennes, Lab. LAMIH, Unite CNRS, Valenciennes Cedex, 59313, France, arnaud.freville@univ-valenciennes.fr, *Stefan Balev, Roumen Andonov, Nicola Yanev*

We present a preprocessing procedure for the 0-1 multi-dimensional knapsack problem. A non-increasing sequence of upper bounds is generated by solving LP-relaxations then a non-decreasing sequence of lower bounds is built using dynamic programming. The comparison of the 2 sequences allows either to prove that the best feasible solution obtained is optimal or to fix a subset of variables to their optimal values...

2) A Stochastic 0-1 Program Approach for Large-Scale Strategic Supply Chain Planning, *Maria Teresa Ortuno*, Universidad Complutense de Madrid, Estadistica e Investigacion Op, Cuidad Universitaria, Madrid, 28040, Spain, mteresa@eucmax.sim.ucm.es, *Antonio Alonso, Laureano F. Escudero, Araceli Garin, Gloria Perez*

A branch & fix coordination approach is proposed for the 2-stage stochastic SSCh planning under uncertainty. The goal is to determine the production topology, product selection and raw material vendor selection. The main uncertain parameters are the product net price and demand and the material supplying cost. Some computational experience is reported.

3) An Exact Stochastic 0-1 Program Approach for Strategic Production Planning, *Gloria Perez*, Universidad del Pais Vasco, Dpto. de Matematica Aplicada, Estadistica e I-O, Sarriena, Leioa, Vizcaya, 48940, Spain, gloria@picasso.lc.ehu.es, *Antonio Alonso, Laureano F. Escudero, Araceli Garin, Maria Teresa Ortuno*

An alternative to the BFC approach for solving stochastic 0-1 programs is presented. The approach is based on a 2-stage model for strategic production planning under uncertainty. A B&B scheme for each scenario is used by branching and fixing simultaneously on the same 0-1 variables. Some computational experience is reported.

4) On Identifying a Class of Facets of the Knapsack Polytope with 0(nlogn) Complexity, *Laureano F. Escudero*, Universidad Miguel Hernandez, Ctr. de Investigacion-Op., Avda del Ferrocarril, Elche, Alicante, 03202, Spain, escudero@umh.es, *Araceli Garin, Gloria Perez*

Elsewhere, we present 2 O(nlogn) procedures for tightening cover induced inequalities by coefficient increasing schemes. By using the Balas-Zemel results, it is shown that the new inequalities define facets of the knapsack polytope provided that the inequalities to tighten are induced by extensions of strong minimal covers.

MA12 Algorithms for Network Design

Cluster: Combinatorial Optimization
Invited Session

Chair: Teodor Gabriel Crainic, University of Montreal, CRT, CP 6128, Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, theo@crt.umontreal.ca

1) Valid Inequalities for the Multicommodity Capacitated Fixed Charge Network Design Problem, *Mervat Chouman*, University of Montreal, DIRO/CRT, CP 6128, succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, mervat@crt.umontreal.ca, *Teodor Gabriel Crainic, Bernard Gendron*

Multi-commodity capacitated fixed charge network design yields hard combinatorial optimization formulations. We examine the polyhedral structure of the problem, adapt well-known valid inequality classes and develop a new family of cuts. Computational results of an associated cutting-plane approach are compared to well-known commercial MIP software.

2) Dual-Ascent Procedures for Multicommodity Capacitated Fixed-Charge Network Design Problems, *Bernard Gendron*, Universite de Montreal, DIRO/CRT, PO 6128 Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, gendron@iro.umontreal.ca, *Dominique Tourillon*

We present a dual-ascent approach for computing lower bounds on the optimal value of fixed-charge multi-commodity capacitated network design problems. We contrast this approach with dual-ascent procedures proposed in the literature, present experimental results and discuss extensions to more effective bounding procedures and heuristics.

3) Tabu Search for Capacitated Multicommodity Network Design, *Ilfat Ghamlouche*, University of Montreal, DIRO/CRT, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, ilfat@crt.umontreal.ca, *Teodor Gabriel Crainic, Michel Gendreau*

We describe a tabu search method for the CMND that takes advantage of cycle-based neighborhoods. We describe the particular neighborhoods used as well as the memory structures and diversification mechanisms. Experimental results are provided.

4) The Effects of Joint Working/Spare Routing on Capacity in a Survivable Network Design Utilizing Path Restoration, *Mark Lewis*, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, mlewis@bus.olemiss.edu

The problem of minimizing joint working/spare capacity using path restoration in survivable telecommunications network design is investigated. The effects on working/spare capacity when using various methods for generating and choosing paths are compared. A heuristic for generating integral flows for solutions requiring concatenated time slots is presented.

MA13 Computational SDP & SOCP II

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Gabor Pataki, University of North Carolina, Dept. of OR, Smith Bldg., CB 3180, Chapel Hill, NC, gabor@unc.edu, http://www.or.unc.edu/~pataki

1) Further Improvements of the Semidefinite Programming Algorithm, *Katsuki Fujisawa*, Kyoto University, Architecture/Architect Systems, Yoshida-Honmati, Sakyo, Kyoto, 606-8501, Japan, fujisawa@is-mj.archi.kyoto-u.ac.jp, *Masakazu Kojima, Kazuhide Nakata, Mituhiro Fukuda*

We are planning to improve the performance of the SDPA by incorporating some new techniques such as a new sparse matrix data structure, the positive definite matrix completion method and the CG method. We compare the performance among some variants of the SDPA.

2) Implementation Issues in CSDP, *Brian Borchers*, New Mexico Tech., Dept. of Math., 801 LeRoy Blvd., Socorro, NM 87801-4796, borchers@nmt.edu, www.nmt.edu/~borchers/

CSDP is a C code for semi-definite programming. We discuss issues in the implementation of CSDP, including support for sparse constraint matrices, the construction of the system matrix O, the accuracy and speed of routines for numerical linear algebra and the adjustment of the barrier parameter mu.

3) Solving Conic Quadratic Optimization Problems using MOSEK, *Erling D. Andersen*, EKA Consulting ApS, Fruebjergvej 3, Boks 16, Copenhagen, 2100, Denmark, e.d.andersen@mosek.com

We discuss how to solve conic quadratic optimization problems using the software package MOSEK. Moreover, we will present our latest computational results for solution of large-scale conic quadratic problems.

4) Solving Positive Semidefinite Programs in a Parallel, Distributed Memory Environment, *Steve Benson*, Argonne National Laboratory, 9700 South Cass Ave., Bldg. 221, Argonne, IL 60439, benson@mcs.anl.gov, *Lois Curfman McInnes, Jorge J. More, Yinyu Ye*

Interior point methods have been the primary tool for solving positive semi-definite programs. The high computational costs and memory requirements, however, have prevented these algorithms from solving very large problems. Our parallel implementation of the dual scaling method solves very large problems while achieving a high rate of parallel efficiency.

MA14 Computational Aspects of Interior Point Methods

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Tamas Terlaky, McMaster University, Dept. of Computing & Software, 1280 Main St. West, Hamilton, Ontario, L8S 4L7, Canada, terlaky@mcmaster.ca

1) A Conic Approach for Separable Convex Optimization, ***Francois Glineur***, Faculte Polytechnique de Mons, Service Math et RO, Rue de Houdain 9, Mons, B-7000, Belgium, francois.glineur@fpms.ac.be

Geometric and l_p-norm optimization have been recently studied in the framework of conic optimization, relying on the introduction of dedicated convex cones. We present a generalization of these cones that leads to a wide class of separable convex problems and investigate the development of interior-point methods applicable to this class.

2) An Interior-Point Branch & Price Method for a Class of Integer Programming Problems, ***Jean Louis Goffin***, McGill University/GERAD, Fac. of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, goffin@management.mcgill.ca, www.crt.umontreal.ca/~jlg, ***Samir Elhedhli***

We present a column generation algorithm for a class integer programming problems. We propose to generate columns at a central dual point, not in extreme points. We discuss the column generation scheme using an interior point cutting-plane method (ACCPM), branching rule, design of incumbent feasible solutions, "warm start". Numerical results are provided.

3) Computational Experiments with IPMs based on Self-Regular Functions, ***Jiming Peng***, McMaster University, Dept. of Computing & Software, 1280 Main St. West, Hamilton, Ontario, L8S 4L7, Canada, pengj@mcmaster.ca, ***Tamas Terlaky***

Recently Peng, Roos & Terlaky introduced a new class of IPMs. The novel concept of self-regular proximities made possible to improve the complexity of large-update large-neighborhood IPMs. Some computational results will be presented to demonstrate the practical strength of the new IPMs.

MA15 Supply Chain Management & Operations Management

Contributed Session

Chair: Danny I. Cho, Brock University, 500 Glenridge Ave., St. Catharines, ON, L2S 3A1, Canada, dcho@taro.bus.brocku.ca

1) Vendor-Manufacturer Partnerships in the Supply Chain in Process Industries, ***Jayaram K. Sankaran***, University of Auckland, MSIS Dept., Private Bag 92019, Auckland, New Zealand, j.sankaran@auclkand.ac.nz, ***Terence H. Wilson***

We report findings from a 2-phased investigation into a vendor-manufacturer partnership located in the forestry sector in New Zealand. The first, field-based, inductive phase of the research reveals insights into partnership dynamics in process industries and the second, deductive phase formalizes these insights with recourse to mathematical models.

2) Risk Ownership in Contract Manufacturing, ***Sezer Ulku***, INSEAD, 33 Blvd. de Constance, Fontainebleau, 77305, France, sezer.ulku@insead.edu

In the outsourced production context, who should carry the demand related risks, the OEM with better market information or the CM that has the capability to hedge? The answer impacts profits in the supply chain. We examine the circumstances under which each party can more efficiently assume the demand uncertainty.

3) Measuring Supply Chain Performance: A Dual-Objective Approach, ***Danny I. Cho***, Brock University, 500 Glenridge Ave., St. Catharines, ON, L2S 3A1, Canada, dcho@taro.bus.brocku.ca

Industry has long lacked common assessment tools on supply chain effectiveness. We develop a standard way to measure supply chain performance, based on dual objectives; namely, efficiency and responsiveness. It would help a company in its benchmarking effort as well as its software selection process.

4) Inventory Sharing & Rationing in a Make-to-Stock System, ***Hui Zhao***, Purdue University, Sch. of IE, West Lafayette, IN 47907, zhaoh@ecn.purdue.edu, ***Jennifer K. Ryan***, ***Vinayak V. Deshpande***

We consider a dealer inventory sharing problem in a continuous-review, make-to-stock system with exponential production lead times. We simultaneously consider inventory sharing and inventory rationing by developing dynamic programming formulations for this problem under 2 different sharing schemes. We proved the structure of the optimal policy of this problem.

MA16 New Issues in Inventory Management

Sponsor: MSOM
Sponsored Session

Chair: Tava Lennon Olsen, Washington University, Olin Sch. of Bus., CB 1133, 1 Brookings Dr., St. Louis, MO 63130-4899, olsen@olin.wustl.edu

1) Inventory Management with Asset-Based Financing, ***Rachel Q. Zhang***, Cornell University, Johnson Grad. Sch. of Mgmt., 364 Sage Hall, Ithaca, NY 14853, rqz2@cornell.edu, ***John A. Buzacott***

Most of the traditional models in production and inventory control ignore the financial state of an organization and can lead to infeasible practices in real systems. We consider several models that incorporate financial capacity into production decisions. In particular, we consider firms with limited funds and need to obtain an asset-based loan from a bank to finance its operations.

2) Channel Coordination of Supply Chains with Overtime & Premium Freight, ***Eric Huggins***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, erichuggins@netscape.net, ***Tava Lennon Olsen***

We consider a 2-echelon supply chain in which at least one echelon must meet demand. When shortages occur, the unmet demand may be filled with overtime production and/or by premium freight shipments. We discuss coordination mechanisms that induce decision-makers at both echelons to minimize total supply chain costs.

3) An Electronic Marketplace for Surplus Components, ***Lingxiu Dong***, Washington University, Olin Sch. of Bus., St. Louis, MO 63130, dong@olin.wustl.edu, ***Erik Durbin***

We study the economic and operational implications of the Internet-based surplus component marketplace to different players. We address issues such as how the marketplace affects the component supplier's production plan and pricing policy, the manufacturers' inventory policy and what should be the revenue model of the marketplace.

4) Joint Lead-Time & Pricing Decisions, ***Tava Lennon Olsen***, Washington University, Olin Sch. of Bus., CB 1133, 1 Brookings Dr., St. Louis, MO 63130-4899, olsen@olin.wustl.edu, ***Hayriye Ayhan***

We consider a retailer who has the ability to offer a menu of lead times and prices to its customers. This menu can be changed dynamically; thus, the most applicable industry for this work is e-commerce. We present optimality results regarding the setting of such menus.

MA17 MSOM Fellows

Sponsor: MSOM
Sponsored Session

Chair: Ronald G. Askin, University of Arizona, Dept. of SIE, Tucson, AZ 85721-0020, ron@sie.arizona.edu

1) Why OR & OM are Hard, ***Paul Zipkin***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, paul.zipkin@duke.edu

2) The Academic-Industry Evolution of Supply Chain Management, ***Hau L. Lee***, Stanford University, Dept. of MSE, Stanford, CA 94305-4026, haulee@leland.stanford.edu

3) A Multiple-Criterion Model for Machine Scheduling, ***Kenneth Baker***, Dartmouth College, Tuck School of Bus. Admin., Hanover, NH 03755-9000, ken.baker@dartmouth.edu, ***Cole Smith***

MA18 Tutorial: Coordinating Production, Inventory & Transportation Decisions in the Supply Chain: From Theory to Practice

Sponsor: MSOM
Sponsored Session

Chair: David Simchi-Levi, MIT, 77 Massachusetts Ave., Rm. 1-171, Cambridge, MA 02139, dslevi@mit.edu

1) Tutorial: Coordinating Production, Inventory & Transportation Decisions in the Supply Chain: From Theory to Practice, ***David Simchi-Levi***, MIT, 77 Massachusetts Ave., Rm. 1-171, Cambridge, MA 02139, dslevi@mit.edu

We look at problems faced by shippers that rely on truckload (TL) and less-than-truckload (LTL) carriers for the distribution of products across their supply chain. In this case, the goal is to design a production/inventory policy and a transportation strategy to minimize system-wide cost by taking advantage of the transportation cost structure. We demonstrate how theoretical analysis can be applied in the development of effective and robust algorithms.

MA19 Tutorial: Beyond Sensitivity Analysis - An Introduction to Stochastic Programming

Cluster: Stochastic Programming
Sponsor: Optimization
Sponsored Session
Chair: Julia L. Higle, University of Arizona, Dept. of SIE, Tucson, AZ 85721, julie@sie.arizona.edu

1) Tutorial: Beyond Sensitivity Analysis - An Introduction to Stochastic Programming, *Julia L. Higle*, University of Arizona, Dept. of SIE, Tucson, AZ 85721, julie@sie.arizona.edu

Uncertainty in linear programming is often addressed via sensitivity analysis. In this presentation, we illustrate the shortcomings of this approach and introduce an alternate modeling paradigm. Computational approaches and emerging trends in stochastic programming will be discussed.

MA21 Forecast-Facilitated Make-to-Order Production

Cluster: Flexible Manufacturing Systems
Invited Session
Chair: John J. Liu, University of Wisconsin, Sch. of Bus., Milwaukee, WI 53201, jjl@uwm.edu

1) Channel Redistribution under Wanna-Dots, *D. Q. Yao*, Towson University, Towson, MD, dyao@wum.edu, ***John J. Liu***

A "wanna-dot" refers to an existing company going online. One pending issue for wanna-dots has been channel redistribution after going online. We develop a channel diffusion model in a variable marketplace. The results concur that the way of doing business has fundamentally changed with the Internet but fundementals of business have not.

2) Promotion, Production Orders & the Bullwhip Effect in Supply Chains, *Hisashi Kurata*, University of Wisconsin, Milwaukee, WI 53201, hkurata@uwm.edu

We report on comprehensive simulation analysis on impacts of promotion and production policies on bullwhip effects. One scenario is that 1 retailer orders from 2 suppliers, one is make-to-stock, the other is make-to-order. We examine bullwhip effects under combinations of promotions, i.e., everyday-low vs. high-and low- and production policies, i.e., MTO vs. MTS.

3) Bullwhip Realities, *Layth C. Alwan*, University of Wisconsin, Milwaukee, WI 53201, alwan@uwm.edu

The bullwhip effect is viewed as a real phenomenon in supply chain environments. However, there are few scenarios for which this effect becomes a reality, namely, irrational ordering behavior or particular forecasting applied to a specific ordering policy and demand process. Otherwise, we find the bullwhip effect appears not to be a reality.

4) A Production-Inventory Problem: You Get Paid for Not Using Electricity, *Frank Chen*, Chinese University of Hong Kong, fbachenf@nus.edu.sg, ***Xuemin Yuan***

This research was motivated by a story that appeared in the New York Times, July 17, 2000. The manufacturer faces probabilistic opportunities offering compensation for not using electricity. The objective is to determine from the manufacturer's perspective whether to take such an offer. The problem is formulated as a multi-period production-inventory model without setup cost...

5) A Real Beer Game: A Make-to-Order Incentive Problem, *John J. Liu*, University of Wisconsin, Sch. of Bus., Milwaukee, WI 53201, jjl@uwm.edu

In theory, make-to-order does not involve a forecast, but in practice, it does. This is synopsized in our recent study of a JIT beer brewery supply chain where a wholesaler submits weekly orders of bottled beer to a brewer who then produces to the order. We found that a real beer game is played quite differently when compared to the pedagogical beer game as played in classrooms.

MA22 Tutorial: Performance Measurement

Cluster: Supply Chain Management
Invited Session
Chair: Yasemin Aksoy, Tulane University, Freeman Sch. of Bus., New Orleans, LA 70118, yaksoy@tulane.edu

1) Tutorial: Performance Measurement, *Yasemin Aksoy*, Tulane University, Freeman Sch. of Bus., New Orleans, LA 70118, yaksoy@tulane.edu, ***Hakan Aksoy***

We present a tutorial on performance measurement of supply chains, individual links on supply chains and processes. We include discussions of applications of the balanced scorecard, 6 sigma, management perception assessment in case of no tangible data and supply chain integration through performance measurement.

MA23 Risk Management in Supply Chains: Applications

Cluster: Supply Chain & E-Market Optimization
Invited Session
Chair: William Grey, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598

Co-Chair: Dailun Shi, IBM Tj Watson Research Center, PO Box 218, Yorktown Heights, NY 10598

1) Supply Chain Risk Management, *William Grey*, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, ***Jayant Kalagnanam***, ***Dailun Shi***

We present a survey of research in supply chain risk management. We include a review of current literature, a discussion of key issues and requirements, a summary of our current research projects and a list of future research challenges.

2) Buy-Side Risks: Application of Risk Management Techniques in Manufacturing Enterprises, *Amit Garg*, Rapt Inc., Customer Solutions, 640 Second St., San Francisco, CA 94107

We will describe how risk management techniques can cushion the impact of supply-demand imbalance and other uncertainties. We will also talk about how it has enabled a manufacturer to redefine the role of its procurement function.

3) Quantifying & Managing Uncertainty in the Supply Chain, *Blake Johnson*, Stanford University/Vivecon Corp., Dept. of MSE, Stanford, CA 94305

We present a quantitative framework for mapping supply chain uncertainties to key business performance metrics, demonstrate how the framework can be used to evaluate alternative supply chain structures and operating policies and review successful applications of the approach in practice.

MA24 Logistics of Future Systems

Cluster: Manufacturing Systems & Supply Chain Integration
Invited Session
Chair: Ebru Bish, Virginia Tech. University, Dept. of ISE, 250 Durham Hall, 0118, Blacksburg, VA 24061, ebru@vt.edu

1) Finished Goods Distribution under Demand Uncertainty & Transportation Economies of Scale, *Kuan-cheng Huang*, Cornell University, Sch. of Civil & Environ. Eng., Hollister Hall, Ithaca, NY 14853-3501, ***Linda K. Nozick***, ***Mark A. Turnquist***

We develop a heuristic procedure to optimize the distribution of finished goods for a manufacturer with multiple plants and many retail outlets when demands are uncertain and there are significant economies of scale in transportation. A real world case study drawn from the distribution of automobiles at General Motors is presented.

2) Logistics & Layout of a Mixed Model Assembly Line, *Joseph Bukchin*, Virginia Tech., Grado Dept. of ISE, 250 Durham Hall 0118, Blacksburg, VA 24061, bukchin@vt.edu, ***Russell D. Meller***

The design of a mixed model assembly line is critical for its effective operation. One aspect of the design, the amount of space dedicated for the inventory of the components feeding the line, has an interesting relationship to both the cost of the design and the operation of it. We explore this relationship and illustrate how it is similar to other logistics problems.

3) Network Design for Service Parts Logistics, *Amy Mainville Cohn*, MIT, OR Ctr. E40-139, Cambridge, MA 02139, amycohn@mit.edu, ***Cynthia Barnhart***

In service parts logistics, repair parts are often expensive and infrequently used, yet time-critical. This typically leads to excessive inventory and/or transportation costs. Stochasticity and a complex network are added difficulties. We pose a framework for network design and presnt preliminary computational results based on work with a large 3PL provider.

4) Impact of Flexibility on the Supply Chain, *Ebru Bish*, Virginia Tech. University, Dept. of ISE, 250 Durham Hall, 0118, Blacksburg, VA 24061, ebru@vt.edu, ***Ana Muriel***, ***Stephan Biller***

We analyze the impact that introducing flexible manufacturing plants has on supply chain performance in a make-to-order environment. We find that suppliers observe more variability and the manufacturer holds more component inventory in a flexible system. We also analyze the interaction between optimal flexibility investments and different pricing policies.

MA25 A New Perspective on Machine Scheduling

Cluster: Scheduling
Invited Session

Chair: Chung-Yee Lee, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, cylee@ust.hk

1) Using Global Scheduling Solutions in a Dynamic Shop Environment, ***Arunabh Barua***, Purdue University, West Lafayette, IN 47907-1287, ***N. Raghavan***, ***Reha Uzsoy***

We develop heuristics that allow the use of global information with local conditions to maintain schedule feasibility in the face of uncertainties. Computational results indicate that the proposed procedure significantly outperforms dispatching rules.

2) withdrawn 10/9: An Online Scheduling Optimization Service for Machine Scheduling & Project Management, ***Jeffrey W. Herrmann***, University of Maryland, Inst. for Systems Research, College Park, MD 20742, jwh2@glue.umd.edu

3) Scheduling with Known Due Dates & an Unknown Deadline to Minimize the Lateness Loss, ***Xiaoqiang Cai***, Chinese University of Hong Kong, Shatin NT, Hong Kong, xqcai@se.cuhk.hk, ***X. Zhou***

We consider the problem of scheduling workers in settings where each worker performs multiple operations and it is necessary to explicitly consider learning and forgetting effects across operations. The objective is to minimize the number of workers needed to satisfy throughput requirements. We demonstrate our methodology on several test problems.

4) Group-Scheduling Problems in Electronics Manufacturing, ***Rasaratnam Logendran***, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, logendrr@engr.orst.edu, ***Chelliah Sriskandarajah***

We present insights into establishing effective lower bounds for multi-stage, sequence-dependent group-scheduling problems with carry over setups commonly found in electronics manufacturing. An example problem representative of a real-world situation will be used to demonstrate the findings.

MA26 Selected Topics on Tactical-Air Combat Models

Sponsor: MAS
Sponsored Session
Chair: James G. Taylor, Naval Postgraduate School, MOVES Academic Group, Monterey, CA 93943, jtaylor@nps.navy.mil

1) Modeling the Effects of ISR Resources & Related Errors on Land Combat, ***Dave Dwyer***, SAIC POST, 1225 Jefferson Davis Hwy, Ste. 803, Arlington, VA 22202, david.dwyer@osd.pentagon.mil, ***Bill Cotsworth***

We present a novel approach to modeling land combat in the presence of ISR assets and their related errors. The effect of ISR error on the time evolution of the simulated combat scenario will be presented. Errors from the combat time-dependent variance and initial input errors are both considered.

2) Analyzing Large State-Space Models of Air Combat with ASSIST, SURE & STEM, ***Robert V. Hemm***, Technology Assessment Group, Logistics Mgmt. Inst., 2000 Corporate Ridge Rd., McLean, VA 22102-7805, rhemm@lmi.org

Stochastic models of air combat may involve large state spaces, i.e., when fighters' states include their numbers of available missiles. We show how ASSIST, STEM and SURE, programs developed by NASA for Markov analyses of complex reliability issues, can be adapted to treat stochastic air combat models.

MA27 Distillations I

Sponsor: MAS
Sponsored Session
Chair: Sarah Johnson, The MITRE Corporation, 2750 Killarney Dr., Ste. 100, Woodbridge, VA 22192

1) Distillations: An Agent-Based Approach to Modeling Combat, ***Sarah Johnson***, The MITRE Corporation, 2750 Killarney Dr., Ste. 100, Woodbridge, VA 22192

Project Albert is a USMC research effort applying distillation modeling and data farming to relevant questions regarding conflict. We describe and demonstrate some of the tools employed to further the concept of operational synthesis, with particular emphasis on the application of distillation models to questions of interest.

2) Adaptive High-Dimensional Exploration of Agent-Based Command & Control Situations, ***Tom Lucas***, Naval Postgraduate School, OR Dept., 236 Glasgow, Monterey, CA 93943-5219, twlucas@nps.navy.mil, ***Susan M. Sanchez***

Insights from combat models should be based on an ensemble of outcomes. We describe new high-dimensional search strategies that automatically look across a breadth of factors and adaptively focus sampling efforts on the "interesting" effects and interactions. The efficiency of the search strategies under a variety of scenarios is examined.

MA28 Binary Relations in Multi-Criteria Optimization: Theory & Applications

Cluster: Multi-Criteria Decision Making
Invited Session
Chair: Marina V. Polyashuk, 900 West Rand Rd., Apt. A205, Arlington Heights, IL 60004, mfogpol@aol.com

1) Rough Approximations of a Preference Relation by a Multi-Attribute Dominance for Determinist, Stochastic & Fuzzy Evaluation Problems, ***Kazimierz Zaras***, Universite du Queuec en Abitibi Temiscamingue, Rouyn-Noranda Quebec, J9X 6N9, Canada, kazimierz.zaras@uqat.uquebec.ca

Three kinds of evaluations will be considered: deterministic, stochastic or fuzzy in relation to each attribute. The multi-attribute dominance for mixed data and for a reduced number of attributes will be suggested to model the preferences in this kind of problem. To apply this dominance, the subset R of attributes from which apprlximation of the global preference is valid is known...

2) Binary Relations, Balanced Solutions & Applications in Radiation Therapy Planning, ***Matthias Ehrgott***, University of Auckland, Dept. of Eng. Sci., Private Bag 92019, Auckland, New Zealand, m.ehrgott@auckland.ac.nz

Balanced solutions of multi-criteria optimization problems can be defined using the lexicographic max-ordering relation. These solutions can be characterized axiomatically by 3 desirable properties from a decision maker's point of view. We give an example of how such solutions can be used in radiation therapy planning when deviations from prescribed doses need to be minimized.

3) Binary Choice in Multiple Criteria Optimization as a Choice Function: Approximation of Preferences, ***Marina V. Polyashuk***, 900 West Rand Rd., Apt. A205, Arlington Heights, IL 60004, mfogpol@aol.com

The choice of non-dominated alternatives with respect to a binary preference relation is viewed as a choice function with specific properties. The problem of adequate approximation of a decision maker's preferences by a binary relation is considered, along with some estimates for the cardinalty of the set of non-dominated solutions.

MA29 Quality Engineering Research

Sponsor: QSR
Sponsored Session
Chair: Robin C. Wurl, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, wurl@engr.orst.edu

1) An Introduction to Sequential Universal Probability Ratio Tests, ***Felipe Pachano-Azuaje***, Universidad de Los Andes, Dept. of OR, Sch. of Systems Eng., Venezuela, pachano@ing.ula.ve, ***Tapas K. Das***

We introduce SUPRa-tests, a method capable of maintaining all the virtues of SPRT, while overcoming its major limitations. Simulation results show that SUPRa-Tests are uniformly superior to the traditional Z, t and chi-square tests. Guidelines are provided for generating tables needed for designing SUPRa-Tests.

2) Multivariate Loss Function for Assessing the Quality of Asphalt Paving, ***Robin C. Wurl***, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, wurl@engr.orst.edu, ***James R. Lundy***, ***Kimberly D. Douglas***

We determine a method to reward asphalt paving contractors for quality work, where quality is determined by multiple product characteristics. We adapt a multivariate loss function to determine a job quality index. This index translates to a payout figure. One challenge is that target values for product characteristics are variable.

3) Improving Quality through Lot-Streaming, Synchronization & Continuous Processing, ***Elkafi Hassini***, University of Waterloo, Dept. of MS, Waterloo, Ontario, N2L 3G1, Canada, ehassini@uwaterloo.ca, http://mansci2.uwaterloo.ca/~ehassini, ***Raymond G. Vickson***

To improve quality in a 2-stage manufacturing process, we investigate a control plan having 3 major components: lot streaming where a batch is divided into small sublots, synchronization where after finishing a sublot the first stage can start on the next sublot only after the second stage starts on the finished sublot

and continuous processing where sublots are processed continuously on either stage 1 or stage 2 in which case the other stage may incur some idle time.

4) Balancing a Product's Usability Dimensions: A Multi-Response Optimization Approach, ***Kwang-Jae Kim***, POSTECH, Dept. of MIE, San 31, Hyoja-Dong, Nam-Gu, Pohang, Kyungbuk, 790-784, Korea, kjk@postech.ac.kr, kayak@postech.ac.kr, ***Sung H. Han, Myung Hwan Yun***

Usability is becoming increasingly important as a factor determining the overall quality and thus the success probability of a product. We develop a framework for simultaneously analyzing and balancing multiple usability dimensions of a product based on the multi-response optimization concept. A case study using consumer electronic products will also be presented.

MA30 Decision Making: Applications & Empirical Studies

Sponsor: Decision Analysis
Sponsored Session

Chair: Jianmin Jia, Chinese University of Hong Kong, Fac. of Bus. Admin., Shatin, NT, Hong Kong, jjia@cuhk.edu.hk

1) Multiple Stakeholders' Perspectives on Management of Water Systems & Pollution, ***L. Robin Keller***, University of California, 350 Grad. Sch. of Mgmt., Irvine, CA 92697-3125, lrkeller@uci.edu,http://www.gsm.uci.edu/~keller,***JefferyL.Guyse, Dipayan Biswas***

We construct and compare different stakeholder groups' hierarchies of multiple objectives for management of water pollution in the Talbert Marshland and near-shore ocean in Huntington Beach. We trace the evolution of the pollution management problem from early detection through beach closures, to expansion of scope with the recent energy crisis.

2) Challenges in Measuring Financial Investors' Risk Aversion, ***Philippe Delquie***, INSEAD, Blvd. de Constance, Fontainebleau, France, philippe.delquie@insead.fr, ***Gillaume Cousin***

We review some difficulties encountered in eliciting the lay investor's preferences for return distributions: tendency to let attention slip to loss side only, valuation of a risk highly relative to the extremes of the range of risks, difficulty with continuous distributions, etc. From this, we try to design an ergonomic elicitation method.

3) An Experimental Study of Risk-Value Theory, ***John Butler***, Ohio State University, Dept. of Acct. & MIS, 2100 Neil Ave., Columbus, OH 43210, ***Jim Dyer, Jianmin Jia***

There are 2 basic assumptions in our risk-value theory: risk and preference are conversely consistent for lotteries with zero-means and preference order between 2 lotteries with the same mean will not change when the common mean changes. We will report the results of an experimental test of these assumptions.

MA31 Markets in Uncertainty

Sponsor: Decision Analysis
Sponsored Session

Chair: David M. Pennock, NEC Research Institute, 4 Independence Way, Princeton, NJ 08540, dpennock@research.nj.nec.com

Co-Chair: Michael P. Wellman, University of Michigan Ai Laboratory, 1101 Beal Ave., Ann Arbor, MI 48109-2110, wellman@umich.edu

1) Decision Markets, ***Robin D. Hanson***, George Mason University, Dept. oc Economics, MSN 1D3, Carow Hall, Fairfax, VA 22030-4444, rhanson@gmu.edu

Speculative markets are consistently more accurate than competing institutions, recently forecasting elections, product sales, and scientific progress. Decision markets harness this power to forecast which decisions produce better consequences. They can thus tell a company when to dump its CEO and can even enable a new form of government: futarchy.

2) Election Forecasts from a Futures Market, ***Forrest Nelson***, University of Iowa, Dept. of Economics, Tippie Coll. of Bus., Iowa City, IA 52242, forrest-nelson@uiowa.edu, ***Joyce Berg, Thomas A. Rietz***

Futures markets aggregate information of traders about future values. The political stock markets conducted by the Iowa Electronic Markets capitalize on this price discovery mechanism to predict election outcomes. We examine the accuracy of such markets in 4 presidential elections and derive and compare alternative estimates of forecast errors.

3) Compact Securities Markets, ***Michael P. Wellman***, University of Michigan AI Laboratory, 1101 Beal Ave., Ann Arbor, MI 48109-2110, wellman@umich.edu, ***David M. Pennock***

Complete securities markets, comprising one security for every state of nature, support Pareto optimal allocations but require a number of markets exponential in the uncertain events. By applying representational ideas from Bayesian networks, we identify conditions where one can construct "operationally complete" securities markets with a relatively compact market structure.

4) The Power of Play: Efficiency, Information Aggregation & Forecast Accuracy in Market Games, ***David M. Pennock***, NEC Research Institute, 4 Independence Way, Princeton, NJ 08540, dpennock@research.nj.nec.com, ***Steve Lawrence, C. Lee Giles***

Information aggregation in securities markets yield prices that constitute accurate forecasts. I show that this property extends even to Internet market games run with play money. Despite their lack of grounding in tangible assets, these market games show clear signs of economic efficiency, informational efficiency, and forecast accuracy.

MA32 New Directions in Financial Engineering

Cluster: Financial Engineering
Invited Session

Chair: Ronnie Sircar, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, sircar@princeton.edu

1) Eigenfunction Expansion Methods in Asset Pricing, ***Vadim Linetsky***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Tech C210, Evanston, IL 60208, linetsky@iems.nwu.edu

We develop an eigenfunction expansion approach to pricing derivative securities written on diffusion processes. Contingent claims are unbundled into portfolios of primitive securities, termed eigensecurities, that diagonalize the pricing semigroup on the Hilbert space of all contingent claims written on the underlying diffusion. We develop applications to asset pricing problems.

2) Market Imperfections, Investment Optimality & Default Spreads, ***Stathis Tompaidis***, University of Texas, MSIS Dept., CBA 5.202, McCombs Sch. of Bus., Austin, TX 78752-1175, stathis.tompaidis@bus.utexas.edu

We present a model for the valuation of risky debt that accounts for the endogeneity of the borrower's investment choice as well as possible borrowing constraints. Numerical simulations allow us to quantify the extent to which investment flexibility, incentive problems and credit constraints affect borrowing rates.

3) Risk Control under Uncertain Volatility, ***Ronnie Sircar***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, sircar@princeton.edu

We discuss asymptotic approximations of optimal trading strategies in financial markets with uncertain and rapidly-changing volatility. Example problems are optimal asset allocation, partial hedging of derivative risk and utility-indifference pricing. The analysis identifies the usual mean historical volatility and the harmonically-averaged long-run volatility as important statistics for such optimization problems.

MA33 Clinical Scheduling & Forecasting

Sponsor: Health Applications
Sponsored Session

Chair: Liam O'Neill, Cornell University, Policy Analysis & Mgmt., N229 MVR Hall, Ithaca, NY 14853-4401, lo22@cornell.edu

1) An Adaptive Forecasting Model for Hospital Bed Planning, ***Murray J. Cote***, University of Florida, Gainesville, FL 32610-0195, mjcote@ufl.edu, ***Benito Flores***

A challenging aspect of daily hospital operations is determining appropriate staffing for a given bed census. We present a modified version of Holt-Winters' multiplicative seasonality model to predict hourly census for hospital care units. The forecasting algorithm, forecast accuracy and managerial implications will be discussed.

2) withdrawn 10/2: Integrating Staff Planning with Staff Scheduling: An Example of Surgery Room Capacity Management, ***Ling X. Li***, Old Dominion University, Dept. of IS/DS, Norfolk, VA 23529-0223, lli8888@hotmail.com

3) Epidemiological Data Evaluating Reasons for Large Variability in Surgical Case Durations, ***Franklin Dexter***, University of Iowa, Dept. of Anesthesia, 6-JCP, Iowa City, IA 52242, franklin-dexter@uiowa.edu, www.FranklinDexter.com

The lack of historical case duration data for surgical procedures is an important cause of inaccuracy in predicting case duration. By pooling case duration data among medical centers, we found that for this strategy to decrease staffing costs and how long patients wait, databases with millions of cases will be needed.

4) Geographic Information Systems for Improving Access to Health Services, ***Liam O'Neill***, Cornell University, Policy Analysis & Mgmt., N229 MVR Hall, Ithaca, NY 14853-4401, lo22@cornell.edu

We used GIS to determine hospital travel time for the treatment of myocardial infarction at 150 urban and rural Pennsylvania hospitals. Some preliminary results are presented.

MA34 Network Equilibrium Models I

Sponsor: TSS
Sponsored Session
Chair: David E. Boyce, University of Illinois, Dept. Civil & Materials Eng., 842 West Taylor St., Chicago, IL 60606-7023, dboyce@uic.edu

1) A Random System Equilibrium Model of Location & Travel Choices, ***Yong Zhao***, University of Texas, Dept. of Civil Eng., ECJ 6.512, Austin, TX 78712, yzhao@mail.utexas.edu, ***Kara Kockelman***

Many integrated land use and transportation studies model the system equilibrium in a static deterministic framework. We formulate an equilibrium model of the long-term location choices and the short-term travel choices considering their stochastic natures. We present a simulation algorithm to implement this method.

2) A Stochastic Dynamic Trip Assignment Model for Intermodal Transportation Networks, ***Khaled F. Abdelghany***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78751, kfaissal@mail.utexas.edu, ***Hani S. Mahmassani***

We present a stochastic dynamic trip assignment model for urban intermodal transportation networks. We formulate the problem as mathematical program, for which a solution algorithm is developed. The model captures the interaction between mode choice and trip assignment through the implementation of a multi-objective shortest path algorithm.

3) Computational Performance for an Origin-Based Combined Model of Travel Demand & Route Assignment, ***Hillel Bar-Gera***, Ben-Gurion University of the Negev, Dept. of IEM, Beer-Sheva, 84105, Israel, bargera@bgumail.bgu.ac.il, ***David E. Boyce***

Travel forecasting models combining demand and network assignment are receiving increased attention. A fixed point formulation for general combined models is presented, and measures of solution accuracy are discussed. An origin-based algorithm for solving such models is proposed computational results demonstrate its efficiency in comparison with prevailing alternatives.

4) Implementation of a Complex Planning Model for the Southern California Association of Governments, ***Michael A. Florian***, INRO Solutions, 5160 Decaarie Blvd., Ste. 610, Montreal, Quebec, H3C 3J7, Canada, mike@inro.ca, ***Jia Hao Wu***, ***Shuguang He***

An implementation of a complex transportation planning method developed by SCAG is described. The demand model has several trip purposes, hierarchical logit mode choice functions for each purpose and multiple classes of users. The network assignment is an asymmetric cost multi-class network equilibrium method.

MA35 Time-Dependent Vehicle Routing

Sponsor: TSS
Sponsored Session
Chair: Amelia C. Regan, University of California, Irvine, CA, aregan@uci.edu

1) A Genetic Algorithm for the Dynamic Vehicle Routing Problem with Time-Dependent Travel Times, ***Ali E. Haghani***, University of Maryland, Dept. of Civil Eng., College Park, MD 20742, haghani@eng.umd.edu, ***Soojung Jung***

We propose and test a GA for the time-dependent VRP. The formulation of the problem considers multiple vehicles with different capacities, pick-up or delivery demands with soft time-windows, real-time service requests and real-time variations in travel times between demand nodes. Numerical results are reported, including comparisons against lower bounds.

2) Dispatching Policies for Vehicle Routing under Different Systems Loads, ***Guntram Noeth***, Bremenweg 34, Wuerzburg, Barvaria, 97084, Germany, guntram_noeth@hotmail.com, ***Randolph W. Hall***, ***Maged Dessouky***

For simple vehicle routing environments, we analytically compare system performance of different dispatching policies under light and heavy traffic. Using simulation, we also show how these results hold under different system loads in more complex environments.

3) Reoptimization in Real-Time Routing, ***Elise Miller-Hooks***, United Technologies Research Center, 411 Silver Ln, East Hartford, CT 06118, millered@utc.utrc.com, ***Baiyu Yang***

One of the goals of intelligent transportation systems is to provide travelers with en-route routing suggestions given real-time information. We present an efficient reoptimization approach for updating shortest paths as real-time conditions change. The approach is significantly faster than recomputing from scratch and can be used in static or dynamic, deterministic or stochastic environments.

4) An Examination of Assignment Models for Local Truckload Trucking Problems with Stochastic Service Times & Time Window Constraints, ***Amelia C. Regan***, University of California, Irvine, CA, aregan@uci.edu, ***Xiubin Wang***

We examine alternative assignment models that explicitly consider stochastic handling and travel times and compare the performance of these to static assignment models which are applied in an iterative manner as the stochastic elements of the problem are realized.

MA36 Aviation Safety & Security

Sponsor: Aviation Applications
Sponsored Session
Chair: Kathleen L. McFadden, Northern Illinois University, OMIS Dept., DeKalb, IL 60115-2854, kmcfadden@niu.edu

1) Air Safety: The End of the Golden Age?, ***Arnold Barnett***, MIT, Sloan Sch. of Mgmt., OR Ctr., E53-379, Cambridge, MA 02139-4307, abarnett@mit.edu

First-world air travel is essentially as safe now as visiting a mall or eating a blueberry muffin. But some aviation hazards that have caused very few Western deaths in recent years might be poised for a resurgence. We discuss this situation.

2) Selecting an Aviation Security Baggage Screening Device Strategy, ***John Kobza***, Texas Tech University, Dept. of IE, Box 43061, Lubbock, TX 79409-3061, johnkobza@coe.ttu.edu, ***Thomas J. Candalino***, ***Sheldon H. Jacobson***, ***Julie E. Virta***

We use a cost model to study and analyze the tradeoffs between screening only selectee baggage vs. screening both selectee and non-selectee baggage for a single baggage screening security device deployed at an airport. Implications of this analysis are discussed.

3) Responding to a Major Airline Incident: Motivations of/and Effects on Employees, ***Charletta Gutierrez***, Northern Illinois University, OMIS Dept., DeKalb, IL 60115, cgutierrez@niu.edu

Extraordinary events in the airline industry are defined as any incident that creates additional stress or maintenance of the passengers. This research is based on the activation of team members assigned to such airline incidents. Using qualitative methods, we explore the motivations of employees that volunteer for such assignments.

4) Facing the Risks: A Study of a Commercial Aviation Safety Program, ***Kathleen L. McFadden***, Northern Illinois University, OMIS Dept., DeKalb, IL 60115-2854, kmcfadden@niu.edu

This empirical study evaluates a commercial aviation safety program that sanctions pilots with alcohol-related motor vehicle convictions. Using data on more than 160,000 commercial pilots, we compare a 5-year period prior to the implementation of the program against a 5-year period after implementation. The results have operational and public policy implications.

MA37 Pricing

Sponsor: Revenue Management & Pricing
Sponsored Session
Chair: Baichun Xiao, Long Island University, Sch. of Bus., 720 Northern Blvd., Brookville, NY 11548, bxiao@liu.edu

1) Price-Directed Replenishment of Inventory: Stronger Mechanisms, ***Dan Adelman***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, dan.adelman@gsb.uchicago.edu

Adelman (2001) develops a price-directed control policy for replenishing inventory to subsets of items. We develop a pricing mechanism that yields improved bounds and policy performance but requires greater computational effort.

2) Analysis of a Price Markdown Mechanism, *Pinar Keskinocak*, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ***Wedad Elmaghraby, Altan Gulcu***

We analyze a markdown pricing mechanism that is increasingly used by companies on the Internet. We compare this mechanism with take-it-or-leave-it pricing and address some fundamental design and associated strategic behavior dimensions.

3) withdrawn 9/25: Periodic Pricing of Perishable Products in a Network Environment with Bulky Demand, *Aaron Putnam*, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, aputnam@prosrm.com, ***Nicola Secomandi***

MA38 Application of Locomotive Models

Sponsor: RASIG
Sponsored Session
Chair: Marty Schlenker, Burlington Northern & Santa Fe Railway Co., 2500 Lou Menk Dr., Box 961073, Ft. Worth, TX 76131, martin.schlenker@bnsf.com

1) A Dynamic Optimization for Locomotive Management based on Information Modeling, ***Warren B. Powell***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, powell@princeton.edu, ***Belgacem Bouzaiene-Ayari***

2) New Approaches for Solving the Locomotive Scheduling Problem, ***Ravindra K. Ahuja***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, ahuja@ufl.edu, ***Liu Jian, James B. Orlin, Dushyant Sharma, Larry Shughart***

Locomotive scheduling problems are some of the most important decision problems in train routing and scheduling and consist of optimally assigning a set of locomotives to cover all scheduled trains while satisfying a variety of constraints. We report new solution techniques that use the state-of-art ideas available in the fields of integer programming, linear programming and network optimization.

MA39 Software Demonstration I

Chair: To be announced

1) Software Demonstration: Simulation & Modeling using Crystal Ball Professional, ***David Fredericks***, Decisioneering, Inc., 1515 Arapahoe St., Ste. 1311, Denver, CO 80202, dfredericks@decisioneering.com, ***John M. Charnes***

Crystal Ball software is one of the most recognized and popular software tools for introducing the concepts of simulation and risk analysis to students. We will introduce the fundamentals of uncertainty analysis, Monte Carlo simulation and optimization modeling techniques using Crystal Ball 2000. Practical applications will include stochastic project modeling and the pricing of exotic options using Crystal Ball and OptQuest.

2) Software Demonstration: AutoMod, ***John Carson***, Brooks Automation, Inc., 655 Medical Dr., Bountiful, UT 84010, john.carson@brooks.com

We will demonstrate the AutoMod family of products, the leading discrete-event simulation package for manufacturing, material handling and logistics applications. AutoMod is object-based, with templates for all the most common material handling components, including conveyor, transport and kinematic devices and equipment. AutoStat for AutoMod offers complete run control and statistical analysis.

MA40 OR/MS in Forestry I

Cluster: Forestry
Sponsor: ENRE
Sponsored Session
Chair: Andres Weintraub, University of Chile, Dept. of IE, PO Box 2777, Santiago, Chile, aweintra@dii.uchile.cl

1) Solving the Adjacency Problem Constructing the Harvesting Units, ***Andres Weintraub***, University of Chile, Dept. of IE, PO Box 2777, Santiago, Chile, aweintra@dii.uchile.cl, ***Marcos Goycoolea, Alan Murray, Rafael Epstein, Francisco Barahona***

The adjacency problem becomes much harder combinatorially if harvesting areas are formed from smaller cells as part of the decision. We present an exact model formulation for this problem and solve it considering characteristics of a cluster representation, a special branching process and strengthening of the formulation. We show numerical results.

2) An Investigation of the Effect of Fire Supression on Burned Area in Boreal Forest Landscapes, ***David L. Martell***, University of Toronto, Fac. of Forestry, 33 Willcocks St., Toronto, Ontario, M5S 3B3, Canada, martell@smokey.forestry.utoronto.ca, ***B. M. Wotton, Wenbin Cui***

The ignition and growth of fire is simulated for several thousand years across a small, hypothetical landscape that is representative of the boreal forest region of northwestern Ontario, Canada. A fire ignition model and a fire growth model are used to assess the impact of varying levels of fire suppression on burned area in Ontario.

3) Supply Chain Optimization in the Pulp Mill Industry, ***Mikael Ronnqvist***, Linkoping University, Div. of Optimization, Linkoping, SE-58183, Sweden, miron@mai.liu.se

We study the supply chain for a large international pulp producer with 5 pulp mills located in Scandinavia. This includes harvest and transportation of pulpwood together with production and distribution of products. In tests with a developed model, we have found strategic implications that reduce the company's supply chain costs remarkably.

4) Short-Term Harvesting & Spatial Scheduling, ***Rafael Epstein***, University of Chile, Dept. of IE, PO Box 2777, Santiago, Chile, repstein@dii.uchile.cl, ***Andres Weintraub, Francisco Costa Neto, Jaime Gabarro***

We present a short-term harvesting system to maximize the revenue from operational decisions of a forest company with many stands and multiple demands. Among other technical constraints, the operational plan should maintain spatial coherence between consecutive periods. A linear model with heuristics was developed. Numerical examples will be shown.

5) Optimization Methods for Log Truck Scheduling, ***Myra S. Palmgren***, University of Linkoping, Dept. of Math, Linkoping Ostergotla, S-581 83, Sweden, mypal@mai.liu.se, ***Mikael Ronnqvist***

The log truck scheduling problem is one of the most general problems in vehicle routing. It involves both pickup and delivery operations at the same time and each destination can be visited several times within one route. We use a set partitioning-based model and a column generation method to solve it.

MA43 Education II

Sponsor: INFORMED
Sponsored Session
Chair: Donna C. Llewellyn, Georgia Institute of Technology, Ctr. for Enhancement of Teachi, ng & Learning, Atlanta, GA 30332, donna.llewellyn@oars.gatech.edu

1) Enhancing the Communication Skills of Undergraduates

Active participation will be encouraged during the final 1/3 of the session. After the two papers are presented, the floor will be opened for a discussion of other models from other institutions. The presenters look forward to learning from the audience.

2) The Content of Communication Courses for Undergraduates, ***Karla Hoffman***, George Mason University, Systems Eng. & OR Dept., 4400 University Dr., MS 4A6, Fairfax, VA 22030, khoffman@gmu.edu

The required communication courses for undergraduates at George Mason University will be described. Included will be a seminar course in which students give oral presentations and write reports on new technologies and a Senior Design course in which students interact with industry while giving technical presentations and writing various documents.

3) Using Workplace Context to Improve Undergraduate Communication Skills, ***Judith Shaul Norback***, Georgia Institute of Technology, Workplace/Academic Comm., Sch. of ISyE, Groseclose Bldg., Atlanta, GA 30332-0205, judith.norback@isye.gatech.edu, ***Jill Hardin, Donna C. Llewellyn***

Workplace context is being used to better prepare graduating students for on-the-job communication. Practical research highlights will be covered; results from interviews with heads of industry and industrial engineers will be described and a web-based system providing senior design students with easy access to workplace data will be illustrated.

MA45 Production & Scheduling V

Contributed Session
Chair: Suna Koksalan, Purdue University, Krannert Sch. of Mgmt., West Lafayette, IN 47907, kondakcis@mgmt.purdue.edu

1) A Simulation Model for the Resource Constrained Sequencing & Scheduling Problem within Assembly Lines, ***Erhan Kozan***, Queensland University of Technology, Sch. of Math Sci.,

GPO Box 2434, Brisbane, Queensland, 4001, Australia, e. kozan@qut.edu.au

A simulation model is developed to solve the large-sized resource allocation, sequencing and scheduling problem for a mixed-model multi-stage truck assembly line. Operations are scheduled to allow the makespan to be minimized while also satisfying all precedence and resource constraints.

2) withdrawn 10/4: Scheduling in Dynamic & Stochastic Environments, ***Ihsan Sabuncuoglu***, Bilkent University, IE Dept., Bilkent, Ankara, 06533, Turkey, sabun@bilkent.edu.tr, www.bilkent.edu.tr/~sabun, ***Ihsan Kizilisik***

3) withdrawn 10/10: Tabu Search Approach for a Bicriteria Single Machine Scheduling Problem, ***Suna Koksalan***, Purdue University, Krannert Sch. of Mgmt., West Lafayette, IN 47907, kondakcis@mgmt.purdue.edu, ***Tuncay Bekiroglu***, ***Murat M. Koksalan***, ***Meral Azizoglu***

MA46 Marketing IV

Contributed Session

Chair: Willson H. Douglas, National Analysts, 1700 Market St., Philadelphia, PA 19103, dougw@nationalanalysts.com

1) Optimizing Product Lines using Choice-Based Conjoint with Individual Heterogeneity, ***Willson H. Douglas***, National Analysts, 1700 Market St., Philadelphia, PA 19103, dougw@nationalanalysts.com, ***Jim J. Gallager***

Traditional product line selection problems are mathematically intractable or NP-hard. Aggregate choice-based conjoint models, although somewhat unrealistic, produce problems that are tractable using standard IP techniques. We examine the performance of IP techniques for choice-based conjoint with individual heterogeneity. Results are related to common conjoint study design practices.

2) A One-to-One Advertising Planning System in the IT Era, ***Makoto Abe***, University of Tokyo, Faculty of Economics, Bunkyo-ku, Tokyo, 113-0033, Japan, abe@e.u-tokyo.ac.jp

The difficulty of one-to-one advertising in broadband arises because thousands of different ads must be delivered to viewers who are characterized by dozens of attributes for targeting. Furthermore, within a given period, there exists a finite number of contacts to each target group that is desired by advertisers. Given these factors, finding the best one-to-one match between ads and contacts is a rather complex problem.

3) Price Indifference Bands: Their Existence, Measurement & Implications, ***Naufel Vilcassim***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, England, UK, nvilcassim@london.edu, www.london.edu, ***Bruce Hardie***

Marketing practitioners have asserted that products have a "price indifference band," a range within which price changes have little impact on customers' purchases. If valid, it has significant implications for firms' pricing decisions, but there is little empirical evidence. We empirically examine its existence, magnitudes and implications for product pricing.

4) Pricing in International Markets: The Role of Market Response within & across Market Strategic Interactions, ***Pradeep Chintagunta***, University of Chicago, 1101 East 58th St., Chicago, IL 60637, pradeep.chintagunta@gsb.uchicago.edu, ***Ramarao Desiraju***

We study 3 determinants of pricing across geographic markets: the price response in each market, the nature of inter-firm strategic interactions within that market and across the markets. We empirically examine the interactions of 3 competitors based on data from the US, UK, France, Italy and Germany.

Monday 10:00-11:30

MB01 Knowledge Abstraction

Sponsor: Artificial Intelligence
Sponsored Session

Chair: Roman Wong, Barry University, Andreas Sch. of Bus., 11300 NE Second Ave., Miami Shores, FL 33161-6695, rwong@mail.barry.edu

1) Towards a Repository for Knowledge Components Identified in Common Audit Tasks, ***Roman Wong***, Barry University, Andreas Sch. of Bus., 11300 NE Second Ave., Miami Shores, FL 33161-6695, rwong@mail.barry.edu

We discuss our current efforts in categorizing the common knowledge components identified in major audit tasks. A collection of the knowledge components identified during our examination of the audit task of inherent risk assessment is reported. These knowledge components are categorized by the role each plays in the examined audit task.

2) Semantic Object-Oriented Access of Relational Databases, ***Khaled Naboulsi***, Barry University, Adult & Continuing Ed. IT Dept, 11300 NE Second Ave., Miami Shores, FL 33161-6695, knaboulsi@mail.barry.edu

We present a model that seeks to improve the query specification of a relational database by defining a semantic object-oriented layer that serves as an intermediary between the end-users and the relational database. The relational instances will be mapped to the semantic layer without actually creating the semantic object-oriented instances.

3) Multimedia Networking: Challenges & Solutions, ***Chakib Chraibi***, Barry University, Dept. of Math & CS, 11300 NE Second Ave., Miami Shores, FL 33161-6695, cchraibi@mail.barry.edu

The "best-effort" approach originally designed for general data communications may not be sufficient for multimedia transfers on the Internet that may entail real-time requirements. We provide an overview of the fast growing field of multimedia communications, and then analyzes the different strategies that can be used to provide adequate service to support multimedia applications over the Internet.

MB02 Tutorial: Accelerating E-Business Infrastructure

Invited Session

Chair: Anindya Datta, Georgia Institute of Technology, adatta@gatech.edu

1) Tutorial: Accelerating the E-Business Infrastructure, ***Anindya Datta***, Georgia Institute of Technology, adatta@gatech.edu

MB03 Ensemble Methods for Data Mining

Cluster: Data Mining
Invited Session

Chair: Nick Street, University of Iowa, MS Dept., S232 PBB, Iowa City, IA 52242, street@dollar.biz.uiowa.edu, nick-street@uiowa.edu

1) Mining for Molecules via Support Vector Machines, ***Kristin P. Bennett***, RPI, Dept. of Math Sciences, 110 8th St., Troy, NY 12180, bennek@rpi.edu, ***Curt M. Breneman***, ***Larry Lockwood***, ***Mark Embrechts***, ***Fabio Arciniegas***, ***Muhsin Ozdemir***, ***Ayhan Demiriz***, ***Michinari Momma***, ***Matthew Sunderling***

We examine SVMs for predicting bio-reactivites of potential drugs. This process, known as quantitative structural activity relationship modeling, requires the solution of high-dimensional inference problems based on very little data. We examine several variants of SVMs that effectively solve these challenging problems.

2) Learning Ensembles for class Probability Estimation & Ranking, ***Dragos Margineantu***, Oregon State University, Dept. of CS, 102 Dearborn Hall, Corvallis, OR 97331-3202

For many practical applications of learning, one would rather have algorithms compute accurate values of probabilities for each possible class, instead of a single class label. Unfortunately, most of the existing classification algorithms either give poor class probability estimates or, for some of them, it is unknown yet how class probability values can be estimated.

3) Building Ensembles of Classifiers Trained on Subsets of the Data, ***Rich Maclin***, University of Minnesota, Dept. of CS, 320 Heller Hall, 10 University Dr., Duluth, MN 55812, rmaclin@d.umn.edu

Building a classifier using only a subset of the training data greatly reduces training time, but at the cost of producing inferior classifiers (in terms of accuracy). Ensemble methods can overcome this limitation. I will present results demonstrating the efficiency and accuracy tradeoffs of ensembles applied to subsets of data.

4) Meta-Evolutionary Ensembles, ***Nick Street***, University of Iowa, MS Dept., S232 PBB, Iowa City, IA 52242, street@dollar.biz.uiowa.edu, nick-street@uiowa.edu, ***YongSeog Kim***, ***Filippo Menczer***

We present a novel ensemble learning method that uses feature selection to promote diversity among the classifiers. In our 2-level evolutionary search strategy, individual classifiers compete to correctly predict training points, while multiple ensembles compete based on estimated accuracy. Computational results compare favorably to bagging and boosting.

MB04 Auction Design & Primal-Dual Algorithms

Cluster: Auctions
Invited Session

Chair: Rudolf Muller, University of Maastricht, Dept. of Quantitative Econ., PO Box 616, Maastricht, 6200 MD, The Netherlands, r.muller@ke.unimass.nl

Co-Chair: Andreas S. Schulz, Mit, Sloan Sch. of Mgmt., OR Ctr., 30 Wadsworth St., Bldg. E53361, Cambridge, MA 02142-1320, schulz@mit.edu

1) Linear Programming & Vickrey Auctions, ***Rakesh V. Vohra***, Northwestern University, Kellogg Sch. of Mgmt., Evanston, IL 60208-2009, rvv684@casbah.acns.nwu.edu, ***Sushil Bikhchandani***, ***James Schummer***, ***Sven de Vries***

The sealed bid Vickrey auction requires to solve as many optimization problems as there are bidders. We survey environments where Vickrey payments correspond to dual variables in certain linear programs. Thus, solving at most two optimization is sufficient. Furthermore, primal-dual algorithms suggest ascending auctions that implement the Vickrey outcome.

2) Primal-Dual Methods in Iterative Auction Design, ***David C. Parkes***, University of Pennsylvania, Dept. of CIS, Philadelphia, PA, dparkes@unagi.cis.upenn.edu

Primal-dual theory provides a useful methodology to design efficient iterative auctions for myopic best-response agent strategies. I describe a new method, "extend and adjust," to also use primal-dual ideas to compute Vickrey payments and make myopic best-response an optimal sequential strategy for a rational agent.

3) On the Computational Complexity of Single-Item Auctions, ***Rudolf Muller***, University of Maastricht, Dept. of Quantitative Econ., PO Box 616, Maastricht, 6200 MD, The Netherlands, r.muller@ke.unimass.nl, ***Elena Grigorieva***, ***Jean-Jacques Herings***

We analyze the computational complexity of single-item auctions. In our model, all operations by bidders and the auctioneer, including messages, are counted. While the Vickrey auction is polynomial, the complexity of the English auction depends on the equilibria played by the bidders. We finally introduce a fast bisection auction.

MB05 Nonsmooth Critical Point Theory, Hemivariational Inequalities & Global Optimization

Cluster: Global Optimization
Invited Session

Chair: Dumitru Motreanu, Universite de Perpignan, Dept. de Mathematiques, 52 Avenue de Villeneuve, Perpignan Cedex, 66860, France, motreanu@univ-perp.fr

1) A Nonlinear Parameter Identification Problem, ***Sergiu Aizicovici***, Ohio University, Dept. of Math, Morton Hall 321, Athens, OH 45701, aizicovi@bing.math.ohiou.edu

We develop an approximation framework for identifying parameters in a general class of non-autonomous functional differential equations. After establishing the existence and uniqueness of solutions to such equations, we present a convergence theory for Galerkin approximations to inverse problems. An application to heat flow in materials with memory is discussed.

2) Critical Points & Optimality Conditions Expressed in Terms of Variational-Hemivariational Inequalities, ***Dumitru Motreanu***, Universite de Perpignan, Dept. de Mathematiques, 52 Av de Villeneuve, Perpignan Cedex, 66860, France, motreanu@univ-perp.fr

A new critical point theory is constructed for a large class of non-smooth and non-convex functionals. This allows us to study different qualitative properties of solutions to various nonlinear boundary value problems and optimization subject to non-convex constraints. Many applications make use of formulations in terms of variational-hemivariational inequalities.

3) On Some Multi-Objective Optimization Problem Related to Economic Equilibrium, ***Zdzislaw Naniewicz***, Cardinal Stefan Wyszynski University of Warsaw, Faculty of Math, Dewajtis 5, Warsaw, 01-815, Poland, naniewicz@uksw.edu.pl

We study a multi-objective optimization problem in which minima of a finite collection of objective functions satisfy some unilateral constraints and are linked together by a certain sub-differential relationship. The governing relations are stated as a system of variational inequalities defined on a nonconvex feasible set.

4) Nonlinear Programming Problems with Closed Range Control-Dependent Operators, ***Nicolae H. Pavel***, Ohio University, Dept. of Math, Morton Hall 321, Athens, OH 45701, npavel@bing.math.ohiou.edu

We will provide the necessary conditions for the optimality of a pair (y,u) with respect to a locally Lipschitz cost functional L(y,u) subject to nonlinear constraints also containing a closed range, densely defined linear operator A(u). Applications to optimal control of some PDE are given.

MB06 Economic Issues in Wired & Mobile E-Commerce

Sponsor: Telecommunications
Sponsored Session

Chair: Kerem Tomak, University of Texas, CBA 5.202, B6500, Austin, TX 78712, kerem.tomak@bus.utexas.edu

1) Effect of Mental Accounting on Enabling Micropayments for Mobile Services, ***Ranjan Dutta***, University of Texas, ranjand@mail.utexas.edu, ***Kerem Tomak***

We will look into the dynamics of consumer behavior to ascertain the impact of mobile Internet commerce. If bandwidth problems are taken care of, it might be easily possible for us to relax this major assumption and this relaxation can produce a number of implications. A burning issue under the new environment will be how to price services and products given the existence of both static Internet access and mobile Internet access.

2) Modeling Competition among Sellers in a Business-to-Business Marketplace, ***Subhajyoti Bandyopadhyay***, University of Florida, s_bajdyopadhyay@mgmt.purdue.edu

We model the competition between 2 similar sellers (same costs and capacities) vying for the same business by trying to be the lowest price bidder, by taking into account some of the unique requirements of the marketplace. For example, the capacities of the sellers are such that they individually cannot cater to the entire demand, but their cumulative capacity is more than the required demand...

3) On the Persistence of Differentiated Commodity Prices in Online Markets, ***Cenk Kocas***, Michigan State University, NBC 301, East Lansing, MI 48824

We examine the prevailing price dispersion for commodities in online markets despite the obvious reductions in search costs. We analyze the competitive pricing dynamics under varying levels of store name loyalty, price comparison behavior and retailer strategies.

4) Modeling a Market of Services Enhanced by Information & Communication Technology, ***Bard K. Reitan***, Norwegian University of Science & Technology, Ind. Econonics & Tech. Mgmt., Trondheim, N-7491, Norway, baard.k.reitan@iot.ntnu.no, ***Stein W. Wallace***, ***Nils J. Berland***

As an answer to decreasing margins, traditional services such as utilities and alarms may be enhanced with information and communication technology. We identify necessary functionality and roles in such markets of enhanced services. Finally, we discuss problems in modeling the actors' decision problems.

MB07 Optimization in Molecular Biology I

Sponsor: Computing
Sponsored Session

Chair: Harvey Greenberg, University of Colorado, Mathematics Dept., CB 170, PO Box 173364, Denver, CO 80217-3364, hgreenbe@carbon.cudenver.edu

Co-Chair: David L. Woodruff, University of California, Grad. Sch. of Mgmt., Davis, CA 95616, dlwoodruff@ucdavis.edu

1) Single Nucleotide Polymorphism Problems, Complexity & Algorithms, ***Giuseppe Lancia***, University of Padova/Celera Genomics, Padova, Italy, lancia@dei.unipd.it

Human DNA is roughly 99% identical among all individuals and it is believed that SNPs are responsible for our diversity. A SNP is a location of our genome in which we can only take 2 possible values instead of the usual 4 {A,C,G,T}. A haplotype specifies the values of a a set of SNPs on a chromosome, and a genotype is a pair of haplotypes, one per chromosome...

2) Comparing Energy Models for Flexible Ligand Docking, ***William E. Hart***, Sandia National Laboratories, MS 1110, Albuquerque, NM 87185-1110, wehart@cs.sandia.gov, ***Laura Frink***

Molecular docking methods are valuable tools for structure-based drug discovery that can be effectively used to identify promising drug candidates. Solving docking problems is particularly challenging when conformational flexibility is included in the docking model. Solving these problems effectively requires accurate empirical energy models in addition to efficient global search methods. Both of these aspects have been well developed in the AutoDock docking tool...

3) New Insights into the Lattice Model for Protein Folding, *Harvey Greenberg*, University of Colorado, Mathematics Dept., CB 170, PO Box 173364, Denver, CO 80217-3364, hgreenbe@carbon.cudenver.edu, *Robert Carr*, *William E. Hart*

The hydrophobic-hydrophilic lattice model for analyzing protein folding holds interesting properties. A recent thesis showed how to incorporate symmetry exclusion into B&B, using this model for its motivating application. We examine the "self-avoiding walk" property closely and considers new cuts and branching rules based on new insights.

MB08 DO-13

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Ted Ralphs, Lehigh University, Dept. of ISE, 200 West Packer Ave., Bethlehem, PA 18015, tkralphs@lehigh.edu

1) Branch, Cut & Price: The Next Generation, *Laszlo Ladanyi*, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, ladanyi@us.ibm.com, *Ted Ralphs*

The next generation of the BCP framework of the COIN-OR (http://www.coin-or.org) project is presented. This version provides significant advances (both theoretical and technical) compared to the previous one. For example, better scalability and fault tolerance, support for warmstarting MIPs with a partial search tree and use as a callable library.

2) A Branch & Price Algorithm for Stochastic Lot-Sizing, *Suvrajeet Sen*, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu, *Guglielmo Lulli*

We will discuss an application of the B&P methodology to a stochastic lot-sizing problem in which multi-period demand is modeled using a scenario tree. We will discuss an "open source" implementation using the framework provided by COIN-OR. Computational results will be reported.

3) Branch & Cut for Capacitated Network Routing, *Ted Ralphs*, Lehigh University, Dept. of ISE, 200 West Packer Ave., Bethlehem, PA 18015, tkralphs@lehigh.edu, *Joseph Hartman*

We discuss the application of our framework for parallel BC&P to the solution of a class of capacitated network routing problems. We present a general formulation which includes the vehicle routing, bin packing, capacitated spanning tree and cable-trench problems as special cases. Computational results will be presented.

MB09 DO-16

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Alan J. Hoffman, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, ajh@us.ibm.com

1) The k-Piece Packing Problem, *David B. Hartvigsen*, University of Notre Dame, 354 Mendoza Coll. of Bus., Notre Dame, IN 46556-5646, dhartvig@wood.helios.nd.edu, *Pavol Hell*

A k-piece of a graph G is a connected subgraph of G whose maximum degree is equal to k. We give a polynomial time algorithm for covering the maximum number of vertices of a graph by vertex disjoint k-pieces.

2) Approximation Algorithms for Minimum Cost Vertex Connectivity, *Lisa Fleischer*, Carnegie Mellon University, GSIA, Rm. 232A, Pittsburgh, PA 15213-3890, lkf@andrew.cmu.edu

We discuss some recent progress in providing approximation guarantees for network design problems. In particular, we consider the design of low cost networks satisfying prespecified vertex connectivity requirements.

3) Remarks on the Honeymoon Hotel, *Alan J. Hoffman*, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, ajh@us.ibm.com, *Elinor Hershaft*, *Baruch Schieber*, *Gregory Sorkin*

The honeymoon hotel of order n is the multigraph on 2n nodes formed by the complete graph plus a matching. Let HH(n) denote this multigraph or its adjacency matrix. Also, let B denote a complete bipartie graph on a subset of the nodes or its adjacency matrix. Joseph Zaks raised the question of finding the smallest number of Bs such that their sum is HH(n). We describe some progress toward resolving this question.

MB10 Algorithms for Solving Complementarity Problems

Cluster: Complementarity & Related Problems
Sponsor: Optimization
Sponsored Session
Chair: Stephen C. Billups, University of Colorado, Dept. of Math., CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

1) The Squared Smoothing Matrix Function & Semi-Definite Complementarity Problems, *Jie Sun*, National University of Singapore, Dept. of Dec. Sci., Singapore, 119620, Singapore, jsun@nus.edu.sg, *Defeng F. Sun*

Solving a semi-definite complementarity problem is equivalent to finding a root of a certain matrix-valued non-smooth equation. The squared smoothing function is shown to be strongly semi-smooth. This property allows us to develop quadratically convergent algorithms for some typical semi-definite complementarity problems.

2) Feasible Homotopy Methods for Complementarity Problems, *Stephen C. Billups*, University of Colorado, Dept. of Math., CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

A probability-one homotopy algorithm will be described for solving complementarity problems. The algorithm links homotopy and smoothing parameters to construct a homotopy mapping that is smooth in the interior of its domain. We show that the 0 curve of this homotopy mapping remains feasible for the complementarity problem.

MB11 Integer & Combinatorial Optimization Applications in Manufacturing & Service Operations

Cluster: Integer Programming
Invited Session
Chair: Joseph B. Mazzola, Georgetown University, McDonough Sch. of Bus., 37th & O St. NW, Washington, DC 20008, mazzolaj@georgetown.edu

1) Application of an Optimization Model in Manufacturing, *Sampath Rajagopalan*, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089-1421, srajagopalan@sba.usc.edu, raj@marshall.usc.edu

We describe the application of an optimization model at a consumer product company. Given a large number of SKUs offered for sale and limited production capacity, which of the SKUs should be inventoried for sale? We discuss the issues involved in application of the model and the resulting insights. discuss the issues involved in application of the model and the resulting insights.

2) Training Optimization in Airlines, *Julian E. Pachon*, CALEB Technologies Corp., 9130 Jollyville Rd., Austin, TX 78759, julian.pachon@calebtech.com, *Michael F. Arguello*, *Benjamin G. Thengvall*, *Gang Yu*

In many airlines, pilots change their positions, i.e., base, fleet, seat, etc., through a bid-award process. Given the awarded positions, airlines need to manage training and flow of pilots across different positions to maximize compliance with their business plan while minimizing system cost and considering FAA regulations and company rules. We will describe the problem and present optimization models and computational results.

3) Dynamic Service-Facility Planning & Location, *Joseph B. Mazzola*, Georgetown University, McDonough Sch. of Bus., 37th & O St. NW, Washington, DC 20008, mazzolaj@georgetown.edu, *Alan W. Neebe*

The planning and location of service facilities must incorporate dynamic factors such as changing customer demand patterns, adoption and deployment of new technologies, and infrastructure obsolescence. We propose models for the dynamic service-facility location problem and discuss algorithms for solving them. We also present preliminary computational experience with these models. them. We also present preliminary computational experience with these models.

MB12 Metaheuristic-Based General Purpose Solvers

Cluster: Combinatorial Optimization
Invited Session
Chair: Jin-Kao Hao, University of Angers, 2 Blvd. Lavoisier, Angers Cedex, 49045, France, hao@info.univ-angers.fr

1) withdrawn 10/11: iOpt: Intelligent Optimization Toolkit, *Raphael Dorne*, British Telecom, Adastral Park PP12/MLB1, Ipswich, Suffolk, IP5 3RE, England UK, raphael.dorne@bt.com,

Christos Voudouris

2) General Constraint Solving by Metaheuristics, ***Philippe Galinier***, Ecole Polytechnique de Montreal, DGI, CP 6079, succ. Center-ville, Montreal, Quebec, H3C 3A7, Canada, philipg@crt.umontreal.ca

I will present a general system for tackling constraint problems. Imitating constraint programming, a general formalism based on high-level primitives representing varaibles and various constraints allows problem representation. A solving engine involving LS and hybrid metaheuristic ensures the resolution. Experimental results on various problems will be presented.

3) withdrawn 10/10: Two Extensions to the GENET-Family of CSP Solvers, ***J. H. M. Lee***, Chinese University of Hong Kong, Dept. of CS & Eng., Shatin NT Hong Kong, Hong Kong, jlee@cse.cuhk.edu.hk, ***K. M. F. Choi, H. F. Leung, P. J. Stuckey, H. W. Won***

4) Easy Local++: An Object-Oriented Framework for Flexible Design of Local Search Algorithms, ***Andrea Schaerf***, University of Udine, Via delle Scienze 206, Udine, Italy, schaerf@uniud.it, ***Luca di Gaspero***

We present EasyLocal++, a C++ framework for the development of local search algorithms. EasyLocal++ abstract classes provide the full control structures of the algorithm, letting the user write only the problem-specific code. EasyLocal++ is highly compositional and supports the design of novel combinations of search techniques and neighborhood structures.

MB13 Interior-Point Methods for Linear & Semidefinite Optimization I

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Kees Roos, TU Delft/University of Leiden, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@its.tudelft.nl

1) Maximum Stable Set Formulations & Heuristics based on Continuous Optimization, ***Renato D. C. Monteiro***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, monteiro@isye.gatech.edu, ***Samuel Burer, Yin Zhang***

We present 2 continuous optimization formulations of the maximum stable set problem obtained by restricting the matrix variable in the Lovasz semi-definite program to be rank-1 or rank-2. We then propose heuristics for obtaining large stable sets based on these formulations and present some computational results.

2) Rank-Two Semidefinite Relaxation Heuristics for Max-Cut & Other Binary Quadratic Programs, ***Samuel Burer***, Georgia Institute of Technology, School of Mathematics, Atlanta, GA 30332, burer@math.gatech.edu, ***Renato D. C. Monteiro, Yin Zhang***

We propose a rank-2 semi-definite relaxation heuristic applicable to some binary quadratic programs, including primarily the maximum cut problem but also others such as the maximum/minimum bisection problem. We also report some intriguing computational results on a large set of test problems and discuss their ramifications.

3) Robust Portfolio Optimization via Second-Order Cone Programming, ***Donald Goldfarb***, Columbia University, IE/OR Dept., 331 Mudd Bldg., New York, NY 10027-6699, goldfarb@columbia.edu, ***Garud Iyengar***

We consider various robust portfolio optimization problems that can be formulated and solved efficiently as second-order cone programs. We present numerical results to illustrate the effectiveness of our approach.

MB14 Linear Complementarity Problems: Numerical Solutions & Applications

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Florian Potra, UMBC, Dept. of Math & Stats., County 1000 Hilltop Circle, Baltimore, MD 21250, potra@math.umbc.edu

1) Deep-Cut Techniques based on the Primal-Dual Central Path, ***Clovis C. Gonzaga***, Federal University of Santa Catarina, Dept. of Math, CP 476, Florianopolis SC, 88010-970, Brazil, clovis@mtm.ufsc.br

A technique for introducing a new cut to the polyhedral approximation of a convex set is presented. Starting from an analytic center, an arbitrarily deep cut is performed following the primal-dual central path.

2) Analysis of Higher-Order Interior-Point Algorithms for LP and LCP based on Self-Regular Functions, ***Goran Lesaja***, Dept. of Math & CS, PO Box 8093, Statesboro, GA 30460, goran@gsu.cs.gasou.edu

Recently a new class of proximity measures based on self-regular functions has been introduced and used in design and analysis of IPMs for LP, LCP and SDP. The new proximities are used in the analysis of higher-order algorithms for LP and LCP and favorable complexity results are obtained.

3) A Superlinearly Convergent Interior-Point Method for LCP based on a Large Neighborhood of the Central Path, ***Florian Potra***, UMBC, Dept. of Math & Stats., County 1000 Hilltop Circle, Baltimore, MD 21250, potra@math.umbc.edu

A predictor-corrector method for solving monotone LCPs is presented. The algorithm operates in a large neighborhood of the central path, has polynomial complexity and is superlinearly convergent even for problems that do not have a strictly complementary solution.

MB15 Large-Scale Integer Programming

Cluster: Large-Scale Mathematical Programming
Invited Session

Chair: Diego Klabjan, University of Illinois, Dept. of MIE, 140 ME Bldg., 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu

1) Distribution of Deferred Items within Multimode, Multiservice Logistics Networks, ***Karen R. Smilowitz***, University of California, Dept. of CEE, 416G McLaughlin Hall, Berkeley, CA 94720-1720, smilo@uclink4.berkeley.edu, ***Alper Atamturk, Carlos F. Daganzo***

We present routing strategies for deferred packages within multi-mode package delivery networks with multiple service guarantees. We consider the allocation of deferred items to excess capacity on alternative models in ways that allow all modes to be better utilized. Model formulation and solution techniques will be discussed.

2) Lifted Inequalities for 0-1 Mixed Integer Programming, ***Jean-Phillip Richard***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, jpacc@isye.gatech.edu, ***George L. Nemhauser, Ismael Regis de Farias, Jr.***

We study the polytope defined by a single knapsack constraint that contains binary and bounded continuous variables. We develop pseudopolynomial algorithms for the sequential lifting of continuous variables. We also introduce the concept of superlinear inequalities and show that the downlifting is significantly simpler for them.

3) Solving Large-Scale Integer Programs by using Subadditive Dual Functions, ***Diego Klabjan***, University of Illinois, Dept. of MIE, 140 ME Bldg., 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu

LP duality is well understood and many algorithms and concepts rely on the reduced cost. We define the reduced cost for integer programs by means of subadditive dual functions and show new algorithms in integer programming that use the notion of the reduced cost. A new family of subadditive functions is presented that are computationally tractable. We give an algorithm that computes an optimal subadditive function...

MB16 E-Commerce & Supply Chain

Sponsor: MSOM
Sponsored Session

Chair: Rachel Q. Zhang, Cornell University, Johnson Grad. Sch. of Mgmt., 364 Sage Hall, Ithaca, NY 14853, rqz2@cornell.edu

1) An Efficient Auction Mechanism for a Production-Transportation Problem, ***Rong Chen***, Cornell University, Johnson Grad. Sch. of Mgmt., Ithaca, NY 14853, rc72@cornell.edu, ***Ganesh Janakiraman, Robin Roundy***

We consider a single buyer purchases from a set of suppliers multiple units of components, which will be shipped to the buyer's plants at different locations. We propose an auction mechanism that is truth-inducing for suppliers, and achieves system efficiency so that the total supply chain integration costs, including production and transportation costs, can be minimized.

2) The Multi-Unit Auction, ***Mike Freimer***, Cornell University, Sch. of OR, Ithaca, NY 14853-3801, mfreimer@orie.cornell.edu, ***Woonghee Huh, Amar Sapra, Robin Roundy, Rachel Q. Zhang***

We examine the expected revenue of the multi-unit Vickrey auction and compare it with those of other auction schemes. We explore the use of stochastic processes for generating utility functions and bids and propose a quasi-uniform price auction protocol.

3) The Transportation Exchange Game, ***Peter L. Jackson***, Cornell University, Sch. of OR/IE, Ithaca, NY 14853, pj16@orie.cornell.edu, ***Derek Nelson***

Brokerage exchanges for full and intermediate truckloads are proliferating on the Internet. We model both a spot and forward market for full truckload transport as an educational board game and demonstrate both the physical and electronic versions of the game. We describe a number of intelligent agent strategies for playing the game.

4) Supply Chain Choice on the Internet, ***Serguei Netessine***, University of Pennsylvania, Wharton Sch., OPIM Dept., 1300 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104-6366, netessinse@simon.rochester.edu, ***Nils Rudi***

Internet companies predominantly use 2 supply chain structures: drop-shipping, where the wholesaler stocks inventory and ships products directly to the customers on the retailers' request, and traditional, where the retailers hold inventory. We analyze the issue of choosing one of these 2 channel alternatives. inventory. We analyze the issue of choosing one of these 2 channel alternatives.

MB17 Models on Supply Chain Operations

Sponsor: MSOM
Sponsored Session
Chair: Jing-Sheng Song, University of California, Grad. Sch. of Mgmt., Irvine, CA 92717, jssong@uci.edu

1) Remanufacturing Networks in Equilibrium, ***Xiuli Chao***, North Carolina State University, Dept. of IE, PO Box 7906, Raleigh, NC 27695, xchao@eos.ncsu.edu, ***Gregory A. DeCroix***, ***Jing-Sheng Song***, ***Paul Zipkin***

We study an inventory model with negative demands, which represent returns from previous sales or parts for remanufacturing. We show how to evaluate and optimize standard inventory policies in this setting. We also discuss managerial implications and insights.

2) Supply Chain Inefficiency: Information & Overreaction, ***Noel Watson***, University of Pennsylvania, The Wharton Sch., OPIM Dept., 1300 SH-DH, Philadelphia, PA 19104-6366, nhwatson@wharton.upenn.edu, ***Yu-Sheng Zheng***

Over-reaction may be an important cause of supply chain inefficiency it affects firms' operational performance and the severity of the boom-bust business cycles. We use parsimonious models to investigate how this over-reaction changes supply chain dynamics and its implications. Correction strategies are formulated based on various information and coordination structures.

3) An Examination of the Influence of Agency in Implementing a (Q,R) Inventory-Replenishment Policy, ***Jun-Yeon Lee***, Purdue University, Krannert Grad. Sch. of Mgmt., West Lafayette, IN 47907, jun-yeon_lee@mgmt.purdue.edu, ***Leroy B. Schwarz***

We examine the influence of a principal-agent relationship in the implementation of a (Q,R) inventory-replenishment policy. In particular, by expending hidden effort, the agent has influence over the distribution of leadtime. We examine contracts under which the principal provides incentives to the agent to expend effort.

4) On the Equivalent Backorder Cost for a Serial Supply Chain Model with a Service-Level Constraint, ***Kevin Shang***, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697, hshang@gsm.uci.edu, ***Jing-Sheng Song***

We investigate the relationship between backorder costs and service levels in serial inventory systems with stochastic demands. We establish bounds for optimal stocking positions for the service-constrained model. As a result, an efficient algorithm is developed for solving the serial model with a service-level constraint.

MB18 Location Analysis I

Sponsor: SOLA
Sponsored Session
Chair: Zvi Drezner, California State University, Dept. of IS/DS, Rm. LH540, Fullerton, CA 92834, zdrezner@fullerton.edu

1) Location Problems with Stochastic Demand & Congestion, ***Oded Berman***, University of Toronto, Rotman Sch. of Mgt., 105 Saint George St., Toronto, Ontario, M5S 3E6, Canada, berman@rotman.utoronto.ca, ***Dmitry Krass***

We will present a critical review of main results and applications of location models of service facilities in a stochastic environment. A general framework will be presented and future direction for further research will be suggested.

2) Worst-Case Incremental Analysis for a Class of p-Facility Location Models, ***Richard L. Francis***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, francis@ise.ufl.edu, rlf@ise.ufl.edu, ***Timothy J. Lowe***, ***Arie Tamir***

We consider a class of p-facility network location models including the p-median, p-center and generalizations thereof. With v(p) denoting the minimal objective function value, for p = i or j, i < j, we find easily computed worst-case constants c(i,j) satisfying v(j)/v(i) < = c(i,j) for all instances of each model.

3) Locational Decisions in Strategic Supply Chain Management, ***Stefan Nickel***, Fraunhofer Institut fuer Techno und Wirtschaftmathematik, Gottlieb-Daimler-Strasse 49, Kaiserslautern, 67663, Germany, nickel@itwm.fhg.de, ***Joerg Kalcsics***, ***Teresa Melo***

We propose several algorithms for analyzing the structure of a supply chain. In addition, we present different tools for redesigning the supply chain (e.g. opening and closing DCs/Plants). The proposed continuous and discrete algorithms are embedded into a business application for supply chain modeling developed by SAP AG (APO).

4) The Multi-Level Location Set Covering Problem, ***Richard Church***, University of California, Dept. of Geography, 5717 Ellison Hall, Santa Barbara, CA 93106, church@geog.ucsb.edu, ***R. A. Gerrard***

We examine the multi-level location set covering problem and an application to The Nature Conservancy. We demonstrate that properties for the single level case can be extended to the multi-level case and develop a solution approach. Results of this process to a nationwide TNC data set are given.

MB19 New Models & Applications in Stochastic Optimization

Cluster: Stochastic Programming
Sponsor: Optimization
Sponsored Session
Chair: Tito Homem-de-Mello, Ohio State University, Dept. of IWSE, 1971 Neil Ave., Columbus, OH 43210-1271, homem-de-mello.1@osu.edu

1) Stochastic Network Modeling of Air Mobility Deployments, ***Julien Granger***, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706, granger@cae.wisc.edu

Large-scale military deployments require transporting equipment and personnel over long distances in a short period of time. Our work investigates the feasibility of applying network approximations, successfully used in manufacturing systems, to enhance existing deterministic air mobility optimization models by taking account of uncertainties such as ground delays.

2) Evaluation of New Variance Reduction Techniques Applied to Operations Management Problems, ***Hongsuk Yang***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, hongsuk.yang@gsb.uchicago.edu, ***Linus Schrage***

We look at the benefits of a type of quasi-random sampling method that combines Latin square sampling with multi-dimensional stratified sampling. We compare this approach with other well-known variance reduction methods when applied to a variety of stochastic optimization problems in the operations management area, ranging from multi-product inventory management with demand substitution, stochastic PERT networks, stochastic programming, etc... demand substitution, stochastic PERT networks, stochastic programming, etc...

3) A Stochastic Program for Optimizing Military Sealift Subject to Attack, ***Javier Salmeron***, Naval Postgraduate School, Dept. of OR, Monterey, CA 93943, jsalmero@nps.navy.mil, ***David P. Morton***, ***R. Kevin Wood***

We present a stochastic program for planning the wartime, sealift deployment of military cargo subject to biological attack. We compare our model with current rule-based methods and show that our approach reduces the expected disruption that can be caused by such attacks.

4) Combining Monte Carlo Methods & Dynamic Programming in Stochastic Optimization, ***Tito Homem-de-Mello***, Ohio State University, Dept. of IWSE, 1971 Neil Ave., Columbus, OH 43210-1271, homem-de-mello.1@osu.edu

We present a hybrid method for stochastic optimization, whose basic idea is to combine techniques from Markov decision processes with Monte Carlo-based methods for stochastic optimization. We separate the horizon into 2 periods, during which the 2 different types of solution techniques are employed. We illustrate the method with applications to perishable inventory models.

MB20 Special Issues in Technology Business Incubation

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt. Sponsored Session

Chair: Leonel Corona, National University of Mexico, Mexico, leonel@servidor.unam.mx

1) The Recent Evolution of Technology Incubation in Canada, ***Jerome Doutriaux***, University of Ottawa

Are technology incubators and science parks driving the development of innovation poles or is it the other way around? An analysis of the evolution of the Canadian technology incubation industry and its recent trends, comparing it with the growth dynamics of Canada's main innovation poles, shows that both technology incubators and science parks tend to be contributors to sustained growth rather than drivers of growth.

2) From Brick & Mortar Facilities to Dot.Com Factories: The State of the US Incubation Industry, ***Sarfraz A. Mian***, SUNY, Sch. of Business, Swetman Hall, Oswego, NY 13126, mian@oswego.edu

More recently, the new e-commerce incubators that functioned as new dot.com factories by offering services to startups had been going through restructuring. We will provide an update on the merging of these newer models with the existing US brick and mortar incubators after the dot.com shakeout.

3) withdrawn 10/9: Networking & Technology Incubation in Mexican Innovation Poles & Beyond, ***Leonel Corona***, National University of Mexico, Mexico, leonel@servidor.unam.mx

MB22 Transportation-Inventory Planning Models

Cluster: Supply Chain Management
Invited Session

Chair: Doug Thomas, Pennsylvania State University, Smeal Coll. of Bus. Admin., Bus. Logistics Dept., 509 BAB, University Park, PA 16802-3005, dthomas@psu.edu

1) Inventory Nuances for E-Commerce Companies, ***Kyle D. Cattani***, University of North Carolina, Kenan-Flagler Bus. Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490, ***Gilvan C. Souza***

We investigate inventory flexibility advantages in e-commerce. Under stochastic demand and replenishment time with lost sales, we conclude that it may be profitable to block shipments to less-profitable customers before inventory drops to 0 and to use more expensive transportation than the customer specified in order to postpone shipment.

2) withdrawn 10/12: Evaluating Logistics Postponement under Multivariate Normal Demand, ***Donald Warsing***, Pennsylvania State University, Dept. of Busl Logistics, Smeal Coll. of Bus. Admin., University Park, PA 16802, warsing@psu.edu, ***Ann Marucheck***

3) The Role of Market Intermediaries in Supply Chains, ***Paul M. Griffin***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, ***Pinar Keskinocak, Secil Savasaneril***

The Internet has opened new venues for companies to create flexible systems by offering high-speed communication and tight connectivity. E-marketplaces (or intermediaries) create value by aggregating buyers and sellers, creating liquidity and reducing transaction costs. We examine market conditions under which intermediaries will be successful.

4) Stochastic Inventory Planning with Lost Sales or Emergency Shipments, ***Doug Thomas***, Pennsylvania State University, Smeal Coll. of Bus. Admin., Bus. Logistics Dept., 509 BAB, University Park, PA 16802-3005, dthomas@psu.edu, ***Steve Hackman***

We examine ordering strategies for a distributor receiving a discount for committing to orders over a finite horizon. The distributor then places supplemental orders in reaction to stochastic demand. This problem is equivalent to stochastic production planning with lost sales. We present an effective heuristic for solving this problem and computationally investigate the behavior of the optimal ordering strategy.

MB23 Issues in Supply Chain Management

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: Yehuda Bassok, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089-1421, bassok@marshall.usc.edu

1) Retail Competition over Product Selection & Service, ***Gerard Cachon***, University of Pennsylvania, The Wharton Sch. of Mgmt., ***Gurhan Kok***

We consider a retail market with multiple competitors. Retailers choose their product selection and service levels. Customers choose retailers to maximize their utility. The behavior in this market is characterized.

2) Competing Online Auctions, ***Damian R. Beil***, MIT, OR Ctr., Cambridge, MA 02142, beil@mit.edu, ***Lawrence M. Wein***

We consider 2 auctioneers that conduct open-ascending auctions for commodity items on the Internet. We investigate the strategic issue of when it is beneficial for each auctioneer to share its customer list with its competitor.

3) Dynamic Pricing Strategies with Stochastic Demand, ***Julie L. Swann***, Northwestern University, Dept. of IE/MS, Evanston, IL 60062, j-swann@northwestern.edu, ***Lap Mui Chan, David Simchi-Levi***

We examine the problem of coordinating dynamic and fixed pricing strategies with production scheduling decisions in a manufacturing firm where demand is assumed to be a general stochastic function. We consider partial planning strategies, where one decision is made at the beginning of the horizon and a second decision delayed until the beginning of each period. We develop several heuristics...

4) Negotiation & Coordination, ***Mahesh Nagarajan***, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089, nmahesh@marshall.usc.edu, ***Yehuda Bassok***

We consider a single seller, who negotiates with N retailers on the wholesale and buy back prices. We assume that all players are risk averse and each aims to maximize his/her own utility.

MB24 Supply Chain Design Economics

Cluster: Manufacturing Systems & Supply Chain Integration
Invited Session

Chair: Burak Eksioglu, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainvesville, FL 32611, burak@ufl.edu

1) Concave Cost Multi-Commodity Network Flow Problems in Supply Chains, ***Sandra Duni Eksioglu***, University of Florida, Dept. of ISE, PO Box 116595, Gainesville, FL 32611-6596, duni@cao.ise.ufl.edu, ***Panos M. Pardalos, H. Edwin Romeijn***

We present modeling and solution techniques for the multi-commodity network flow problem with concave cost function. These types of problems have a wide range of applications in supply chains. Computational results for large-scale problems are promising.

2) General Motors Outbound Supply Chain Network Design, ***Erdem Eskigun***, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907, eskigun@ecn.purdue.edu, ***Reha Uzsoy, Jeffrey Tew, Paul V. Preckel***

Three different outbound supply chain networks are designed for General Motors. The first two design models are ILP while the third is NLIP. A Lagrangian relaxation heuristic is used to solve all 3 models. Computational experiments on the developed algorithm give very good solution quality in promising computational time.

3) Transfer Pricing in Spatial Networks: An Equilibrium Approach, ***Mehmet Bayram Yildirim***, University of Florida, ISE Dept., 303 Weil Hall, PO Box 116595, Gainesville, FL 23611-6595, ybayram@cao.ise.ufl.edu

Assuming that there is a dominant player who provides logistics services, we propose a transfer pricing method to control the flows over the supply chain network in the equilibrium.

4) Nonconvex Piecewise Linear Network Flow Problems in Supply Chains, ***Burak Eksioglu***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611, burak@ufl.edu, ***Panos M. Pardalos***

We present computational experience with large-scale piecewise linear nonconvex network flow problems in supply chains. Different exact equivalent MIP formulations and their limitations are also discussed.

MB25 Scheduling Theory & Applications

Cluster: Scheduling
Invited Session

Chair: Cole Smith, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, cole@sie.arizona.edu

1) Two-Machine Flowshop Distributed Scheduling using Coupling, ***V. Jorge Leon***, Texas A&M University, College Station, TX 77843, jleon@acs.tamu.edu

The 2-machine flowshop problem to minimize the sum of completion times is isolved for the case when no single decision maker has complete access to the

associated global model. An algorithm is proposed that considers the distribuiton of information among machines and subsets of jobs. The decomposition approach is similar to LR; however, in the proposed methodology, the coupling constraints don't need to be controlled by a single entity...

2) MIP Formulations for Flexible Flowline Scheduling, ***Mary E. Kurz***, University of Arizona, Tucson, AZ 85721-0020, maryk@sie.arizona.edu, ***Ronald G. Askin***

Two MIP formulations for a flexible flowline scheduling problem are presented and discussed. One formulation includes the machine to which each job is assigned as part of the decision variables and the other does not. Comparisons based on number of constraints and ease of implementation are discussed.

3) Workforce Scheduling Considering Learning & Forgetting Effects, ***Bryan A. Norman***, University of Pittsburgh, 1033 Benedum Hall, Dept. of IE, Pittsburgh, PA 15261, banorman@engrng.pitt.edu, ***David A. Nembhard***

We consider the problem of scheduling workers in settings where each worker performs multiple operations and it is necessary to explicitly consider learning and forgetting effects across operations. The objective is to minimize the number of workers needed to satisfy throughput requirements. We demonstrate our methodology on several test problems.

4) Job Sequencing & WIP Level Determination in a Cyclic CONWIP Flowshop with Blocking, ***Subhash C. Sarin***, Virginia Polytechnic Institute, 207 Durham Hall, Grado Dept. of ISE, Blacksburg, VA 24061, sarins@vt.edu, ***N. Palekar***

MB26 Selected Topics on Combat Models

Sponsor: MAS
Sponsored Session
Chair: James G. Taylor, Naval Postgraduate School, MOVES Academic Group, Monterey, CA 93943, jtaylor@nps.navy.mil

1) Stochastic Models of Air Combat, ***David A. Lee***, Technology Assessment Group, Logistics Mgmt. Inst., 2000 Corporate Ridge Rd., McLean, VA 22102-7805, dlee@lmi.org

Modeling air combat as sequences of few-vs.-few stochastic Lanchester engagements may be more realistic than many-vs.-many deterministic Lanchester models. We give some examples, including a model of engagements of bombers with fighter cover vs. air defense fighters.

2) Predicting Combat Effects: Selling the Book, ***Dean S. Hartley, III***, Hartley Consulting, 106 Windsong Ln, Oak Ridge, TN 37830, dshartley3@home.com

MAS is publishing a new book, "Predicting Combat Effects." We will describe the contents so that you will develop an irresistable desire to purchase the book. the contents so that you will develop an irresistable desire to purchase the book.

MB27 Distillations II

Sponsor: MAS
Sponsored Session
Chair: Sarah Johnson, The MITRE Corporation, 2750 Killarney Dr., Ste. 100, Woodbridge, VA 22192

1) Application of Distillation Modeling to the US Marine Corps Mission Area Analysis Process, ***Stephen Upton***, The MITRE Corporation, 2750 Killarney Dr., Ste. 100, Woodbridge, VA 22192

The Marine Corps organizes its internal capability analysis in terms of 5 pillars: doctrine, organization, training, equipment and supporting facilities. Current models adequately address the equipment pillar. New distillation models offer the opportunity to address the other 4 pillars. We present recent results of new distillation modeling.

2) Considering the Intangibles: Social Capital & Agent-Based Modeling, ***Russ Bergeman***, USMC, Studies & Analysis, MCCDC, 3300 Russell Rd., Quantico, VA 22134, bergemanrl@mccdc.usmc.mil

The complex and chaotic nature of war presents 3 phenomena that the military analyst must overcome in order to answer the "difficult" questions. Those phenomena are: intangibles, non-linearity and co-evolving landscapes. The "difficult" questions of military analysis may be simplified if a methodology of analysis that successfully considers these phenomena is discovered...

MB28 Methodological Advances in MCDS

Cluster: Multi-Criteria Decision Making
Invited Session
Chair: Margaret M. Wiecek, Clemson University, Dept. of Math Sci., Clemson, SC 29634, wmalgor@clemson.edu

1) withdrawn 10/9: Affordable Upgrades of Complex Systems: An Application of Multicriteria Methods, ***James P. Reneke***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, reneke@clemson.edu, ***Matthew J. Saltzman***, ***Margaret M. Wiecek***

2) Partitioning Optimal Solutions in Multiple Objective Linear Programming, ***Allen Holder***, Trinity University, Math Dept., 715 Stadium Dr., San Antonio, TX 78212, aholder@trinity.edu

The optimal partition plays a crucial role in analyzing linear programs. However, no such construct has been developed for the case of multiple objectives. We present analogous partitions for both Pareto and lexicographic linear optimization. Via examples from radiotherapy design, these new partitions are shown to be computable and useful.

3) Norm-Based Approximation in Multiple Objective Programming, ***Margaret M. Wiecek***, Clemson University, Dept. of Math Sci., Clemson, SC 29634, wmalgor@clemson.edu, ***Bernd Schandl***, ***Kathrin A. Klamroth***

A methodological framework for approximating the nondominated set of multiple objective programs is proposed. The methodology uses polyhedral gauges and yields a piecewise linear approximation of the set. By adapting to the problem's structure and scaling, the approximation is constructed objectively without interaction with the decision maker.

MB29 Panel: Challenges & Opportunities of QSR Methods - A Sponsor Agencies Perspective

Sponsor: QSR
Sponsored Session
Chair: Darek Ceglarek, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706-1572, darek@engr.wisc.edu

1) Panel: Challenges & Opportunities of Quality, Statistics & Reliability Methods - A Sponsor Agencies Perspective, ***Irem Tumer***, NASA Ames Research Center, Computational Sci. Division, ***Ronald L. Rardin***, National Science Foundation, OR & Production Systems, 4201 Wilson Blvd., Rm. 512-550, Arlington, VA 22230, rradin@nsf.gov, ***Steven LeClair***, US Air Force, MLMR, OH

No abstract supplied.

MB30 Portfolio Decision Analysis

Sponsor: Decision Analysis
Sponsored Session
Chair: Gregory S. Parnell, US Military Academy, Dept. of Systems Eng., West Point, NY 10996-1779, gparnell@usma.edu

1) The Asset Allocation Decision: Portfolio Optimization for Investors, ***Dane Odell***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, ***John B. Willis***

The US Government's Thrift Savings Plan is a retirement savings and investment program designed for government employees. Participants can invest in a choice of 5 funds, each with a historical risk/return profile. We address a method to optimally allocate money into the funds based on an individual's risk tolerance.

2) A Framework for Combining Multiple Objective Decision Analysis & Optimization, ***Brian Stokes***, US Military Academy, Dept. of Systems Eng., Mahan Hall, Thayer Rd., West Point, NY 10996, fb8654@usma.edu, ***Gregory S. Parnell***, ***Brad Foster***

In several recent DoD decision analysis applications, multiple objective decision analysis is used with optimization to develop the optimal resource allocation plan. We believe that fundamental modeling issues have not been adequately addressed. We develop a framework for alternative multiple objective value models.

3) Modeling the Cost Objective in a Decision Maker's Value Structure, ***Frank Snyder***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, frank-snyder@usma.edu

We examine 2 approaches for representing cost. First, minimizing cost is a fundamental objective in the value structure. Second, minimizing cost is treated separately. We plot value (utility) against cost for the decision maker. We analyze and compare these 2 cost modeling approaches. We conclude a survey

of the audience.

4) Air Force Portfolio Analysis Application: Selecting F-16 Engine Modifications, ***Stephen P. Chambal***, AFIT/ENS, Bldg. 640, 2950 P St., WPAFB, OH 45433-7765, stephen.chambal@afit.edu, ***Cihangir Yay***

We demonstrate a multi-attribute decision making process for the F-16 program office. An initial value hierarchy is developed for selecting engine modifications based on safety, cost and combat capability. Sample alternatives are ranked and evaluated based on cost. We select portfolios based on changing budget constraints.

MB31 Computational Dynamic Programming

Cluster: **Bellman Memorial Cluster on Dynamic Programming**
Invited Session

Chair: Art Lew, University of Hawaii at Manoa, Dept. of Info. & CS, 1680 East West Rd., Post 317, Honolulu, HI 96822, arelew@hawaii.edu

1) Multi-Level Programming in a Dynamic Environment, ***E. Stanley Lee***, Kansas State University, Dept. of IMSE, Manhattan, KS 66506, eslee@ksu.edu, ***Hsu-Shih Shih***, ***Yu-Ru Syau***

The use of the fuzzy set concept to oveer come the computational difficulties of multi-level optimization for large systems is extended to dynamic systems. The formulation is based on exploring the fuzziness which is almost always present in a decentralized large hierarchical organization, via dynamic programming. Modeling and computational advantages are demonstrated.

2) Determining Value Functions in a Remnant Inventory System, ***Warren E. Hearnes***, Lucent Technologies, 2000 NE Expressway, Norcross, GA 30071, whearnes@lucent.com

An industrial application of using an MIP with approximate dynamic programming to efficiently allocate resources in a remnant inventory system is reviewed. Due to the uncertain nature of the incoming inventory and future orders, several heuristics for detemining the inventory's value functions and clustering of orders are evaluated.

3) On the Contribution's of Dynamic Programming to Computer Science, ***Art Lew***, University of Hawaii at Manoa, Dept. of Info. & CS, 1680 East West Rd., Post 317, Honolulu, HI 96822, arelew@hawaii.edu

Bellman's dynamic programming methodology can be applied to a wide range of computer science optimization problems. Some of these applications are reviewed. We survey interrelationships of disparate computer science areas and how progress in these areas evolved from Bellman's work.

MB32 Financial Engineering with Jumps

Cluster: **Financial Engineering**
Invited Session

Chair: Paul Glasserman, Columbia University, Grad. Sch. of Business, 403 Uris Hall, New York, NY 10027, pg20@columbia.edu

1) A Unified Model for Credit Derivatives, ***Steven E. Shreve***, Carnegie Mellon University, Dept. of Math Sciences, Pittsburgh, PA 15213-3890, shreve@cmu.edu, ***Alain Belanger***, ***Dennis Wong***

A framework is provided for pricing derivatives on defaultable bonds and other credit-risky contingent claims. The framework includes structural models (those in which the time of default is determined by the value of the issuing firm), general reduced-form models (those in which default is exongenous) and reduced-form models in which default can occur only at specific times...

2) Hedging Derivatives with Jump-Diffusions, ***Patrick Jaillet***, University of Texas, MSIS Dept., CMC B6500, Austin, TX 78712, jaillet@athena.bus.utexas.edu

In contrast to the Black & Scholes model, jump-diffusion models induce incompleteness of the market. After providing some background on pricing under jump-diffusion models, we will concentrate on the "dual" problem of hedging such derivatives. We will analyze and compare several hedging strategies. Both analytical and numerical results will be presented.

3) A Numerical Solution of Jump-Diffusion Market Models, ***Paul Glasserman***, Columbia University, Grad. Sch. of Business, 403 Uris Hall, New York, NY 10027, pg20@columbia.edu, ***Nicolas Merener***

We develop numerical methods for pricing interest rate derivative in models of the LIBOR term structure with both jumps and diffusion. Some important classes of instruments can be priced through numerical transform inversion. Others require simulation, for which we develop and analyze accurate discretization schemes.

MB33 Operations Research in Medicine

Sponsor: **Health Applications**
Sponsored Session

Chair: Lawrence M. Wein, MIT, Sloan Sch. of Mgmt., 30 Wadsworth St., Rm. E53-343, Cambridge, MA 02142-1347, lwein@mit.edu

1) Under Conditions of Uncertainty when to Pay for Information: Keeping Patients Healthy & Costs Down, ***Julie E. Simmons Ivy***, University of Michigan, Business Sch., 701 Tappan St., Ann Arbor, MI 48109-1234, jsimmons@umich.edu

We use a partially observable Markov decision process to characterize cost effective maintenance policies for breast cancer detection and treatment. We use our model to determine when to have mammogram and given the information provided by the mammogram, the course of action to be taken.

2) Computational Optimization Techniques for Treatment Planning of Prostate Permanent Implants, ***Eva K. Lee***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, eva.lee@isye.gatech.edu

Integer programming models for designing radionuclide implants for treatment of prostate cancer are described. Multi-period dose-volume constraints are discussed. Empirical results using real patient cases will be analyzed.

3) Towards the Optimal Initiation of Dyalysis Therapy, ***Stefanos Zenios***, Stanford University, Grad. Sch. of Business, Stanford, CA 94305,stefzen@leland.stanford.edu,stefzen@exch-gsb.stanford.edu, ***Tao Yao***

Clinical evidence suggest that incremental dialysis protocols in which the dialysis dose is adjusted according to disease severity are far superior than current practices. We derive an optimal incremental dialysis protocol by formulating and solving an optimal control problem for a system governed by a bilinear first-order partial differential equation.

4) Optimal Rescheduling of Radiotherapy & Angiogenic Inhibitors: A Mathematical Approach to the Antiangiogenic Hypothesis, ***Ayla Ergun***, MIT, OR Ctr., Cambridge, MA 02142, ***Kevin Camphausen***, ***Lawrence M. Wein***

We incorporate a previously validated mathematical model of a vascularized tumor into an optimal control problem to determine the temporal scheduling of radiotherapy and angiogenic inhibitors that maximizes the control of a primary tumor, subject to toxicity and drug availability constraints. We present analytical and computational results.

MB34 Network Equilibrium Models II

Sponsor: **TSS**
Sponsored Session

Chair: Anna Nagurney, University of Massachusetts, Isenberg Sch. of Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu

1) Investigating Learning Processes in Commuter Behavior under Real-Time Information, ***Karthik Srinivasan***, Vanderbilt University, Dept. of Civil & Environ. Eng., 206B Jacobs Hall, Nashville, TN 37235, karthik.k.srinivasan@vanderbilt.edu, ***Hani S. Mahmassani***

We provide evidence of learning processes in commuter's route and departure time choice behavior under real-time information. The evidence is obtained using longitudinal discrete choice models from behavioral data observed in interactive simulator based experiments. Specifically, evidence of discriminative and trial and error learning are reported.

2) A Space-Time Network for Telecommuting vs. Commuting Decision-Making, ***Anna Nagurney***, University of Massachusetts, Isenberg Sch. of Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu, ***June Dong***, ***Patricia L. Mokhtarian***

We develop a theoretical framework for the study of telecommuting vs. commuting decision-making over a fixed time horizon. We consider multicriteria decision makers and propose a network equilibrium model over a space-time network. An algorithm is given and applied to numerical examples.

3) A Model of the Pedestrian Network Equilibrium Problem with Bi-Directional Effect, ***Ding Zhang***, SUNY, Sch. of Business, Oswego, NY 13126, zhang@oswego.edu, ***William H. K. Lam***

We present the first equilibrium model for pedestrian network assignment problems. The model incorporates explicitly the effects of bi-directional flow on increases in walking time and reduction of effective capacity by pedestrian facility. We explore qualitative properties of the model such as existence and uniqueness and provide a numerical example.

4) A Bilevel Nonlinear Programming Formulation to Estimate

Dynamic Origin-Destination Flows from Traffic Counts, ***Hossein Tavana***, Continental Airlines, Ste. 918D, Houston, TX 77002, htavan@coair.com, ***Hani S. Mahmassani***

In generalized least-square estimation of OD flows, the nonlinearity in OD flows and traffic counts is commonly ignored. Moreover, the key parameter, the link-flow proportion matrix, is not constant and itself is a function of the unknown flows. A bilevel nonlinear programming formulation is proposed to address these issues.

MB35 Time-Critical Vehicle Routing

Sponsor: TSS
Sponsored Session
Chair: Elise Miller-Hooks, United Technologies Research Center, 411 Silver Lane, East Hartford, CT 06118, millered@utc.utrc.com

1) Dynamic Coordination for a Deadline Vehicle Routing Problem with Uncertainty, ***Alan L. Erera***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, alan.erera@isye.gatech.edu, ***Carlos F. Daganzo***

A deadline VRP arises when a fleet must complete a set of tasks by a time deadline. We consider a deadline problem in which customer service times are uncertain when planning and analyze operating strategies that utilize dynamic coordination with approximation methods.

2) A Priori Route Construction for the Stochastic Shortest Route Problem with Delivery Deadlines, ***Barrett Thomas***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-1227, barrettt@umich.edu, ***Chelsea C. White, III***

We consider the problem of constructing an a priori route when only a subset of a known set of customers is present on any given day and each customer has a delivery deadline associated with it. We introduce a model for this problem, discuss solution techniques and present computational experience.

3) The A Priori Probabilistic Covering Tour Problem, ***Hao Tang***, Pennsylvania State University, Dept. of Civil & Environ. Eng., University Park, PA 16802, hxt141@psu.edu, ***Elise Miller-Hooks***

The PCTP seeks an a priori tour with minimum expected length. The presence of any given customer is known a priori with uncertainty. Customers are skipped if they are not present and for some customers, it is sufficient to directly visit any one of a subset of customers. Exact and heuristic procedures are proposed.

MB36 Air Traffic Control

Sponsor: Aviation Applications
Sponsored Session
Chair: Norman T. Fujisaki, Federal Aviation Administration, 800 Independence Ave SW, Washington, DC 20591, norman.fujisaki@faa.gov

1) Charting the Course for Tomorrow's ATC System, ***Michael Harrison***, Federal Aviation Administration, Architecture & Systems Eng., 800 Independence Ave. SW, Washington, DC 20591, michael.harrison@faa.gov

Near and long term plans for the US air traffic control system are compared to current and projected demand, growth, and capacity constraints. Policies, marketplace forces, technology risks, user acceptance, operational issues, and other factors that will shape the future system will be discussed.

2) Optimizing the Mix of Legacy & New Navigation Services, ***Nastaran S. Coleman***, Federal Aviation Administration, Operations & Research Analysis, 800 Independence Ave. SW, Washington, DC 20591, nastaran.coleman@faa.gov

Given a set of objectives, such as user travel cost, cost of decommissioning and cancellation cost, a large scaled linear programming network model is introduced to optimize the number of legacy very high frequency omnidirectional ranges needed to support aircraft unequipped with satellite-based systems.

3) Measuring Free Flight Improvements, ***David A. Knorr***, Federal Aviation Administration, Free Flight Performance Metric, 1500 K St. NW, AOZ-40, Washington, DC 20005, dave.knorr@faa.gov

The FAA's Free Flight Phase 1 initiative has deployed a collection of promising technologies to increase air traffic control capacity and efficiency. The agency's first major attempt to rigorously capture and quantitatively evaluate the effectiveness of newly deployed systems will be reviewed.

4) Getting a Grip on the Cost of ATC Services, ***Penny L. Mefford***, Federal Aviation Administration, Air Traffic Services ATS-8, 800 Independence Ave. SW, Washington, DC 20591, penny.mefford@faa.gov

The FAA has developed a business-style cost accounting system to manage the delivery of ATC services. Results of economic analyses of enroute services using new mathematical models, appropriate metrics, and benchmarks will be presented. Work to benchmark enroute ATC services between the U.S. and Europe is described also.

5) Defining the System Capacity/Delay Problem, ***Michael O. Ball***, University of Maryland, Decision & IT, Smith Sch. of Business, College Park, MD 20742-1815, mball@rhsmith.umd.edu

In March 2001, the Center of Excellence for Aviation Operations Research invited leaders from the U.S. aviation community to participate in a workshop on Airline and National Strategies for Dealing with Airport and Airspace Congestion. Conclusions from workshop discussions and implications for future work will be presented.

MB37 Applications of Revenue Management I

Sponsor: Revenue Management & Pricing
Sponsored Session
Chair: Ying Kang, PROS Revenue Management, Inc., 3223 Smith St., Ste. 100, Houston, TX 77006, ykang@prosm.com

1) Golf Revenue Management: A Simulation of Tee Time Intervals, ***Sherri Kimes***, Cornell University, Statler Hall, Ithaca, NY 14853, sek6@cornell.edu, ***Lee R. Schruben***

Golf courses possess the conditions necessary for the application of revenue management. Managers have 2 tools, duration control and variable pricing, which they can use to implement revenue management. We used simulation to study the revenue impact of varying the tee time interval at the Cornell University golf course.

2) Models for Revenue Management in the Media Industry, ***Ioana Popescu***, INSEAD, Tech. Mgmt. Dept., Blvd. de Constance, Fontainebleau Cedex, 77305, France, ioana.popescu@insead.fr

We investigate models for allocation of advertising breaks to targeted audition demand in the media industry. We propose a static allocation model under various efficiency objectives and scheduling constraints. We further look at a dynamic pricing model where customer demand is satisfied stochastically over time. We combine principles from revenue management and resource allocation to develop a bid-pricing approach.

3) Combining Revenue Management with Risk Management: A Perfect Match for the Energy Industry, ***Ying Kang***, PROS Revenue Management, Inc., 3223 Smith St., Ste. 100, Houston, TX 77006, ykang@prosm.com

We propose a framework to tackle the unique challenges faced by today's energy industry, i.e., to maximize revenue or portfolio return while considering the risk limits and physical constraints at the same time. An energy trading floor example is presented.

MB38 Line & Terminal Capacity Assessment Methodology & Tools

Sponsor: RASIG
Sponsored Session
Chair: Dave Wheeler, Union Pacific Railroad, 1416 Dodge St., Rm. 406, Omaha, NE 68179, drwheele@up.com

1) Line & Terminal Capacity Assessment Methodology & Tools, ***Dave Wheeler***, Union Pacific Railroad, 1416 Dodge St., Rm. 406, Omaha, NE 68179, drwheele@up.com

This session will include presentations & discussions on methodology and tools used to quantify the capacity of line-of-road and terminals including service impacts with volume increases and quantifying the value of new capacity projects. The primary focus is on practical applications and examples.

MB39 Software Demonstration II

Chair: To be announced

1) Software Demonstration: Methods for Embedding CPLEX Algorithms, ***Irv Lustig***, ILOG, 25 Sylvan Way, Short Hills, NJ 07078-1379, ilustig@ilog.com

Learn which approach for embedding CPLEX algorithms is best suited for your specific software development needs: ILOG CPLEX Callable Library, ILOG Concert Technology (C++), ILOG OPL Studio and ILOG Concert Technology (Java), the new Java interface for CPLEX. We provide a comparative overview of each method with benefits, tradeoffs, examples and recommendations.

MB40 OR/MS in Forestry II

Cluster: Forestry
Sponsor: ENRE
Sponsored Session
Chair: Denis J. Dean, Colorado State University, Geomatics Program, Dept. of Forest Services, Ft. Collins, CO 80523, denis@cnr.colostate.edu

1) An Investigation of Nonlinear Techniques for Making a Large-Scale Trend Surface in Simple Kriging with Varying Local Means, ***Susan L. King***, USDA Forest Service, Northeastern Research Station, Newtown Square, PA 19073, sking01@fs.fed.us, ***Andrew J. Lister, Michael L. Hoppus***

Simple kriging with varying local means is a geostatistical procedure for making high quality, spatially resolute maps that easily incorporates ancillary data. We investigate nonlinear techniques such as neural networks to model the large-scale trend of cubic foot volume in Connecticut. The residuals are modeled using simple kriging and the 2 surfaces combined to produce the final map

2) Neural Networks as an Alternative to Statistical Modeling in the Semivariogram Analysis Portion of Kriging Procedures, ***Elaine M. Giroux***, Colorado State University, Geomatics Program, Dept. of Forest Sciences, Ft. Collins, CO 80523, ***Denis J. Dean***

A hybrid spatial interpolation procedure based on an extension of kriging will be discussed. This hybrid procedure replaces the statistical model used in the semivariogram analysis portion of traditional kriging with an artificial neural network. Comparative performance of the traditional and modified procedures will be described.

3) Using Geographic Information Systems & Genetic Programming to Identify Regions Prone to Landslides, ***Sam Litschert***, Colorado State University, Geomatics Program, Dept. of Forest Sciences, Ft. Collins, CO 80523, ***Denis J. Dean***

Expert opinion has been the primary means of developing maps showing areas prone to landslides. We attempt to recreate expertly-created landslide hazard maps using genetic programming. It is hypothesized that experts use complex decision trees composed of simple rules to assess landslide hazard. If these rules can be identified, GP can recreate the decision trees.

4) The White River National Forest Plan Revision: Connecting with Stakeholders Midway through the Process, ***Brian Kent***, USDA Forest Service, Rocky Mt. Research Station, 2150 Centre Ave., Bldg. A, Ft. Collins, CO 80526, bkent@fs.fed.us, ***Pamela Kaval, Joyce Berry***

The White River National Forest, home to international destination ski areas in Vail and Aspen Colorado, issued a draft revised forest plan in October 1999. This proposal generated substantial controversy because of insufficient stakeholder involvement in plan development. We describe steps taken to engage stakeholders in developing the final plan.

MB43 Education III: Spreadsheet Interest Research Group

Sponsor: INFORMED
Sponsored Session
Chair: Thomas A. Grossman, University of Calgary, Fac. of Mgmt., Calgary, Alberta, T2N 1N4, Canada, grossman@ucalgary.ca

1) Spreadsheet Research is Important to Management Science & the Practice of Management, ***Thomas A. Grossman***, University of Calgary, Fac. of Mgmt., Calgary, Alberta, T2N 1N4, Canada, grossman@ucalgary.ca

Spreadsheets are a leading vehicle for business and financial analysis and a growing platform for application of OR/MS by traditional practitioners and non-traditional end-user modelers. Research opportunities that can affect practice include spreadsheet lifecycles, error-reduction, spreadsheet engineering, model management, profiles of spreadsheet programmers and consumers and end-user modeling.

2) The Subversive Spreadsheet, ***David Chadwick***, University of Greenwich, Sch. of Computing & Maths, Park Row, London, SE10 9LS, England UK, cd02@gre.ac.uk

There is growing evidence that a spreadsheet may frequently subvert the controls in all other parts of an information system, resulting in integrity problems of enormous significance. We look at some common spreadsheet errors and give an overview of audit and development methods that may be useful. We conclude with a brief discussion of the European Spreadsheet Risks Interest Group.

3) Spreadsheet Modeling Practice: Researching End-User Computing, ***Stephen G. Powell***, Dartmouth College, Tuck Sch., Hanover, NH 03755, sgp@dartmouth.edu

In order to effectively teach spreadsheet modeling, we should know what end-users actually do in practice, how their practice falls short of the ideal and how to teach best practices so that they are adopted. We will discuss what is known in these areas and what remains to be discovered.

4) Launch of the Spreadsheet Research Interest Group, ***Thomas A. Grossman***, University of Calgary, Fac. of Mgmt., Calgary, Alberta, T2N 1N4, Canada, grossman@ucalgary.ca, ***Stephen G. Powell***

We propose an information spreadsheet research interest group to stimulate and disseminate research, teaching and discussion on any aspect of spreadsheets, with emphasis on their use in OR and MS. Our inspiration is the European Spreadsheet Risks Research Group (EuSpRIG) (http://www.gre.ac.uk/~cd02/EUSPRIG/), represented at this session by David Chadwick.

MB45 Production & Scheduling VI

Contributed Session
Chair: Wafik H. Iskander, West Virginia University, IMSE Dept., PO Box 6070, Morgantown, WV 26506-6070, whiskander@mail.wvu.edu

1) Assessing Uncertainty in an Intelligent Forecasting System, ***Yan Deng***, West Virginia University, Dept. of IMSE, PO Box 6070, Morgantown, WV 26505-6070, ydeng@ds5500.cemr.wvu.edu, ***Majid Jaraiedi, Wafik H. Iskander***

The uncertainty of forecasts is a major concern for any forecasting procedure that has received little mention in neural and fuzzy forecasting methods. We discuss the uncertainty issue in the development of a forecasting system using AI and in generating cumulative forecasts and building prediction intervals with confidence limits.

2) Estimation of the Bayesian Probability Forecast of a Turning Point in an Economy, ***Mehdi Mostaghimi***, Southern Connecticut State University, PO Box 569, Madison, CT 06443, mostaghimi@southernct.edu

An information-theoretic based methodology for estimating Bayesian probability forecast of a turning point in an economy will be presented. Its application to the present state of the U.S. economy will be investigated with an interest in predicting a recession.

3) Optimal Designs of Serial Assembly Lines under Labor Turnover, ***Adrian F. Montano***, Arizona State University, 1711 South Rural Rd., Bldg. GWC, Rm. 502, Tempe, AZ 85287-5906, adrian.montano@asu.edu, ***Jesus R. Villalobos***

Labor turnover has detrimental effects on the throughput of serial assembly lines. An analytical approach is taken to determine optimal designs for assembly lines under different levels of turnover and operator replacement policies. The designs under study are traditional balanced line, bucket brigades and work sharing.

4) Minimizing the Impact of Labor Turnover, ***Luis R. Mar***, Arizona State University, 1711 South Rural Rd., Bldg. GWC, Rm. 502, Tempe, AZ 85287, luis.mar@asu.edu, ***Jesus R. Villalobos***

Labor turnover has significant negative effects on the throughput of serial assembly lines. We focus on exploring engineering solutions to this problem. We propose to use dynamic work allocation methods, such as bucket brigades, in combination with active replacement policies to reduce the effects of labor turnover.

MB46 Marketing Decision Analysis

Sponsor: Decision Analysis
Sponsored Session
Chair: Robert F. Bordley, General Motors, Renaissance Center, MC 482-D20-B24, PO Box 100, Detroit, MI 48265-1000, robert.bordley@gm.com

1) Bayesian Updating of Customer Expectations, ***Roland Rust***, University of Maryland

Some common beliefs about customer-perceived quality are wrong, once customer expectations are viewed as distributions, rather than simple point expectations. This may help explain why current measures of customer satisfaction only partially predict future behavior. We experimentally confirm most of the predictions of this model.

2) Integrating Gap Analysis & Utility Theory in Service Research, ***Robert F. Bordley***, General Motors, Renaissance Center, MC 482-D20-B24, PO Box 100, Detroit, MI 48265-1000, robert.

bordley@gm.com

The value of a service is generally a function of the gap between how that product performs and customer expectations about how it should perform. As we show, the target-based approach to utility allows us to easily model this behavior. We show that while information and past experience generally increases the desirability of a product expected to perform above expectations...

3) Incorporating Endogenous Demand into the Newsvendor Problem, ***David Bell***, Harvard Business School

In the classic newsvendor problem, lost sales have only a financial impact perhaps including some effect on goodwill. A reputation for lost sales lowers future demand. Surprisingly, the optimal inventory solution is still of the classic style. We extend the analysis to optimal inventories for multiple products.

4) Applying Principles of Decision Quality & Brand Management in Marketing Niche Vehicles, ***Jennifer L. Meyer***, Strategic Decisions Group, 2440 Sand Hill Rd., Menlo Park, CA 94025, jmeyer@sdg.net, jmeyer@sdg.com, ***Nazir Ahmad***

A stylized case study will demonstrate how a company proceeded with its problematic marketing of several niche brand vehicles in an industrialized market. Dialogues with management dealt with thorny analytical questions and with navigating through complex organizational and cultural issues about a company, its people and their identity in the marketplace.

Monday 13:15-14:15

MK47 Keynote: The Traveling Salesman Problem

Keynote Session

Chair: Robert J. Vanderbei, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, rvdb@princeton.edu

1) Keynote: The Traveling Salesman Problem, ***William J. Cook***, Princeton University, bico@math.princeton.edu

The TSP is one of the most widely studied and most often cited problems in OR. Over the past 50 years, the study of the TSP has led the way to improved solution methods in both discrete optimization and integer programming in general. I will present some highlights from the TSP literature, focusing on results that have had an impact on other areas of optimization. I will then discuss areas of current TSP research, including joint work with D. Applegate, R. Bixby & V. Chvatal on the solution of a 15,112-city instance.

MK48 Keynote: The Value Proposition of Outsourcing - Fact or Fiction?

Keynote Session

Chair: S. Selcuk Erenguc, University of Florida, Dept. of DIS, Gainesville, FL 32611-7169, erenguc@dale.cba.ufl.edu

1) Keynote: IT Outsourcing - The 20th Century Myth, ***George G. Surdu***, Ford Motor Company, gsurdu@ford.com

George Surdu is the Director of e-Infrastructure and Network Services for Ford Motor Company. His organization is responsible for managing the global infrastructure technology needs for the second largest industrial company in the world, which includes data centers, local and wide area voice and data networks, video conferencing, desktop computing and all forms of pervasive computing devices and infrastructure research and development. George will provide an overview of his organization and the intellectual capital challenges that he is facing today. He will discuss the "outsourcing myth" that has emerged throughout the 1990s and the impact that this strategy has had on IT, the business and the bottom line. He will also discuss their millennium strategy and specific actions that they are taking to address what he refers to as a "historically flawed approach."

Monday 14:30-16:00

MC01 Aplications of Machine Learning Techniques

Sponsor: Artificial Intelligence

Sponsored Session

Chair: Haldun S. Aytug, University of North Carolina, BISOM Dept., Belk Coll. of Bus, 9201 University City Blvd., Charlotte, NC 28223, haytug@email.uncc.edu

1) Identifying Predictor Variables by Feature Wrappers in Classifying Criminal Recidivism, ***Ping Wang***, James Madison University, CIS/OM Program, MS C0202, Harrisonburg, VA 22807, wangpx@jmu.edu, http://cob.jmu.edu/wangpx, ***Momiao Xiong***, ***Susan W. Palocsay***

To improve criminal recidivism predictions, we propose a general framework to incorporate predictor variable selection into pattern recognition for classifying criminal recidivism. We develop a feature wrapper to search for an effective set of predictor variables. We test results on a well-known recidivism data set.

2) Data Farming vs. Data Mining, ***Andrew Kusiak***, University of Iowa, Dept. of IE, 4132 Seamans Ctr., Iowa City, IA 52242-1527, andrew-kusiak@uiowa.edu

The quality of knowledge extracted from a data set can be enhanced with data farming methods. The data farming methods vary from simple data transformation schemes to data cultivation approaches and evolutionary transformation of knowledge. A typology of data farming methods is presented and the methods are illustrated with examples.

3) Rapid Modeling & Learning of Priority Dispatching Rules, ***Christopher D. Geiger***, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907-1287, geigercd@ecn.purdue.edu, ***Haldun S. Aytug***, ***Reha Uzsoy***

Priority dispatching rules have been studied for decades in production scheduling. Their popularity is derived from their ability to rapidly generate reasonably good solutions in practical settings. We propose an autonomous learning approach that is capable of discovering effective dispatching rules for a given production environment.

4) Classifying Scheduling Problems for Shifting Bottleneck Algorithms, ***Haldun S. Aytug***, University of North Carolina, BISOM Dept., Belk Coll. of Bus, 9201 University City Blvd., Charlotte, NC 28223, haytug@email.uncc.edu, ***Vincent Osisek***

Shifting bottleneck algorithms are very successful in solving static scheduling problems. Recent results show that different versions of the algorithm perform better on different problem instances. We investigate problem specific attributes that can be used to classify a given scheduling problem as an instance of a shifting bottleneck heuristic.

MC02 E-Business

Contributed Session

Chair: Chen-Ho Chao, University of Missouri, 31 University Heights, Columbia, MO 65203, cc180@mizzou.edu

1) Resource-Advantage Theory & E-Business, ***Chen-Ho Chao***, University of Missouri, 31 University Heights, Columbia, MO 65203, cc180@mizzou.edu, ***Youlong Zhuang***

All business will be e-business. Resource-advantage theory, based on a multi-discipline of economics, management, marketing and sociology, studies how relative resource costs and resource-produced value affect firms' strategies. This research applies resource-advantage theory to e-business context and observes how e-business resources help firms establish marketplace positions, and thereby, financial performance.

2) A Components-Based Approach to Designing Customer Relations Management Systems, ***Parviz Ghandforoush***, Virginia Polytechnic Institute, 7054 Haycock Rd., Falls Church, VA 22043, pghandfo@vt.edu, ***Tarun Sen***, ***Ramachandran Ramaswamy***

CRM is a business process geared towards increasing market share, thus optimizing profitability of business organizations while ensuring customer satisfaction. Currently, there are no accepted models or frameworks for designing CRM systems. We propose a framework for designing CRM systems using a components-based approach. We discuss an application using this approach and identify its benefits.

3) E-Supply Chain in the Auto Industry: Cost Implications of Physical & Digital Proximity, ***Francisco M. Veloso***, MIT, CTPID-MSL, 77 Mass Ave., Rm. E40-212, Cambridge, MA 02139, fveloso@mit.edu, ***Richard Roth***

We discuss how the exchange of information and goods affects cost in the automotive supply chain, comparing a traditional supply configuration to an e-supply chain. Using system cost modeling, a new technique to assess cost of complex supply chains, the relative importance of physical and digital proximity is analyzed.

4) Dual Sourcing: Strategic Partners vs. Spot Markets, ***Jinxin Yi***, Carnegie Mellon University, 29 Posner Hall, 5000 Forbes Ave., Pittsburgh, PA 15213, jyi@andrew.cmu.edu, ***Alan Scheller-Wolf***

The Internet has created new choices for purchasers: between e-markets and strategic partners. Spot markets may offer attractive deals but with greater price and quality variability, while partners offer known (contracted) quality and price. We model these situations, answering questions such as how much business to conduct with each supplier.

MC03 Boolean Functions & Learning

Cluster: Data Mining
Invited Session

Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) Combinatorial Dimensions in Learning Theory, ***Martin Anthony***, London School of Economics, Dept. of Mathematics, London, WC2A 2AE, England, UK, anthony@vax.lse.ac.uk

In computational or statistical learning theory, a number of ways have been used to characterize the complexity of a class of functions by associating a "dimension" to the class. These dimensions quantify the complexity of learning the function class in various models of machine learning. The Vapnik-Chervonenkis dimension is the most well-known. I will survey some of the "dimensions" commonly used, explaining their relevance to machine learning.

2) Separation-Based Models for Feature Subset Selection, ***Endre Boros***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, boros@rutcor.rutgers.edu, ***Takashi Horiyama***, ***Toshihide Ibaraki***, ***Kazuhisa Makino***, ***Mutsunori Yagiura***

Finding essential attributes in data sets is a frequently arising task in knowledge discovery, data mining, learning theory, logical analysis of data, etc. We propose optimization models based on various measures of separation, devise approximation algorithms, and report on comparative computational results on randomly generated and real world data sets.

3) On Functional Dependencies in q-Horn Theories, ***Alex Kogan***, Rutgers University, Acctg., Fac. of Mgmt., RUTCOR, kogan@rutcor.rutgers.edu, ***Toshihide Ibaraki***, ***Kazuhisa Makino***

We study functional dependencies in q-Horn theories and discuss their use in knowledge condensation. We introduce compact model-based representations of q-Horn theories and show that every minimal functional dependency in a q-Horn theory can be expressed either by a single term or by a single clause, and the set of all minimal functional dependencies is quasi-acyclic.

4) The Logical Analysis of Data in the Insolvency of Firms, ***Vittorio Moriggia***, University of Bergamo, Dept. of Math, Piazza Rosate 2, Bergamo, I-24129, Italy, vittorio.moriggia@tin.it

In the variety of data analysis techniques suggested by statistics, OR and AI, the logical analysis of data is applied in the financial classification problem of insolvency. Following the general principles of the logical analysis of data, we study its capability to classify the creditworthiness of an Italian firm's sample.

MC04 Winner Determination in Combinatorial Auctions

Cluster: Auctions
Invited Session

Chair: Rudolf Muller, University of Maastricht, Dept. of Quantitative Econ., PO Box 616, Maastricht, 6200 MD, The Netherlands, r.muller@ke.unimass.nl

Co-Chair: Andreas S. Schulz, Mit, Sloan Sch. of Mgmt., OR Ctr., 30 Wadsworth St., Bldg. E53361, Cambridge, MA 02142-1320, schulz@mit.edu

1) Winner-Determination in Multi-Unit Combinatorial Auctions: Branch & Bound Heuristics, ***Rica Gonen***, Hebrew University of Jerusalem, Jerusalem, 91904, Israel, ***Daniel Lehmann***

We investigate B&B techniques to find the optimal allocation in multi-unit combinatorial auctions and present both theoretical results and empirical data. Different methods for efficiently bounding from above the value of the best allocation are considered. Theoretical results characterize the best approximation ratio and the ordering criterion that provides it.

2) Branch & Price for Winner Determination in Multi-Unit Iterative Combinatorial Auctions, ***Marta Eso***, IBM TJ Watson Research Center, PO Box 704, Yorktown Heights, NY 10598, martaeso@us.ibm.com, ***Jayant Kalagnanam***, ***Laszlo Ladanyi***

We study B&P as the solution technique for the winner determination problem in multi-unit combinatorial auctions (and exchanges) where a bidder's bundles are implicitly defined. Our implementation uses BCP, a generic branch-and-cut-and-price framework for MIP (http://www.coin-or.org). We illustrate the use of these techniques in a simulated bandwidth marketplace.

3) Using Primal-Dual Heuristics in a Branch & Bound Approach, ***Rudolf Muller***, University of Maastricht, Dept. of Quantitative Econ., PO Box 616, Maastricht, 6200 MD, The Netherlands, r.muller@ke.unimass.nl

We illustrate how straight forward primal-dual algorithms can be used in a B&B approach. The primal-dual algorithms can be viewed as virtual auctions. The B&B tree is organized such that nodes in the tree correspond one-to-one to inclusion-maximal feasible solutions. Computational results are reported.

MC05 Scheduling

Contributed Session

Chair: Ceyda Oguz, Hong Kong Polytechnic University, Dept. of Mgmt., Hung Hom, Kowloon, Hong Kong SAR, msceyda@polyu.edu.hk

1) Designing an Assembly Process with Stochastic Material Arrivals, ***Sitong Tan***, Chinese University of Hong Kong, Shatin NT, Hong Kong, China, sttan@se.cuhk.edu.hk, ***Houmin Yan***

We study the problem of designing an assembly sequence when the arrival of components is stochastic. Our purpose is to find an assembly sequence such that the probability of finishing the end product on time is maximized. We provide efficient heuristic algorithms and a B&B algorithm.

2) A Genetic Algorithm for Multiprocessor Task Scheduling, ***Ceyda Oguz***, Hong Kong Polytechnic University, Dept. of Mgmt., Hung Hom, Kowloon, Hong Kong SAR, msceyda@polyu.edu.hk, ***Bernard Cheung***

We present a GA for multi-processor task scheduling problem. We utilize some well-known crossover operators and also develop 2 new crossover operators considering the characteristics of this scheduling problem. Our experimental results show that the new crossover operators perform better than the existing ones.

3) A New Branch & Bound for a Parallel Machine Scheduling Problem with Setups, ***Ghaith Rabadi***, University of Central Florida, 1617 Cricket Club Cir. #303, Orlando, FL 32828, grabadi@mail.ucf.edu, ie.engr.ucf.edu/ver40/faculty/rabadi/rabadi.htm, ***Ameer Salem***, ***Georgios C. Anagnostopoulos***

MC06 Telecommunications Keynote: Distinguished Applications of Telecommunications Planning

Sponsor: Telecommunications
Sponsored Session

Chair: Robert B. Cooper, Florida Atlantic University, Dept. of CSE, 777 West Glades Rd., Boca Raton, FL 33431, bob@cse.fau.edu

1) Optimal Design of an Internet-Offload Network, ***John F. Shortle***, George Mason University, Dept. of Systems Eng. & OR, 4400 University Dr., MS 4A6, Fairfax, VA 22030-4444, jshortle@gmu.edu, http://mason.gmu.edu/~jshortle/, ***Paul Katz***, ***Dennis C. Dietz***, ***Craig Williamson***, ***Jim Koehler***, ***Amie Elcan***

One way to relieve congestion on the voice network is to transfer Internet calls to a separate data network. We developed an integer programming model and interactive Excel tool that optimizes the locations and capacities of offload equipment, saving Qwest an estimated $1.5 million.

2) DOCAF: A Commercial Tool for Solving Frequency Allocation & other Problems in Cellular Phone Networks, ***Jean-Marie Bourjolly***, Concordia University/CRT, 1455 Maisonneure Blvd. West, Montreal, Quebec, H3G 1M8, Canada, brjolly@vax2.concordia.ca, ***Leslie Dejoie***, ***Ke Ding***, ***Oumar Dioume***, ***Michel Lominy***

We present DOCAF, a commercial package built through a university-industry research project that enables operators to manage their cellular networks more effectively through solving problems such as frequency planning (in AMPS, D-AMPS and GSM), BSIC allocation and others. We also make a case for integrating products such as DOCAF with tools for cell dimensioning and RF planning in a GIS environment...

MC07 Optimization in Molecular Biology II

Sponsor: Computing
Sponsored Session

Chair: Harvey Greenberg, University of Colorado, Mathematics Dept., CB 170, PO Box 173364, Denver, CO 80217-3364, hgreenbe@carbon.cudenver.edu

Co-Chair: David L. Woodruff, University of California, Grad. Sch. of Mgmt., Davis, CA 95616, dlwoodruff@ucdavis.edu

1) withdrawn 10/9: Tabu & Scatter Search Combined for DNA Sequencing, ***Jacek A. Blazewicz***, Poznan University of Technology, Inst. of Computing Sci., ul. Piotrowo 3a, Poznan, 60-965, Poland, blazewic@put.poznan.pl, ***Fred W. Glover***, ***Marta Kasprzak***

2) A Heuristic Search Procedure for Gene Selection in Whole Genome Functional Analysis, ***Momiao Xiong***, University of Texas, Health Science Ctr., Genetics Ctr., PO Box 20334, Houston, TX 77225, mxiong@sph.uth.tmc.edu

A search procedure is developed to identify disease-associated genes and to recognize biomarkers of drug action using whole genome gene expression profiles obtained from DNA chips. The problem is modeled as a combinatorial optimization problem and tabu search is used to guide the search in the procedure.

3) Statistical Analysis of Microarray Data, ***David L. Woodruff***, University of California, Grad. Sch. of Mgmt., Davis, CA 95616, dlwoodruff@ucdavis.edu, ***David M. Rocke***

Microarray technology provides measurements concerning expression levels of genes. The fact there are typically thousands of measurements for only a few dozen individuals as well as the lack of meaningful scales creates a need for special attention to the optimization problems implied by many multivariate estimators.

MC08 DO-09

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Oktay Gunluk, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, gunluk@us.ibm.com

1) Basis Reduction for Structured Hard Integer Programs, ***Gabor Pataki***, University of North Carolina, Dept. of OR, Smith Bldg., CB 3180, Chapel Hill, NC, gabor@unc.edu, http://www.or.unc.edu/~pataki, ***Bala Krishnamoorthy***

We consider several well-known classes of hard IPs, such as Jeroslow's IP, Chvatal's hard knapsack problems and pigeonhole problems, etc., and examine whether basis reduction methods help to solve such problems to optimality.

2) Mixed Integer Knapsack Sets, ***Alper Atamturk***, University of California, Dept. of IE/OR, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, atamturk@ieor.berkeley.edu

Gomory cutting planes for mixed integer programming are obtained from individual rows of the simplex tableau, i.e., mixed integer knapsack sets. We study the facial structure of convex hull of these sets and describe strong cutting planes for them.

3) A New Min-Cut Max-Flow Ratio for Multicommodity Flow Problems, ***Oktay Gunluk***, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, gunluk@us.ibm.com

We present an improved min-cut max-flow ratio for multicommodity flow problems. Our result also provides tight bounds on the "quality" of the cut-set relaxation of the capacitated network design problem. The relaxation is obtained by replacing flow balance and capacity constraints by cut-set inequalities.

MC09 DO-05

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Endre Boros, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, boros@rutcor.rutgers.edu

1) New Methods & Results for Boolean Optimization, ***Fred W. Glover***, University of Colorado, Sch. of Bus., CB 419, Boulder, CO 80309-0419, fred.glover@colorado.edu, ***Gary A. Kochenberger***

We describe recent new approaches and computational results for several boolean optimization problems, including zero-one unconstrained and constrained quadratic optimization problems, graph optimization problems and DNA sequencing problems.

2) Bounds on the Stability Number of a Graph, ***Peter L. Hammer***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu, ***Gabriela Alexe***, ***Sorin Alexe***

After showing how the determination of the stability number of graphs can be viewed as pseudo-Boolean optimization problems, we use this transformation for deriving powerful upper and lower bounds on this graph parameter, and present results of substantial computational experiments demonstrating the usefulness of these bounds for B&B methods.

3) Probabilistic Analyses of the Number of Patterns with Large Coverage, ***Mutsunori Yagiura***, Kyoto University, Dept. Applied Math & Physics, Grad. Sch. of Informatics, Kyoto, 606-8501, Japan, yagiura@i.kyoto-u.ac.jp, ***Endre Boros***, ***Toshihide Ibaraki***

We consider data sets consisting of n-dimensional binary vectors representing positive and negative examples for some (possibly unknown) phenomenon. We analyze, both theoretically and experimentally, the number of patterns with large coverage and show that it is quite small if the number of examples in the given data set is sufficiently large.

MC10 Data Envelopment Analyses I

Contributed Session
Chair: Katerina C. Lyroudi, University of Macedonia, 156 Egnatia St., Thessaloniki, 54006, Greece, lyroudi@macedonia.uom.gr

1) The Performance Efficiency of the Life Insurance Companies in Greece, ***Katerina C. Lyroudi***, University of Macedonia, 156 Egnatia St., Thessaloniki, 54006, Greece, lyroudi@macedonia.uom.gr, ***Thomas G. Hatzigayos***, ***Athanassios G. Noulas***

Applying DEA, we investigate the performance efficiency of the life insurance companies in Greece at the beginning of the 21st century. The preliminary results indicate that the insurance firms are very inefficient with significant differences among them regarding their efficiency levels.

2) Relative Performance Evaluation of Engineering Designs: A Fuzzy DEA Approach on Quality Function Deployment, ***Manabendra N. Pal***, Indian Institute of Management Calcutta, Diamond Harbor Rd., Joka, Post Box 16757, PO Alipore, Kolkata West Bengal, 700-027, India, mnp@iimcal.ac.in, ***Ranjan Pal***, ***Jeebak Mitra***

The fuzzy DEA approach is introduced in quality function deployment for evaluating relative performance of alternative engineering designs, when performance characteristics obtained from voice of customers are fuzzy, product design data are often limited, inaccurate and vague andvague and imprecise relationships exist among engineering and performance characteristics.

3) An Empirical Study to Evaluation Projection in DEA, ***Sari K. Rytokoski***, Helsinki School of Economics, Runeberginkatu 22-24, PO Box 1210, Helsinki, FIN-00101, Finland, sari.rytokoski@hkkk.fi, ***Pekka J. Korhonen***, ***Mikko J. Syrjanen***

A model combining MOLP and DEA approaches is constructed for a group of students faced with a time allocation problem of future activities. Students' behavior is studied when choice can be selected freely on their efficient frontier without using radial projection.

4) withdrawn 10/10: Cost Forecasting with Data Envelopment Analysis & Activity-Based Costing in a Steel Plant, ***Marcos J. Singer***, Pontificia Universidad Catolica de Chile, Escuela de Admin., Vicuna Mackenna 4860 Macul, Santiago, Chile, singer@volcan.facea.puc.cl, ***Patricio Donoso***

MC11 MIP for Cutting Stock, Capacity & Production Planning

Cluster: Integer Programming
Invited Session
Chair: Janny M. Y. Leung, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, Hong Kong, janny@se.cuhk.edu.hk

1) Linearizing a Nonlinear Cutting-Stock Formulation, ***Ronny Aboudi***, University of Miami, Dept. of MS, PO Box 248237, Coral Gables, FL 33124, raboudi@umiami.ir.miami.edu, ***Jon Lee***, ***Janny M. Y. Leung***

Exploiting and extending an idea of Coppersmith, Lee & Leung (1999), we develop a linearization of a nonlinear formulation of a classic 1-dimensional cutting-stock problem. The formulation and B&C solution strategy are particularly suited to problems for which a limited number of cutting patterns should be employed.

2) withdrawn 10/12: Capacity Planning with Capacity

Deterioration, ***Vernon Hsu***, George Mason University, Sch. of Mgmt., 142 Enterprise, 4400 University Dr., Fairfax, VA 22030-4444, vhsu@gmu.edu, ***Renato E. de Matta***

3) Hoist Scheduling for Printed Circuit Board Manufacturing with Multiple Hoists & Generic Tank Placement, ***Janny M. Y. Leung***, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, Hong Kong, janny@se.cuhk.edu.hk, ***Guoqing Zhang***

In PCB manufacturing, boards are processed in sequence in tanks and transferred between tanks using programmable hoists. Optimizing hoist-scheduling maximizes throughput. We present a MIP formulation and a B&C procedure for optimizing the hoist schedule for the case with multiple hoists and general processing sequence (relative to tank location).

MC12 Algorithms & Tools for Logistics Problems

Cluster: Combinatorial Optimization
Invited Session

Chair: Buyang Cao, ESRI, Inc., 380 New York St., Redlands, CA 92373, bcao@esri.com

1) Solving Real-World VRP, ***Jai Chakrapani***, ESRI, Inc., 380 New York St., Redlands, CA 92373, jchakrapani@esri.com, ***Wee-Liang Heng***, ***Rollie Trapp***

We describe a tabu search heuristic for solving the multiple depot VRP with real-world constraints including multiple time windows, multiple tours, enroute pick-ups, scheduled breaks and legal restrictions. Applications are reported for standard benchmark test cases and problems in excess of 5000 orders.

2) A Large-Scale GIS-Integrated Implementation of Network Partitioning & Arc Routing, ***Burcin Bozkaya***, ESRI, 380 New York St., Redlands, CA 92373, bbozkaya@esri.com, ***Buyang Cao***

We present our methodology for solving a large-scale real-life arc-routing problem. We outline the steps of our algorithm and describe its integration with a client-server enterprise GIS.

3) Models for the Design & Analysis of a Large Package-Sort Facility, ***Paul McAree***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, ***Lawrence D. Bodin***, ***Michael O. Ball***

We describe a MIP formulation for determining a sort facility's optimal layout for an overnight delivery company where packages are moved by forklift. We then present the BAM and RAM heuristic (based on the MIP) for generating locally optimal solutions, some computational results and application to the overnight delivery company.

MC13 Interior-Point Methods for Linear & Semidefinite Optimization II

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Kees Roos, TU Delft/University of Leiden, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@its.tudelft.nl

1) Interior Point Algorithms & Several Classes of Complementarity Problems, ***Akiko Yoshise***, University of Tsukuba, Tsukuba, Ibaragi, 305-8573, Japan, yoshise@shako.sk.tsukuba.ac.jp

We will give a survey of recent developments in interior point algorithms for solving complementarity problems from the point of view of the existence of interior point, solution of the problem and central path and other properties. We will also discuss some open problems in this field.

2) An Affine Scaling Algorithm for Linear Programming with Bounded Variables, ***Susumu Nishibu***, Tokyo Institute of Technology, Dept. of IEM, 2-12-1 Oh-Okayama, Meguro, Tokyo, 152-8552, Japan, nishibu@me.titech.ac.jp, ***Shinji Mizuno***

An affine scaling algorithm is a simple interior point algorithm for linear programming. We consider a linear programming problem whose variables are nonnegative and bounded from above. We propose an efficient affine scaling algorithm for such a problem and present preliminary numerical experimental results.

3) Interior Point Algorithms for Convex QCQPs, ***Motakuri V. Ramana***, United Airlines R&D, ram_motakuri@yahoo.com, ***Mathis Stolpe***

We present interior point methods for convex multi-quadratic programs, also known as convex QCQP, that work in the dual space. The main ingredients of our methods are affine scaling and trust region subproblems. We also introduce a very efficient and novel method for solving trust region subproblems.

MC14 Applications of Second-Order Optimization & Related Topics

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Robert M. Freund, MIT, 50 Memorial Dr., Bldg. E53-357, Cambridge, MA 02142-1347, rfreund@mit.edu

1) Blind Equalization of Constant Modulus Signals via Semidefinite Programming, ***Boris Maricic***, McMaster University, Dept. of ECE, Hamilton, Ontario, L8S 4K1, Canada, maricic@sunrise.crl.mcmaster.ca, ***Zhi-Quan Luo***

We formulate the blind equalization of constant modulus signals as a semidefinite program. This is done by performing an algebraic transformation on the original nonconvex formulation and then restricting the design variables to a subset of the original feasible set. This formulation produces superior equalization results than the original formulation.

2) On Solving SOCPs with an Interior-Point Method for NLP, ***Robert J. Vanderbei***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, rvdb@princeton.edu, ***Hande Y. Benson***

We shall report on our attempts to formulate and solve second-order cone programming problems as smooth convex nonlinear programming problems and to solve them with loqo, an interior-point method for general nonlinear programming.

3) Computing Minimum Volume Ellipsoids for Large Data Sets: An Application from Data Mining, ***Peng Sun***, MIT, OR Ctr., 77 Massachusetts Ave., Cambridge, MA 02139-4307, ***Robert M. Freund***

An important application in data mining involves the repetitive computation of the minimum volume ellipsoid containing a large number of points. We develop specialized methods for solving this problem efficiently in practice.

MC15 Interior Point Methods for Nonlinear Programming

Cluster: Large-Scale Mathematical Programming
Invited Session

Chair: Robert J. Vanderbei, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, rvdb@princeton.edu

1) The Successive Linear Programming Approach for Large-Scale Nonlinear Constrained Optimization, ***Richard Waltz***, Northwestern University, Sch. of Eng. & Applied Sci., ECE Dept., 2145 Sheridan Rd., Evanston, IL 60208-3118, rwaltz@neruda.ece.nwu.edu

Classic active-set sequential quadratic programming, although good for small- to medium-scale problems, is often inefficient for large-scale problems because of the combinatoric difficulty of determining the active-set. The SLP method uses the SQP framework but solves an LP to quickly identify the correct active-set. We will present numerical results.

2) Infeasibility & Unboundedness Detection for Interior-Point Methods for Nonlinear Programming, ***David F. Shanno***, Rutgers University, RUTCOR, New Brunswick, NJ 08903-5062, shanno@rutcor.rutgers.edu

We discuss infeasibility and unboundedness detection for interior-point methods for NLP using filter methods.

3) Filter Methods & Interior-Point Algorithms, ***Hande Y. Benson***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, hyurttan@princeton.edu

We will discuss several ways to implement filter methods in the context of interior-point algorithms and we will present extensive numerical results.

MC16 Panel: Where to Publish?

Sponsor: MSOM
Sponsored Session

Chair: Seyed Iravani, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., C210 Tech., Evanston, IL 60208, iravani@iems.nwu.edu

1) Panel: Where to Publish?, ***Mark S. Daskin***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, daskin@northwestern.edu, ***Garrett J. van Ryzin***, Columbia University, Grad. Sch. of Bus., 412 Uris Hall, New York, NY 10027, gjv1@columbia.edu, ***Terry P. Harrison***, Pennsylvania State University, Dept. of MSIS, 306 Beam BAB, University Park, PA 16802, tharrison@psu.edu, http://silmaril.smeal.psu.edu/tph,

Richard F. Serfozo, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332

The editors of IIE-Transactions, Queueing Systems, Interfaces and Operations Research will discuss their editorial policies and provide the audience with insight on how to choose a journal for submission of their papers.

MC17 Pricing & Coordination in Supply Chains

Sponsor: MSOM
Sponsored Session
Chair: Scott Carr, UCLA, Anderson Grad. Sch. of Mgmt., 110 Westwood Plaza, Los Angeles, CA 90095, scott.carr@anderson.ucla.edu

1) Strategic Incentive Design in Channels, ***Sridhar Balasubramanian***, University of Texas, Austin, TX 78712, sridhar.balasubramanian@bus.utexas.edu, ***Pradeep P. Bhardwaj***

We analyze the implications of strategic incentive design for channel strategy. That is, we show that incentive schemes for managers can be used as effective coordination mechanisms within supply chains.

2) Price & Inventory Decisions in New Internet-Based Market Institutions, ***Noah F. Gans***, University of Pennsylvania, The Wharton Sch., Philadelphia, PA 19104, gans@wharton.upenn.edu, ***Teck-Hua Ho***

We consider the effect of different internet-based pricing-setting institutions on inventory decisions. We compare the results to those of more traditional inventory models.

3) Supplier-Manufacturer Perspectives on Business-to-Business Exchange Operation & Strategy, ***Jochen Kleinknecht***, Stanford University, Dept. of MSE, Terman Engineering Ctr. 450, Stanford, CA 94305-4025, jochenk@stanford.edu, ***Victor F. Araman***, ***Ram Akella***

We consider operational and strategic aspects of operating a B2B exchange from a supplier perspective, exploiting insights from our earlier work on risk management between long-term reservation capacity with a price schedule and a spot market. We develop optimal trading strategies and obtain optimal operational parameters in a multi-supplier/manufacturer environment, with an Internet web-based platform.

4) Excess Inventory & Gray Market Distribution Channels, ***Scott Carr***, UCLA, Anderson Grad. Sch. of Mgmt., 110 Westwood Plaza, Los Angeles, CA 90095, scott.carr@anderson.ucla.edu, ***Reza Ahmadi***

Issues such as demand uncertainty, production batching and volume discounts may lead to excess inventory and this inventory may be diverted to parallel (or gray market) distribution channels. We study how these channels may be indirectly managed and possibly exploited through supply chain policies.

MC18 Location Analysis II

Sponsor: SOLA
Sponsored Session
Chair: Oded Berman, University of Toronto, Rotman Sch. of Mgt., 105 Saint George St., Toronto, Ontario, M5S 3E6, Canada, berman@rotman.utoronto.ca

1) The Connection Location Problem, ***Rajan Batta***, SUNY, Dept. of IE, 342 Bell Hall, Buffalo, NY 14260, batta@acsu.buffalo.edu, ***Simin Huang***, ***Rakesh Nagi***

Suppose that there are flows between 2 separated groups of nodes that are connected by a set of facility connections (no flow between connections). The CLP determines the optimal locations of connections (bounded or unbounded) such that the total travel cost between the 2 groups of nodes is minimized.

2) Planar Minmax Regret Location Problems, ***Igor Averbakh***, University of Toronto, Division of Mgmt., 1265 Military Trail, Scarborough, Ontario, M1C 1A4, Canada, averbakh@scar.utoronto.ca, ***Sergei Bespamjatnikh***

We present low-order polynomial algorithms for minmax regret single facility location problems (1-median and weighted 1-center) on the plane, where only interval estimates for the weights and coordinates of customers are known. The cases of rectilinear and Euclidean metrics are considered.

3) Integrated Inventory/Location Modeling, ***Leyla Ozsen***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208-3119, leyla@iems.nwu.edu, ***Collette R. Coullard***, ***Mark S. Daskin***

We formulate an integrated model of facility location and inventory management. The model incorporates shipments from plants to DCs, whose location is to be determined, and from DCs to retailers as well as inventory decisions at the DCs. We discuss algorithms for solving the problem and computational results.

4) A Powerful Genetic Algorithm for the Quadratic Assignment Problem, ***Zvi Drezner***, California State University, Dept. of IS/DS, Rm. LH540, Fullerton, CA 92834, zdrezner@fullerton.edu

A compounded GA for the QAP is proposed. 29 symmetric problems in QAPLIB with unknown optimum were solved 20 times each. The best known solution was always found at least twice and the average solution for each problem was 0.017% or less over the best known.

MC19 Algorithms for Stochastic Integer Programming Problems

Cluster: Stochastic Programming
Sponsor: Optimization
Sponsored Session
Chair: Shabbir Ahmed, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sahmed@isye.gatech.edu

1) A Polynomial-Time Dynamic Programming Algorithm for the Multi-Stage Stochastic Uncapacitated Lot-Sizing Problem, ***Andrew J. Miller***, CORE, 34 Voie du Roman Pays, Louvain-la-Neuve, 1348, Belgium, miller@core.ucl.ac.be, http://core4ux.core.ucl.ac.be/~miller

We develop a backward recursion for SULSP that allows us to prove that the value function in each period is piecewise linear, right-continuous and non-increasing. We then exploit this structure to develop a polynomial-time algorithm for the problem.

2) Stochastic Integer Programming: A Super-Additive Dual Approach, ***Andrew J. Schaefer***, University of Pittsburgh, Dept. of IE, 1031 Benedum Hall, Pittsburgh, PA 15261, schaefer@engrng.pitt.edu, ***Nan Kong***

We consider a 2-stage integer program with stochastic right-hand sides and use a dual formulation that is easily solved once the value functions are known. This approach allows us to solve instances with enormous deterministic equivalent formulations. We present computational results and indicate directions for future research.

3) MIP Methods Applied to Stochastic Integer Programming Problems, ***Bram Verweij***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, bram@isye.gatech.edu, ***Shabbir Ahmed***, ***Anton J. Kleywegt***, ***George L. Nemhauser***, ***Alexander Shapiro***

We study 2-stage stochastic versions of the shortest path problem and the TSP. Our approach is to approximate these problems by sampling a fixed number of scenarios. By solving the resulting mixed integer programming problems to optimality, we obtain provably close to optimal solutions for the original problems.

MC20 Best Dissertation Award Winners 2001

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session
Chair: Jeffrey K. Liker, University of Michigan

1) Dissertation Winner: Basic Research, Applied Research & Innovation in the Semiconductor & Pharmaceutical Industries, ***Kwanghui Lim***, MIT, Sloan Sch. of Mgmt., 50 Memorial Dr., E52-545, Cambridge, MA 02139, k@kwanghui.net

The thesis comprises 3 essays on the relationships among basic research, applied research and innovation and explores various mechanisms through which absorptive capacity is developed. These include connectedness to the external scientific community, the provision of a science-oriented research environment, and investment in basic research. The chief contribution is to document the ways in which firms develop absorptive capacity...

2) Dissertation Runner-Up: Mapping National Knowledge Networks - Scientists, Firms & Institutions in Biotechnology in the US & France, ***Michelle Gittelman***, NYU, Stern Sch. of Bus., 40 West 4th St., 711 Tisch, New York, NY 10012-1118, mgittelm@stern.nyu.edu

This study compares the emergence of a science-based industry in 2 very different institutional contexts, utilizing both qualitative and quantitative research methods. The findings shed light on organizational evolution and drivers of innovation performance in an emerging industry. The study considers both factors driving innovation specific to local context and those that appear to operate across contexts...

MC21 Information-Based Extended Product Development II

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt. Sponsored Session

Chair: Vish V. Krishnan, University of Texas, CBA 4.202, 21st & Speedway, Austin, TX 78712, krishnan@mail.utexas.edu

1) Electronic Measurement Systems in New Product Development, ***Adwait Ayare***, Montana State University, Dept. of MIE, 220 roberts Hall, Bozeman, MT 59717-3800, ***Durward K. Sobek, II***

We summarize the results of a research project to study the use of electronic measurement systems in developing consumer electronics products. We specifically investigate hardware-software configurations in use and how recent trends such as computer simulation and remote data transfer affect the PD process.

2) Linking Information Technology & Development Performance: Evidence from Empirical Data, ***Stefan Thomke***, Harvard Business School, Soldiers Field Rd., Boston, MA 02163, sthomke@hbs.edu

As firms are increasingly turning to new (information) technologies to improve their development performance, we need to understand more clearly how such improvements are actually achieved. I will report on findings from a large, global study on automotive development performance.

3) Preliminary Results from an Empirical Analysis of Integrating Outsourced Product Design across Firm Boundaries, ***Edward G. Anderson***, University of Texas, Mgmt. Dept., CBA 4. 202, Austin, TX 78712, edward.anderson@bus.utexas.edu, ***Alison Davis-Blake***, ***Geoffrey G. Parker***

Using interview data from 8 large firms, we present exploratory research into the mechanisms used to expand supply-chain management to include the integration of outsourced product design. In particular, we find that firms rely on highly-skilled generalists, "supply-chain integrators," to coordinate product development, marketing, production and logistics across firm boundaries.

4) Architectural Stretching: The Changing Nature of Product & Processes in Information Driven Environments, ***Nitin Joglekar***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu, ***Stephen Rosenthal***

We argue that firms are increasingly turning to new information-based technologies not only to improve their development productivity, but also to change the very nature of the product or the product realization processes. These changes do not follow conventional patterns for product and process innovation.

MC22 Electronic Market Driven Supply Chains

Cluster: Supply Chain Management
Invited Session

Chair: S. David Wu, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, sdw1@lehigh.edu

1) Supply Chain Implications of Auction Protocols, ***Robin Roundy***, Cornell University, Dept. of OR, Rhodes Hall, Ithaca, NY 14853, robin@orie.cornell.edu, ***Rachel Chen***, ***Mike Freimer***, ***Ganesh Janakiraman***, ***Woonghee Huh***, ***Amar Sapra***, ***Rachel Q. Zhang***

Auctions protocols are impacting supply chains in new ways. We study the effects of auction protocols on supply chain efficiency, individual profitability and the formation of impact of coalitions. This is based on analytical models of the Vickery auction, the quasi-uniform-price auction and supply chain variants of VCG auctions.

2) Emergent E-Supply Chain Strategies, ***Roy Kwon***, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, rkwon@seas.upenn.edu, ***Morris A. Cohen***, ***S. David Wu***, ***Karthik Balasubramaniam***

We present the results of an empirical study of industry use of B2B electronic supply chain entities. We classify strategies based on attributes related to a company's particular industry, existing relationship with suppliers, product and process clockspeed and architecture. Normative models will be suggested that could aid in strategic decisions in using B2B e-commerce entities.

3) Supply Chain Cooordination in Electronic Markets, ***S. David Wu***, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, sdw1@lehigh.edu

We consider different forms of supply chain contracting in e- marketplaces. While auction often serves as a price-determination mechanism in this environment, we show that it could also serve as a coordination mechanism and its form could have a significant impact on the dynamics of supplier-buyer interaction.

MC23 Auction Mechanisms & Ontologies for E-Commerce

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: Andrew J. Davenport, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, davenport@us.ibm.com

1) Designing Business Processes & Communication Structures for E-Business using Ontology-Based Enterprise Models with Math Models, ***Henry M. Kim***, York University, Schulich Sch. of Bus.

Organizations are apprehensive about developing e-business systems because the endeavor is novel. If e-business is considered as the conduct of business using the Internet network of networks, then e-business systems design can be represented as a network design problem. We outline an approach for analysis and design of business process and communications structure networks for e-business.

2) The Negotiauction Hybrid Negotiation/Auction System, ***Jeffrey E. Teich***, New Mexico State University, ***Hannele E. Wallenius***, ***Jyrki Wallenius***, ***Alexander Zaitsev***

We describe extensions to our Negotiauction hybrid negotiation/auction system. Specifically, we offer auction owners the capability to set up multi-item, multi-unit auctions. Bidders may query the system interactively, searching for the best combinatorial bid which maximizes their underlying value. Unlike multi-staged combinatorial auctions, here bidders always know where they stand.

3) Computational Aspects of Clearing Continuous Call Double Auctions with Assignment Constraints & Indivisible Demand, ***Jayant Kalagnanam***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, jayant@us.ibm.com, ***Andrew J. Davenport***

We present 2 generalizations for double auctions, motivated by electronic marketplaces for the process industry. Clearing markets with assignment constraints can be solved efficiently using network flow algorithms. However, clearing markets with indivisible demand the generalized assignment.

MC24 Game Theoretic Models for Supply Chain Coordination

Cluster: Manufacturing Systems & Supply Chain Integration
Invited Session

Chair: Murat Erkoc, Lehigh University, IMSE Dept., 200 West Packer Ave., Bethlehem, PA 18015, mue2@lehigh.edu

1) Supply Chain Contracting in Electronic Markets: Incentives & Coordination Mechanisms, ***Mingzhou Jin***, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, mij2@lehigh.edu, ***S. David Wu***

In e-market transactions, modeling the system as multiple suppliers and one buyer with a third-party market intermediary is appropriate. We examine the complete and asymmetric information cases and propose mechanisms to increase channel coordination. We show that buyers could extract significant benefits from supplier competition, where interemediaries could play an important role.

2) Coalition Formation in Auctions, ***Svetlana Oshkai***, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, svo2@lehigh.edu, ***S. David Wu***

The active growth of B2B auctions in e-commerce demands the study of economically effective rules to form the coalitions between e-market participants. The cases involving single-product coalitions have been studied before. We consider the case when a coalition is offering multiple products which could be combined in different packages. This situation reflects a growing trend in supply chain coordination.

3) The Capacity Allocation Game in the Semiconductor Industry, ***Suleyman Karabuk***, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015, suk6@lehigh.edu, ***S. David Wu***

We study the capacity allocation problem in the semiconductor industry from a game theoretical perspective. We model the problem as a game with incomplete information where manufacturing managers and product managers possess private information with which they are motivated to extract rent at the expense of system-wide profits.

4) Supply Contracts for High-Tech Capacity Reservation, ***Murat Erkoc***, Lehigh University, IMSE Dept., 200 West Packer Ave., Bethlehem, PA 18015, mue2@lehigh.edu, ***S. David Wu***

We propose supply contracts for the coordination of capacity reservation, pricing and expansion between a buyer and supplier in the high-tech industry. We consider a leader-follower game where the supplier offers capacity pricing while the buyer decides on reservation quantity. Our analysis evaluates key properties of the coordination.

MC25 Scheduling I

Contributed Session

Chair: Ali Allahverdi, Kuwait University, Dept. of MIE, PO Box 5969, Safat, 13060, Kuwait, allahverdi@kuc01.kiniv.edu.kw

1) withdrawn 10/4: Scheduling on an M-Machine No-Wait Flowshop with a Bicriteria Objective Function, ***Ali Allahverdi***, Kuwait University, Dept. of MIE, PO Box 5969, Safat, 13060, Kuwait, allahverdi@kuc01.kiniv.edu.kw, ***Tariq Aldowaisan***

2) withdrawn 10/9: Scheduling & Sequencing Jobs on Machines by Simulated Annealing-Based Heuristics, ***Fidel J. Torres***, Cra 1 No. 18-A 10, Bogota, Colombia, ftorres@uniandes.edu.co

3) withdrawn 10/10: Crane Scheduling on a Plate Storage, ***Jesper Hansen***, Technical University of Denmark, Bldg. 321, Te, Lyngby, 2800, Denmark, jha@imm.dtu.dk, http://www.imm.dtu.dk/~jha/, ***Jens Clausen***

4) Approximation Algorithms for Common Due Date Assignment & Job Scheduling on Parallel Machines, ***Wen-Qiang Xiao***, HKUST, Dept. of IEEM, Clear Water Bay, Kowloon, Hong Kong, iexiao@ust.hk, ***Chung Lun Li***

We consider the problem of assigning a common due date to a set of jobs and scheduling the jobs on parallel machines so that the weighted sum of the due date, total earliness and total tardiness is minimized. Heuristics are developed for the problem and worst case analysis is performed.

MC26 Assessing the State-of-the-Art for Aggregated Force Combat Models

Sponsor: MAS

Sponsored Session

Chair: James G. Taylor, Naval Postgraduate School, MOVES Academic Group, Monterey, CA 93943, jtaylor@nps.navy.mil

1) Overview & Assessment of Lanchester-Type Models of Warfare, ***James G. Taylor***, Naval Postgraduate School, MOVES Academic Group, Monterey, CA 93943, jtaylor@nps.navy.mil

An overview and assessment of Lanchester-type models will be given.

2) Panel: Aggregated-Force Combat Models, ***Bruce W. Fowler***, US Army Aviation & Missile Command, Aviation Missile RD & Eng. Ctr, Advanced Systems Directorate, Redstone Arsenal, AL 35898, ***Frederick Hartman***, ***Andy Loerch***

We will consider the state-of-the-art for aggregated-force combat models. An overview and assessment of Lanchester-type models will be given. A panel of experts will then give different perspectives, ranging from that of the Defense Modeling and Simulation Office to that of academia and the search for truth.

MC27 Ballistic Missiles

Sponsor: MAS

Sponsored Session

Chair: Mario Riggione, SAIC, 4001 North Fairfax Dr., Ste. 800, Arlington, VA 22203, riggionem@saic.com

1) A Ballistic Missile Defense Modeling Methodology using the Integrated Tool Strategic Defense Simulation-Performance Assessment, ***Mario Riggione***, SAIC, 4001 North Fairfax Dr., Ste. 800, Arlington, VA 22203, riggionem@saic.com

The computer model SDSPA is a medium fidelity, end to end, architecture effectiveness tool. This integrated tool, developed in the mid 1980s, has been enhanced and updated to analyze alternative ballistic missile defense architectures, including simultaneous modeling of space-, air-, sea- and land-based elements.

2) Sequential Engagements & the Probability of Zero Leakage, ***Nigel S. Siva***, SPARTA, Inc., 1911 North Ft. Myer Dr., Ste. 1100, Arlington, VA 22209, nigel_siva@rosslyn.sparta.com, ***John L. Dyer***, ***James A. Mosora***

We present RADSAM, a resource management simulation for phased-array radar systems. Topics to be addressed include radar mode scheduling & power allocation, target clustering and antenna and beam positioning. Representative scenario analysis results will be presented in the context of ballistic missile defense.

MC28 Multi-Criteria Optimization in Engineering

Cluster: Multi-Criteria Decision Making

Invited Session

Chair: George Fadel, Clemson University, Mech. Eng. Dept., 202 Fluor Daniel EIB, Clemson, SC 29634-0921, gfadel@ces.clemson.edu

1) An Interactive Multiobjective Optimization Design Strategy for Multidisciplinary Design, ***John E. Renaud***, University of Notre Dame, 365 Fitzpatrick Hall, Notre Dame, IN 46556-5637, renaud.2@nd.edu, ***Ravindra V. Tappeta***

We focus on MDO of large-scale systems that have multiple objective functions. The primary goal is to develop and test an interactive multi-objective optimization algorithm for multi-disciplinary system design that takes into account the decision maker's preference during the design process.

2) Single-Criterion vs. Multicriteria Approaches in Engineering Design, ***Wei Chen***, University of Illinois, Mech. Eng. Dept., MC 251, 842 West Taylor St., Chicago, IL 60607-7022, weichen1@uic.edu

On of the distinctive debating issues in the engineering design community is how the utility of a design should be formulated under a decision-based design framework. Which is more appropriate: a multicriteria or a single criterion approach? We will examine the roles these 2 approaches can play in engineering design.

3) withdrawn 10/9: Affordable Upgrades of Complex Systems: A Multi-Level Performance-Based Approach, ***James P. Reneke***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, reneke@clemson.edu, ***Matthew J. Saltzman***, ***Margaret M. Wiecek***

4) Decision Making using Bicriteria Optimization, ***George Fadel***, Clemson University, Mech. Eng. Dept., 202 Fluor Daniel EIB, Clemson, SC 29634-0921, gfadel@ces.clemson.edu, ***Yusheng Li***

We present a methodology based on approximating the Pareto set of bi-objective problems and presenting these trade-off graphs to the designer to facilitate decisions on trade-off. Once a solution is selected from the approximated set, the designer can chose to either set a target on one or both objectives and use 1 of 2 methods to find the sought-after solution.

MC29 FasterBetterCheaper Experimentation

Sponsor: QSR

Sponsored Session

Chair: Theodore T. Allen, Ohio State University, 210 Baker Systems, 1971 Neil Ave., Columbus, OH 43210, allen.515@osu.edu

1) Sequential Methods for Mixture Experiments with Process Variables, ***Navara Chantarat***, Ohio State University, 210 Baker Systems, 1971 Neil Ave., Columbus, OH 43210, chantarat.1@osu.edu, ***Theodore T. Allen***

Often both upper and lower bound constraints exist on the mixture variables. Then, researchers and commercial software have recommended non-sequential methods based on D-optimal designs crossed with factorial designs for the process variables. We propose simulation optimal designs that permit sequential experimentation, address bias errors and use substantially fewer runs.

2) When to Use Supersaturated Designs & What to Expect, ***John Schmitz***, Ohio State University, 210 Baker Systems, 1971 Neil Ave., Columbus, OH 43210, ***Mikhail Bernshteyn***, ***Theodore T. Allen***

Supersaturated designs have more factors than runs. They have a long history but surprisingly little consensus exists about when and how to use them. We present results from numerous simulation studies and guidelines for their successful application. We also present new designs derived from simulation optimization with clear advantages.

3) Heuristics for Simulation Optimization: Methods & Review, ***Mikhail Bernshteyn***, ProfitLogic, 11 Cambridge Ctr., Cambridge, MA 02142, mbernstheyn@hotmail.com, ***Theodore T. Allen***

Simulation optimization permits experimental design methods to be generated from a wide variety of objectives and assumptions. We review the current state-of-the-art in simulation optimization methods and describe our own

heuristics and their advantages. Our heuristics are based on GAs, selection and ranking and variance reduction techniques.

4) A Comparison of Alternative Methods for Constructing Meta-Models for Computer Experiments, ***Theodore T. Allen***, Ohio State University, 210 Baker Systems, 1971 Neil Ave., Columbus, OH 43210, allen.515@osu.edu, ***Mikhail Bernshteyn***, ***Khalil Kabiri***

We compare response surface and kriging approaches using results from a real world engineering design problem and test functions from the literature. The results call into question common conceptions including that kriging models offer important accuracy advantages when relatively few experimental runs are feasible.

MC30 Panel: Pre-College Decision Analysis Education

Sponsor: Decision Analysis
Sponsored Session
Chair: Ronald A. Howard, Stanford University, Dept. of MSE, Terman Eng. Ctr., Sch. of Eng., Stanford, CA 94305-4026

1) Panel: Pre-College Decision Analysis Education, ***Ronald A. Howard***, Stanford University, Dept. of MSE, Terman Eng. Ctr., Sch. of Eng., Stanford, CA 94305-4026

For many years, there have been endeavors to introduce some form of decision analysis education in grade school and high school classes. A distinguished panel with relevant experience will discuss the benefits and challenges of such enterprises. Attendees will be invited to share their views.

MC31 Tutorial: A Brief Introduction to the Dempster-Shafer Theory

Invited Session
Chair: Arthur P. Dempster, Harvard University, Dept. of Statistics, Cambridge, MA 02138, dempster@hustat.harvard.edu

Co-Chair: Paul-Andre Monney, University of Fribourg, Dept. of Quantitative Econ., Ave. de Beauregard 11, Fribourg, Ch-1700, Switzerland, paul-andre.monney@unifr.ch

1) Tutorial: A Brief Introduction to the Dempster-Shafer Theory, ***Arthur P. Dempster***, Harvard University, Dept. of Statistics, Cambridge, MA 02138, dempster@hustat.harvard.edu, ***Paul-Andre Monney***

MC32 Portfolio Choice under Uncertainty in Hedge Funds

Cluster: Financial Engineering
Invited Session
Chair: Elmira Popova, Lehman Brothers/University of Texas, Equity Derivatives Analytics, 200 Vesey St., New York, NY 10002, epopova@lehman.com

1) Portfolio Choice under Uncertainty, ***Ivilina Popova***, Deutsche Bank Asset Management/Purdue University, Global Research Ctr., 130 Liberty St., New York, NY 10006, ivilina.popova@db.com

We relax several of the assumptions in the standard mean-variance framework and offer a general setup for a portfolio choice. We consider random returns that could come from distributions with fat tails. For a general set of preferences, the corresponding problem is solved from a stochastic optimization point of view. We illustrate the methodology by constructing a fund of hedge funds.

2) Optimal Rebalancing, ***Chris Donohue***, Deutsche Asset Management, Global Research Ctr., 130 Liberty St., New York, NY 10006, christopher.donohue@db.com

We will discuss the application of stochastic optimization methods to optimal portfolio management with transaction costs and/or taxes. Alternative rebalancing strategies will be compared.

3) The Decision to Invest in Active Management: A Bayesian Approach Based on a Pricing Models Abstract, ***Colm O'Cinneide***, Deutsche Asset Management, Global Research Ctr., 130 Liberty St., New York, NY 10006, colm.o-cinneide@db.com

No abstract supplied.

4) Bayesian Arbitrage Trading Strategies, ***Elmira Popova***, Lehman Brothers/University of Texas, Equity Derivatives Analytics, 200 Vesey St., New York, NY 10002, epopova@lehman.com

Short-term trading strategies based on a filtered (Bayesian) stock price curve will be presented. The performance will be illustrated with 4-year backtests on 350 stocks traded on the New York Stock Exchange.

MC33 Cost-Effectiveness Methods in Health Care

Sponsor: Health Applications
Sponsored Session
Chair: Sandra Potthoff, University of Minnesota, Health Care Mgmt. Carlson Sch., 321 19th Ave. South, Rm. 3-140, Minneapolis, MN 55455-9940, potth001@tc.umn.edu

1) Incorporating Costs of a Targeted Intervention for an Infectious Disease, ***Amy R. Wilson***, University of Minnesota, Health Services Res. & Policy, 420 Delaware St. SE, MMC 729, Minneapolis, MN 55455, amy.r.wilson-1@tc.umn.edu

Targeting interventions for infectious disease to specific populations can increase intervention effectiveness. Targeting can increase program costs if the population is hard to locate or can decrease costs if the population is readily accessible. We develop simple analytic models to explore the tradeoffs between population accessibility and intervention effectiveness.

2) Allocating HIV Prevention Resources: Balancing Efficiency & Equity, ***Edward Kaplan***, Yale School of Management, Box 208200, New Haven, CT 06520-8200, edward.kaplan@yale.edu, ***Michael H. Merson***

The primary goal of HIV prevention is to prevent as many infections as possible. This requires that HIV prevention resources be allocated according to cost-effectiveness principles: those activities that prevent more infections per dollar are favored over those that prevent less. This is not current practice in the US, where prevention resources flow in proportion to reported AIDS cases...

3) Quality Management Practices & Outcomes in Nursing Homes, ***Sandra Potthoff***, University of Minnesota, Health Care Mgmt. Carlson Sch., 321 19th Ave. South, Rm. 3-140, Minneapolis, MN 55455-9940, potth001@tc.umn.edu

We examine the links between Baldrige framework quality management practices and clinical and financial outcomes in 65 not-for-profit US nursing homes.

MC34 Optimization Problems in Traffic Management

Sponsor: TSS
Sponsored Session
Chair: H. Edwin Romeijn, University of Florida, Dept. of ISE, PO BOx 116595, 303 Weil Hall, Gainesville, FL 32611-6595, romeijn@ise.ufl.edu

1) A Combined Model for Dynamic Trip Distribution & Traffic Assignment, ***Yue Irene Li***, Northwestern University, Civil Eng. Dept., Evanston, IL 60208, liyue@northwestern.edu, ***Thanasis Ziliaskopoulos***, ***David E. Boyce***

The combined dynamic trip distribution and traffic assignment problem is formulated as a mathematical programming model. The development of a solution algorithm is discussed. The algorithm uses Dantzig-Wolfe algorithm to decompose the formulation, and the sub-problem is then solved by Lagrangian relaxation and a 3-point function interpolation algorithm.

2) A Heuristic Solution Method for the Minimum Tool Booth Problem, ***Li Hui Bai***, University of Florida, ISE Dept., 303 Weil Hall, Gainesville, FL 32611-6595, lbai@cao.ise.ufl.edu, ***Donald W. Hearn***, ***Mehmet Bayram Yildirim***

The problem of determining tolls for user-equilibrium traffic assignment so that the solution is system optimal and the number of the booths is minimal is formulated as a mixed integer problem with fixed charge constraints. A dynamic slope scaling algorithm is customized for this problem and numerical results are reported.

3) Allocating Funds to Highway Improvements under the Presence of Equity Constraints, ***George Kozanidis***, Northeastern University, 328 Snell Engineering Ctr., Dept. of MIME, Boston, MA 02115, gkozanid@coe.neu.edu, ***Emanuel Melachrinoudis***, ***Marius M. Solomon***

We present a model for allocating funds to highway improvements. Both discrete and continuous interventions are considered. Equity constraints that keep a balance on the budget amounts spent on different improvement sets are incorporated. The problem is formulated as a MIP knapsack model with special structure and interesting properties.

4) Online Adaptive Variable Message Sign Control for Traffic Network Congestion Management, ***Nhan Huynh***, University of Texas, Dept. of Civ. Eng., ECJ 6.2, Austin, TX 78712,

nhuynh@mail.utexas.edu, ***Yi-Chang Chiu***, ***Hani S. Mahmassani***

We discuss an online adaptive VMS control scheme for a closed-loop transportation system. The goal is to adaptively provide advisory information and taking into account travelers' response to the provided information so as to achieve optimal network performance.

MC35 Computational Issues in Transportation Decision Models

Sponsor: TSS
Sponsored Session

Chair: Pitu B. Mirchandani, University of Arizona, SIE Dept., Tucson, AZ 85721

1) Assessment of Computational Performance of Transportation Network Modeling Software, ***Xuesong Zhou***, ***Nhan Huynh***, ***Hani S. Mahmassani***

When modeling large networks, the computational performance of the software becomes a critical issue. Of interest is the effect of several destination zone aggregation and of temporal and spatial resolution on the software execution speed and memory requirements. We examine these aspects through the use of DYNASMART-P, a dynamic traffic assignment-simulation program. Proposed strategies for reducing memory requirements and increasing execution speed are discussed.

2) The Dynamic Traveling Salesman Problem: An Examination of Alternative Heuristics, ***Xiangwen Lu***, University of California, Inst. of Transport. Studies, Irvine, CA 92697, xlu@uci.edu, ***Amelia C. Regan***, ***Sandra Irani***

We examine the performance of several algorithms for the dynamic TSP. Using results obtained from an M/G/1 queueing system, we provide bounds on and insights into the performance of these algorithms.

3) An Integrated On-Line Shortest Path & Phase Setting Algorithm, ***Dasheng Lou***, University of Arizona, SIE Dept., Tucson, AZ 85721, ***Pitu B. Mirchandani***

It is possible to jointly provide a recommended route and set signals so that an emergency vehicle travels an optimal route from an origin to a destination with least disruption to the rest of traffic. An integrated on-line algorithm is developed and analyzed it is also evaluated using simulations.

4) Time Budgets for Real-Time Decision Making, ***Pitu B. Mirchandani***, University of Arizona, SIE Dept., Tucson, AZ 85721, ***Dasheng Lou***

We focus on response time requirements for on-line algorithms that support real-time decision systems. The paradigm of time budgets for data-handling, communication and computation will be discussed and its role in design of algorithms. Some examples will be presented.

MC36 Aviation Applications

Sponsor: Aviation Applications
Sponsored Session

Chair: David K. Chin, Federal Aviation Administration, 800 Independence Ave. SW, ASD-400, Washington, DC 20591, david.chin@faa.gov

1) Direct Routing Analysis in the Southern Region, ***Daniel A. Citrenbaum***, Federal Aviation Administration, 800 Independence Ave. SW, Washington, DC 20591, daniel.citrenbaum@faa.gov, ***Dave Chien***, ***Doug Baart***

The FAA will evaluate the impact of direct routing through the 3 ARTCCs in the Southern Region: Atlanta, Jacksonville and Miami. The metrics presented include potential fuel savings, flight distance, flight time, maximum instantaneous aircraft capacity-to-demand ratios by sector and operational delay under wind optimized and direct routing scenarios.

2) The Case for System Redundancy in Automated Conflict Detection in Aviation: Reducing the False Alert Problem, ***Ellis Feldman***, Federal Aviation Administration, 800 Independence Ave. SW, Washington, DC 20591, ellis.feldman@faa.gov

The false alert rate for conflict detection software may be high since conflicts are rare events. We use the odds-ratio form of Bayes' rule to show that multiple independent versions of conflict detection software could significantly reduce the false alert rate while maintaining the true conflict detection rate.

3) The Effect of Reduced Unimpeded Taxi-Out Times on Departure Delays at Capacity Constrained Airports, ***Gary Paull***, MCR Federal, Inc., 175 Middlesex Turnpike, Bedford, MA 01730, gpaull@mcri.com, ***Nastaran S. Coleman***

At capacity constrained airports, aircraft frequently must wait in queue before departing. Queuing theory and simulation modeling are used to explore whether reduced unimpeded taxi-out times due to new pilot tools translate into departure delay savings. The effect of less than universal equipage on system delay savings is also considered.

4) A Plan for Estimating Optimal Flight Times, ***Duc Le***, Federal Aviation Administration, 800 Independence Ave., Washington, DC 20591, duc.le@faa.gov, ***Nastaran S. Coleman***, ***Daniel A. Citrenbaum***

Our objective is to develop and test a methodology for estimating and projecting future "optimal times" or "minimum feasible times" for major city pairs. Representative city pairs, with several variables such as season, time of day, aircraft type, etc. that impact flight time, will be evaluated within the current NAS environment to estimate future performance.

5) What's in a Name? Aircraft IDs & Runway Collision Risk, ***Arnold Barnett***, MIT, Sloan Sch. of Mgmt., OR Ctr., E53-379, Cambridge, MA 02139-4307, abarnett@mit.edu

If 2 planes at an airport are in danger of colliding, an air traffic controller typically does not know their identities. But would knowing that the aircraft are, for example, United #308 and American #1446 allow more effective emergency warnings? We assess the safety benefits of technologies that would provide "name-tags."

MC37 Applications of Revenue Management II

Sponsor: Revenue Management & Pricing
Sponsored Session

Chair: Montgomery Blair, Dollar Rent-a-Car Systems, Inc., 5330 East 31st St., Tulsa, OK 74153-1167, mblair@dollar.com

1) Revenue Management for Performing Arts Institutions, ***Jessica Randall***, McKinsey & Company, Inc., 55 East 52nd St., 21st Floor, New York, NY 10022, jessica_randall@mckinsey.com, ***Raymond DeVre***, ***Kamran Ansari***, ***Lowell Doppelt***

We analyze potential applications of revenue management techniques to performing arts centers. In particular, we focus on basic revenue management techniques that can have substantial financial impact with minimal barriers to implementations. Innovative tactics to improve revenue performance that have been successfully deployed in other arts organizations and other industries are also considered.

2) The Impact of Fare Variance on Airline Flight Leg Booking Limits, ***Partha Ramachandran***, PROS Revenue Management, Inc., 3223 Smith St., Ste. 100, Houston, TX 77006, pramachandran@prosrm.com

Calculation of leg booking limits are based on a point fare values for each bucket and the variance component is often ignored. We investigate the value of incorporating the fare variability in deriving booking limits and evaluate its performance using revenue simulations.

3) A Revenue Management Performance Monitor, ***Montgomery Blair***, Dollar Rent-a-Car Systems, Inc., 5330 East 31st St., Tulsa, OK 74153-1167, mblair@dollar.com

It is a difficult task to analyze and evaluate the performance of applied revenue management systems. The system we are creating objectively quantifies the results of revenue management actions. It incorporates sound metrics, determines relative and absolute performance, points towards accountability and helps to refine a DSS.

MC38 Queueing Systems in Heavy Traffic

Sponsor: Applied Probability
Sponsored Session

Chair: John J. Hasenbein, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712-1063, jhas@mail.utexas.edu

1) Dynamic Scheduling of Photolithography Mask Production, ***Melanie A. Rubino***, Stanford University, EEC & OR, Stanford, CA 94305-4025, rubino@stanford.edu, ***J. Michael Harrison***

Electron-beam machines (e-beams) are the first and most expensive type of equipment used in making photolithography masks. The Intel Mask Operation (IMO) receives delay-sensitive orders for 100 different types of masks, which begin as blank disks of quartz to be processed through one of five e-beams. The processing time distribution depends both on the type of mask and the e-beam selected...

2) Dynamic Scheduling of a Multi-Class Queue in the Halfin-Whitt Heavy Traffic Regime, ***Assaf J. Zeevi***, Stanford University, Info. Systems Lab, EE Packard Bldg., Rm. 251, Stanford, CA 94305-

9510, assaf@isl.stanford.edu, ***J. Michael Harrison***

We consider the problem of dynamically scheduling a multiclass queue handled by a single pool of servers. Letting the traffic intensity approach one, while increasing the size of the system in accordance with the Halfin-Whitt scaling, we obtain a limiting diffusion control problem which is analyzed and solved.

3) Asymptotic Behavior of Fluid Limits for Heavily Loaded Processor Sharing Queues, ***Amber L. Puha***, University of California, Dept. of Math, 9500 Gilman Dr., La Jolla, CA 92093-0112, apuha@math.ucsd.edu, ***Ruth J. Williams***

We will discuss the asymptotic behavior in time of fluid limits for heavily loaded processor sharing queues. In particular, we determine conditions under which a fluid limit converges as time tends to infinity and identify the time infinity limit. Under additional moment assumptions, a rate of convergence is proved.

4) Insights from Heavy Traffic Theory for Problems of Network Control, ***J. Michael Harrison***, Stanford University, Grad. School of Business, Stanford, CA 94305-5015, harrison_miahcel@gsb.stanford.edu

With regard to dynamic control of stochastic processing networks, what have we learned from "heavy traffic theory" about the structure of good controls and corresponding system behavior? I summarize my view of that matter, illustrating the main points by means of a 3-server example that has been discussed and partially analyzed in earlier work.

MC39 Software Demonstration III

Chair: To be announced

1) Software Demonstration: Optimization Modeling with LINDO, LINGO & What's Best, ***Mark Wiley***, LINDO Systems, Inc., 1415 North Dayton St., Chicago, IL 60622, mwiley@lindo.com

Build models quickly, access data easily and integrate optimization into your applications. Come see how easy it is with the new LINDO API - powerful linear, quadratic and integer solver engine, LINGO - integrated modeling language with linear/nonlinear solvers and a new What'sBest - large scale linear/nonlinear spreadsheet solver.

2) Software Demonstration: Using the MPL OptiMax 2000 Component Library with VBA for Excel & Visual Basic, ***Bjarni Kristjansson***, Maximal Software Inc., 2111 Wilson Blvd., Ste. 700, Arlington, VA 22201, bjarni@maximalsoftware.com

The OptiMax 2000 is a highly anticipated Component Library (API) designed to take full advantage of the ActiveX Automation component software technologies from Microsoft. Using step-by-step examples, we will demonstrate how to use the OptiMax 2000 to seamlessly integrate MPL into VBA for Excel/Access, Visual Basic, Visual C++, Delphi, Java and the Web, thus easily creating customized end-user applications to solve real-world optimization problems.

MC40 OR/MS in Forestry III

Cluster: Forestry
Sponsor: ENRE
Sponsored Session
Chair: Robert G. Haight, USDA Forest Service, North Central Research Station, 1992 Folwell Ave., St. Paul, MN 55108, rhaight@fs.fed.us

1) Integrating Minimum Patch Size Requirements in Harvest Scheduling Models, ***Stephanie Rebain***, Pennsylvania State University, Sch. of Forest Resources, 214B Ferguson Bldg., University Park, PA 16802-4301, ***Marc McDill***

A maximum opening size is often imposed in forest management. However, smaller openings can increase forest fragmentation and have negative effects on habitat for species that require large patches of mature forest. A spatially explicit MIP model is presented that maintains a minimum area of older forest in large patches.

2) Simulated Annealing: Prospects & Problems when Applied to Spatially Explicit Harvest Scheduling, ***Sonney George***, Pennsylvania State University, Sch. of Forest Resources, 214B Ferguson Bldg., University Park, IL 16802-4301, ***Marc McDill***

Simulated annealing is a promising method for finding good solutions for spatially explicit harvest scheduling models. Results from a simulated annealing application are compared with results obtained with CPLEX(r). Results are compared in terms of solution times and deviations from optimality and feasibility. A framework for comparing alternative solution methods is proposed.

3) Teaching OR in Forestry Engineering: An Outcomes-Based Approach, ***Evelyn Richards***, University of New Brunswick, Fac. of Forestry, Fredericton, NB, E3B 6C2, Canada, ewr@unb.ca, ***Pierre Zundel***

We present the outcomes-based OR teaching approach used in the UNB Forest Engineering program as an alternative to the traditional subject-based one. We integrate OR into a developmental, problem-based learning environment. The goal is to bring students to the point, over a 5-year program, where they can demonstrate competence in a set of abilities that combine OR knowledge with other professional skills.

4) Teaching OR in Forestry: An Assessment of the Oregon State University Experience over the Last 30 Years, ***John Sessions***, Oregon State University, Dept. of Forest Eng., Corvallis, OR 97331-5706, john.sessions@cof.orst.edu, ***J. Douglas Brodie***

A cadre of Forestry graduate students acquired expertise in OR techniques in the late 1960s and early 1970s. Adoption of LP by public agencies and companies in the 1970s created demand for technical familiarity at the professional entry level thus, undergraduate courses were instituted. Dynamic programming and a host of landscape and stand-level heuristics have been incorporated through the 1980s and 1990s and into the current century.

MC43 Education IV: INFORMS Case Competition 2001: Finalists 1 & 2

Sponsor: INFORMED
Sponsored Session
Chair: Christopher J. Zappe, Bucknell University, Dept. of Mgmt., Lewisburg, PA 17837, zappe@bucknell.edu

1) INFORMS Case Competition 2001: Finalists 1 & 2

During this special open session, the first two of the four finalists in INFORMS 2nd Annual Case Competition will deliver 30-minute presentations of their entries before a panel of judges. The judges will select the winning entry from the cases presented during this session and the following session.

MC45 Operations Management III

Contributed Session
Chair: Karndee Leopairote, University of Wisconsin, Dept. of IE, 1513 University Ave., Rm. 379, Madison, WI 53705, leopairo@cae.wisc.edu

1) Worker Assignment with Individual Learning & Forgetting Effects in a Cellular Manufacturing System, ***Karndee Leopairote***, University of Wisconsin, Dept. of IE, 1513 University Ave., Rm. 379, Madison, WI 53705, leopairo@cae.wisc.edu, ***David A. Nembhard***

We focus on the development of a worker-task assignment model in the cellular manufacturing environment to improve overall cell productivity. We examine the performance of labor assignment policies, staffing level, as well as other shop floor control policies under varying levels of individual learning and forgetting characteristics.

2) Optimal Dynamic Pricing for Perishable Assets with Uncertain Demand, ***Nicholas C. Petruzzi***, University of Illinois, 350 Wohlers Hall, 1206 South 6th St., Champaign, IL 61820, petruzzi@uiuc.edu, ***George E. Monahan***, ***Wen Zhao***

We develop and solve a model to determine the optimal pricing policy for a retailer of a perishable asset (e.g., airline flight) when customers' reservation prices are random and the retailer adjusts its price periodically as sales are realized. We develop corresponding insights from the model.

3) Worker-Task Assignment with Learning, Forgetting & Task Heterogeneity, ***Napassavong Osothsilp***, University of Wisconsin, 2020 University Ave., #201, Madison, WI 53705, osothsil@cae.wisc.edu, ***David A. Nembhard***

We estimate productivity of workers who learn and forget for tasks of varying complexity. We propose policies to assign workers to tasks in this setting to maximize overall productivity. The effects of worker redundancy and task-tenure on productivity are also examined.

4) Minimizing Total Cost for a Preventive Maintenance Program, ***Cheng-Shuo Wang***, United Technologies Research Center, 411 Silver Ln, MS 129-55, East Hartford, CT 06108, wangc@utrc.utc.com, ***Maximilian M. Etschmaier***

Preventive maintenance is to keep equipment in a specified condition, taking into account both the cost of maintenance activities and the consequence of failure. The maintenance characteristics of equipment are analyzed to determine which functions should be maintained and what maintenance packages are available. The maintenance program of equipment spells out which maintenance tasks are performed...

Monday 14:30-16:00

MC46 Marketing V

Contributed Session

Chair: Leslie O. Morgan, University of Utah, 1645 East Campus Center Dr., Salt Lake City, UT 84112, mgtlm@business.utah.edu, www.business.utah.edu/~mgtlm/

1) An Integrated Marketing & Manufacturing Response to Pirate Products, ***Leslie O. Morgan***, University of Utah, 1645 East Campus Center Dr., Salt Lake City, UT 84112, mgtlm@business.utah.edu, www.business.utah.edu/~mgtlm/, ***Ruskin M. Morgan***, ***William L. Moore***

We examine a market with an original product and a pirate product and model the original's strategic marketing and supply chain optimal response to the pirate. The nature of the product and complexity of the production and distribution supply chain will influence risk and associated optimal response.

2) Strategic Orientation of New Ventures in Transitional Economies: The Case of Tanzania, ***Vladimir Vlahovich***, Widener University, University Place 1, Chester, PA 19013, vladimir.vlahovich@widener.edu, ***Myroslaw Kyj***, ***Surendra Pal***

The question of how firms compete has been a central concern for management as well as entrepreneurial scholars. Although there are a number of normative models that explain strategic behavior in the management literature, very little is known as to whether those theories developed in Western market economies can be applicable to other different forms of economies...

3) E-Grocery Shopping: An Investigation into the success & Failures of US vs. UK Strategic Models, ***Rosa Lemel***, Kean University, 58 South Parker Dr., Monsey, NY 10952, lemelx2@aol.com

Online grocery shopping is an e-business concept whose time is here. The convenience and time saving possibilities of using the Internet to order groceries are obvious. Why, then, have almost all US e-grocers gone out of business? By contrast, British e-grocers have prospered. We compare the British model with the US model for this special type of e-business...

4) New Hardware Looking for Software: Modeling Indirect Network Effects over the Life Cycle, ***Stefan Stremersch***, Tilburg University, Warandelaan 2, Tilburg, 5000, The Netherlands, s.stremersch@kub.nl, ***Gerard J. Tellis***, ***Philip Hans Franses***

Products such as TVs, CD players and DVD players display indirect network effects. The utility of these products increases as software availability increases. We propose a multivariate regime-switching model, estimated on archival data, which captures this phenomenon. It estimates order of takeoff and provides regime-specific estimates of network effects.

Monday 16:15-17:45

MD01 Applications of Data Mining

Sponsor: **Artificial Intelligence**

Sponsored Session

Chair: Yuehwern Yih, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907, yih@purdue.edu

1) Data Mining-Based Adjustment of Production Control Policies, ***Choonjong Kwak***, Purdue University, Sch. of IE, West Lafayette, IN 47907, choonjon@ecn.purdue.edu, ***Yuehwern Yih***

It is difficult to retrieve the most relevant information from CIM databases. It is a challenging problem to analyze the effects of dispatching rules and protocols on system performance based on the information. We applied data mining to efficiently adjusting the production control policies in a CIM environment.

2) Development of a Real-Time Multi-Objective Scheduler for a Semiconductor Fabrication System, ***Hyeung-Sik Min***, Purdue University, Sch. of IE, West Lafayette, IN 47907, ***Yuehwern Yih***

Our goal is to develop a real time scheduler to determine decision rules for multiple decision variables so that it is able to achieve multiple desired performance measures in semiconductor wafer fabrication system. A system control strategy based on simulation and a competitive neural network is suggested.

3) Data Type & Induced Decision Trees, ***Selwyn Piramuthu***, University of Florida, Dept. of DIS, Gainesville, FL 32611, selwyn@nersp.nerdc.ufl.edu

Decision trees are widely used in concept learning applications. The commonly used decision tree method, c5 and its variants, counts the examples that belong to different concepts of interest. We study the effect of variance of data across time and space on learning concepts using this method.

4) Clustering Web-Clickstream Data using a Sequence Oriented Method, ***G. Wets***, Limburg University, Fac. of Applied Economic Sci., Universitaire Campus, Bldg. D, Diepenbeek, 3590, Belgium, geert.wets@luc.ac.be, ***B. Hay***, ***K. Vanhoof***

In web usage, mining web-clickstream data are analyzed in order to extra usage patterns. We will explain how clusters of visitors can be obtained which take into account the order of pages that are visited during a session. To this end, sequence alignment methods are used.

MD02 Optimization Services on the Internet I

Cluster: **OR/MS & the Internet**

Invited Session

Chair: Robert Fourer, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.northwestern.edu

1) An Update on Optimization as an Internet Resource, ***Robert Fourer***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.northwestern.edu

Few users of optimization techniques have more than a handful of solver software packages installed on computers they use regularly. Recent advances in Web interfaces are encouraging experimentation with a greater variety of solvers. We update a survery of current Internet optimization interfaces and suggest priorities for continued development.

2) Evaluation, Selection & Testing of Optimization Software, ***Hans D. Mittelman***, Arizona State University, Dept. of Math, Box 871804, Tempe, AZ 85287-1804, mittelmann@su.edu

For the past several years, we have provided a web-based optimization software selection guide, "Decision Tree for Optimization Software," a Web repository of benchmarking results for comparing optimization software and a series of solver implementations for Web submission of optimization problems. Experiences, current status and future plans will be discussed.

3) WWW-NIMBUS for Multiobjective Optimization, ***Vesa Ojalehto***, University of Jysvaskyla, Dept. of MIT, PO Box 35 Agora, Jyvaskyla, FIN 40351, Finland, ojveal@mit.jyu.fi, ***Kaisa Miettinen***, ***Marko Makela***

We describe NIMBUS, an interactive multi-objective optimization system capable of solving non-differentiable and non-convex problems and its implementation, WWW-NIMBUS. Introduced in 1995, WWW-NIMBUS was the first such system available through the Internet. We present several recent developments such as versatile scalarizing functions including a global solver.

4) An XML-Based Format for Sharing Mathematical Programs, ***Leo Lopes***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, leo@iems.northwestern.edu, ***Robert Fourer***

The MPS format has survived for decades as the standard for communicating LPs, despite well-known shortcomings and awkward extensions. We describe work toward a new standard that addresses the needs of optimization applications and provides a location-transparent ability to share objects with algebra, database and publishing systems through SML and MathML.

MD03 Boolean Functions & Graphs

Cluster: **Data Mining**

Invited Session

Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) Pseudo-Boolean Optimization & Graph Transformations, ***Vadim Lozin***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, lozin@rutcor.rutgers.edu

We study graph transformations that change the stability number by a constant. Many useful transformations of this type have been deduced from Boolean considerations. We first review principal results in this area and then elaborate some of them in graph-theoretic terminology. Our results are illustrated by a number of new examples.

2) Stable Sets & Chromatic Numbers, ***Dominique de Werra***, Swiss Federal Institute of Technology, Dept. of Math, Lausanne, CH-1015, Switzerland, dewerra@dma.epfl.ch, ***Pierre Hansen***

The theorem of Roy-Gallai on the chromatic number of a graph has generated a long sequence of variations and extensions essentially links between the maximum number of nodes in an oriented path and the chromatic number are

exploited. We shall present some recent extensions of the theorem which provide new upper bounds on the chromatic number of a graph.

3) Struction Revisited, ***Gabriela Alexe, Peter L. Hammer***

The struction method, proposed by de Werra, Ebenegger and me in 1984, consists of a Boolean-based transformation which associates to any graph of (unknown) stability number a, another graph of stability number a-1. We provide a generalized version of this method, along with applications to finding upper bounds of a.

4) Adaptive Classification Decision Trees, ***John W. Chinneck***, Carleton University, Systems & Computer Eng., Ottawa, Ontario, K1S 5B6, Canada, chinneck@sce.carleton.ca, ***Ahmad Moghrabi***

Better decision trees for classification can be constructed by using different algorithms for subdividing subsets of points depending on the characteristics of the subsets. We present results for an adaptive procedure that chooses from among a set of algorithms for the placement of separating surfaces.

MD04 Multidimensional Auctions

Cluster: Auctions
Invited Session

Chair: Eric van Heck, Erasmus University of Rotterdam, Dept. of DIS, F1-32, Box 1738, Sch. of Mgmt., Rotterdam, 3000, The Netherlands, e.heck@fac.fbk.eur.nl

1) Performance Evaluation of Online Multi-Dimensional Auction Systems: A Computer Simulation Investigation, ***Sungwon Cho***, Korea Telecom, Multimedia Technology Lab, 17 Woomyeon-dong, Seocho-gu, Seoul, 137-792, Korea, mamens@hanmail.net

As a trading mechanism in B2B e-marketplaces, we proposed multi-dimensional auction mechanism (MAMENS). The performance of MAMENS is evaluated using computer simulation. The simulation results demonstrate that 2 main features of MAMENS, i.e., use of sellers' feedback and post-utility value selection, lead to better bargaining outcomes.

2) Information Architecture & Electronic Market Performance: The Case of Multi-Dimensional Auctions, ***Otto Koppius***, Erasmus University of Rotterdam, Dept. of DIS, F1-32, Box 1738, Sch. of Mgmt., Rotterdam, 3000, The Netherlands, ***Eric van Heck***

The Internet offers opportunities for designing new kinds of markets. One example is the multi-imensional auction in which bidders bid not only on price, but on the underlying value drivers as well. Because these auctions are much more complex than traditional price-only auctions, the information available to the bidders is expected to play an important role in determining the performance of these markets...

3) Individual Item Price Discovery in Combinatorial Auctions using Gibbs Sampling, ***Joni L. Jones***, University of Michigan Business School, Dept. of CIS, 701 Tappan St., D5210, Ann Arbor, MI 48109, jonij@umich.edu, ***Richard W. Andrews***

With combinatorial auctions, where goods and services are sold as a bundle, individual item price discovery is forfeited. Gibbs sampling is employed to extract individual item market clearing prices from winning bids and is shown to be effective with the sparse data common to these auctions, yet robust enough for complex problems.

MD05 Artificial Intelligence I

Contributed Session

Chair: Sonia Bartolomei-Suarez, University of Puerto Rico, Dept. of IE, Box 9043, Mayaguez, PR 00681, sonia@ece.uprm.edu

1) The Use of Evolutionary Neural Networks as Reverse Simulation Metamodels, ***Mahdi Nasereddin***, Penn States Berks, Lehigh Valley Coll., Tulpehocken Rd., Reading, PA 19610-6009, mxn16@psu.edu, http://www.personal.psu.edu/mxn16/, ***Mansooreh Mollaghasemi***

The use of an ENN as a reverse simulation model is explored. Several factory simulation scenarios with different levels of complexity were used to compare the performance of a reverse ENN simulation metamodel to a back-propagation neural network simulation metamodel.

2) Agent Communities in Information Management, ***Barin N. Nag***, Towson University, Dept. of Mgmt., Towson, MD 21252, bnag@towson.edu, ***Walter Truszkowski, Jay Karlin***

Communities of intelligent agents can play an effective role in supporting users in an information management system by their enhanced knowledge about the information and better understanding of implications in requests. We discuss the issues and structure of the agent community including dynamic behavior of the community.

3) A Simulation Model for the Design of a Semi-Automatic Packaging Line through Experimental Design, ***Sonia Bartolomei-Suarez***, University of Puerto Rico, Dept. of IE, Box 9043, Mayaguez, PR 00681, sonia@ece.uprm.edu, ***Carlos J. Gonzalez-Miranda, Carlos E. Saleta-Rodriguez***

We present a 2-phase approach used to improve the output rate at a packaging line based on an experimental design analysis. The first phase involves the use of fractional factorial simulation experiments for identifying operational factors that have a significant effect on the packaging line performance as measured by the cycle time. In the second phase, a metamodel is constructed...

4) PageCluster: Mining Conceptual Structures from Web Log Files towards Adaptive Websites, ***Jianhan Zhu***, University of Ulster, Ctyard House 9, Rm. 2, Accommodation Office, Newtownabbey, Antrim, BT37 OQB, UK, jhzhu@acm.org

We propose a hierarchical clustering algorithm called PageCluster to mine conceptual structures among Web pages from Web log files on a website. The mined structures are used to construct a conceptual hierarchy of the website and integrate with link prediction in an online system online recommendation explorer to help users' navigation towards an adaptive website.

MD06 Finance: Theory & Empirics III

Contributed Session

Chair: Bing Han, Stanford University, Dept. of MSE, 1028 Vernier Place, Stanford, CA 94305, binghan@stanford.edu, http://www.stanford.edu/~binghan/

1) Moral Hazard & Budget Constraints in Auctions, ***Jose E. Quintero***, Stanford University, PO Box 14529, Stanford, CA 94309, jquintero@stanford.edu

A contract is auctioned to agents with private information about budget and ability. Bidders' valuations depend on the resulting price because it diminishes their capacity to invest, due to incentives or simply due to financial costs. We show that different auctions yield different allocation and studies when the seller should provide financing.

2) Affine Modeling of Co-Movements between Exchange Rates & Interest Rates, ***Bing Han***, Stanford University, Dept. of MSE, 1028 Vernier Place, Stanford, CA 94305, binghan@stanford.edu, http://www.stanford.edu/~binghan/

With complete markets, exchange rate dynamics derived from affine term structure models depend only on interest rates and market prices of risk. This necessitates additional state variables and country-specific equivalent martingale measures. Incomplete markets offer little extra flexibility because exchange rates and observationally equivalent pricing kernels are severely constrained.

3) Using Financial Statements in the Valuation of a Firm, ***Anibal C. Irarrazabal***, Universidad Catolica de Chile, Vicuna MacKenna 4860, Santiago, Chile, airarraz@ing.puc.cl

Because financial statements provide the most widely available data in public corporations, investors rely on financial reports to determine the value of their assets. The use of discounted cashflow is applied to several large firms in Chile. assets. The use of discounted cashflow is applied to several large firms in Chile.

4) Recursive Partitioning Techniques for Time Series Forecasting, ***Sandy D. Balkin***, Pfizer, Inc., Dept. of MS, 235 East 42nd St., 219/05/10, New York, NY 10017, sandy.balkin@pfizer.com

Recursive partitioning methods prove very useful tools for function approximation and predictive data mining. We present different recursive partitioning methods and evaluate their predictive accuracy on both continuous and discrete response variables using various time series examples.

MD07 Tutorial: Configuration as a Key Problem for E-Commerce Success

Sponsor: Computing
Sponsored Session

Chair: Irv Lustig, ILOG, 25 Sylvan Way, Short Hills, NJ 07078-1379, ilustig@ilog.com

1) Tutorial: Configuration as a Key Problem for E-Commerce Success, ***Daniel Mailharro***, ILOG SA, rue de Verdun, BP 85, Gentilly Cedex, 4253, France, dmailharro@ilog.fr, ***Ulrich Junker***

Rapidly becoming a key part of e-commerce solutions, configuration applications let users customize more and more complex products or services through the Web. Computing and optimizing such user-defined configuration now becomes critical for the success of an enterprise. This tutorial is an

opportunity to understand what are configuration problems and how they can be solved with state-of-the-art constraint programming technology...

MD08 DO-04

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: David B. Hartvigsen, University of Notre Dame, 354 Mendoza Coll. of Bus., Notre Dame, IN 46556-5646, dhartvig@wood.helios.nd.edu

1) Decomposition of Perfect Graphs, ***Gerard Cornuejols***, Carnegie Mellon University, GSIA, Rm. 232A, Pittsburgh, PA 15213-3890, gc0v@andrew.cmu.edu, ***Michele Conforti, Kristina Vuskovic***

We discuss how to approach the strong perfect graph conjecture (SPGC) using graph decomposition and we prove that square-free perfect graphs are bipartite, line graphs of bipartite graphs, or have a 2-join or a star cutset. It follows that the SPGC holds for square-free graphs.

2) A Polynomial-Time Algorithm to Find Shortest Paths with Recourse, ***J. Scott Provan***, University of North Carolina, scott_provan@unc.edu

The SPR problem involves finding the shortest expected-length path through a stochastic network where arc lengths are known only when the tail node is reached. We give a Dijkstra-like polynomial-time method of solving the problem when arc lengths reset randomly after each step. All no-reset versions of the problem are NP-hard.

3) A Production-Inventory-Pricing Model that Can (Sometimes) be Solved by Submodular Flow, ***S. Thomas McCormick***, University of British Columbia, Fac. of Commerce & Bus. Admin., Vancouver, BC, V6T 1Z2, Canada, stmv@adk.commerce.ubc.ca, ***Lap Mui Chan, David Simchi-Levi, Julie L. Swann***

We consider a model where multiple products are assembled from multiple parts in a tree structure over time, and we decide on pricing, production and inventory. We show how to model this as a minimum convex separable cost network flow problem with equal flow constraints, and explore special cases.

MD09 DO-08

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Oktay Gunluk, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, gunluk@us.ibm.com

1) Heuristics for Generating General Disjunctions, ***Sanjay Mehrotra***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, mehrotra@iems.nwu.edu

We will present 2 heuristics for generating general disjunctions for a generalized B&B method developed in our earlier work. We will present computational results on the effectiveness of the heuristics for solving real problems.

2) Computational Experiments with Integer Programming, ***Dan Bienstock, Mark Zuckerberg***

We present new results using various classical and new techniques for 0-1 integer programming, illustrated using the MIPLIB.

3) Cutting Planes & Lagrangian Relaxation for the Steiner Tree Problem in Graphs, ***Francisco Barahona***, IBM, barahon@watson.ibm.com, ***Laszlo Ladanyi***

We present a cutting plane algorithm for the Steiner tree problem in graphs. The LP relaxation is solved either with the simplex method or via Lagrangian relaxation and the volume algorithm. We compare these 2 approaches. Joint work with.

MD10 Data Envelopment Analyses II

Contributed Session
Chair: Amilcar J. Serrao, Universidade de Evora, Largo dos Colegiais, Evora, 7000-554, Portugal, aserrao@uevora.pt

1) withdrawn 10/1: Efficiency Evaluation with Convex Pairs, ***Jorgen Tind***, University of Copenhagen, Stats & OR, Universitetsparken 5, Copenhagen O, 2100, Denmark, tind@math.ku.dk, www.math.ku.dk/~tind, ***Per J. Agrell, Peter Bogetoft, Michael Brock***

2) Using Data Envelopment Analysis to Evaluate Productivity & Efficiency of Portuguese State Universities, ***Amilcar J. Serrao***, Universidade de Evora, Largo dos Colegiais, Evora, 7000-554, Portugal, aserrao@uevora.pt

We address a problem that has not been satisfactorily analyzed by productivity and efficiency studies. We note that 2 different forms of organization have dominated the Portuguese State Universities: "old universities" which are organized as faculties and "new universities" which are organized as schools. This led to us discovering whether one of these organizations forms is superior, i.e., more efficient, to the other...

3) Modeling & Measuring Technical Change in Offshore Oil & Gas, ***Shunsuke Managi***, University of Rhode Island, 216 Kingston Coastal Inst., Environ. & Natural Resources, Kingston, RI 02881, sman8824@postoffice.uri.edu, ***James Opaluch, Di Jin***

We use DEA to measure technical change in offshore oil and gas production. Field-level data from 1946 through 1995 is used to measure technical change net of depletion effects. We also separate effects of discovery of specific new technologies vs. effects such as learning by doing.

MD11 Quadratic Assignment & Related Problems

Cluster: Integer Programming
Invited Session
Chair: Peter M. Hahn, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, hahn@seas.upenn.edu

1) Steiner Trees & the Dynamic Quadratic Assignment Problem, ***J. MacGregor Smith***, University of Massachusetts, Elab Bldg., Dept. of MIE, Amherst, MA 01003, jmsmith@ecs.umass.edu, www.ecs.umass.edu/mie/faculty/smith/

Two of the most challenging problems in network design are the QAP and the Steiner network problem. Dynamic flows in QAPs are modeled as stochastic processes. A heuristic for the stochastic QAP is developed for solving this Steiner network topology problem and computational experience is presented.

2) Hard Real-Time Distributed Systems: A New Perspective using the Quadratic Assignment Problem Approach, ***Tania M. Querido***, CEFET-RJ, Dept. of Elect. Eng., Av. Maracana 229, Rio de Janeiro, 20271-110, Brazil, querido@openlink.com.br, ***Paulo L. Aquino, Andre G. Rua, Claudio L. Augusto***

Real-time distributed systems are widely used in industrial processes and arise on the problem of minimizing the effects of communication between tasks, assuming a fixed set of multi-tasking single processor nodes. We present a study of the problem in a QAP problem approach and suggest the development of efficient heuristic algorithms.

3) Adaptive Dual Ascent utilizing the Level-2 Linearization for the Quadratic Assignment Problem, ***William L. Hightower***, High Point University, 1337 Willie Pace Rd., Burlington, NC 27217, hightowr@netpath.net, ***Peter M. Hahn, Terri Anne Johnson***

The viewpoint of transformational bounds is explained. Its success when coupled with the level-1 linearization is reviewed. Coupling the technique with the level-2 linearization yields tight and efficient bounds. Results from incorporating this technique in a B&B algorithm are presented. Coupling the technique with constraints arising from cuts is explored.

4) Modeling the Quadratic Constraints to Improve Exam Timetabling Solutions, ***Siqun Wang***, University of Pennsylvania, Dept. of OPIM, Wharton Sch., Philadelphia, PA 19104-6366, siqun@wharton.upenn.edu, ***Monique Guignard, Michael Bussieck***

We apply a new decomposition methodology to a 0-1 integer timetabling problem. The original MILP formulation was unsolvable due to the extremely large number of binary variables. We redefine/decompose the variables and reformulate the problem with quadratic constraints to improve solutions. Encouraging results have been found for a real application.

MD12 Issues for Developing Large-Scale Combinatorial Optimization Heuristics

Cluster: Combinatorial Optimization
Invited Session
Chair: Cesar Rego, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, crego@bus.olemiss.edu

1) Algorithmic Issues on the Implementation of Large-Scale Traveling Salesman Problems, ***Dorabela Gamboa***, Universidade Portucalense, Dept. de Informatica, Rua Dr. A. B. de Almeida, Porto, 4200, Portugal, dgamboa@upt.pt, ***Cesar Rego, Fred W. Glover***

We describe findings from the DIMACS Implementation Challenge on TSP

algorithms (http://www.research.att.com/~dsj/chtsp/). We show the impact of several algorithmic components which are critical for performance. We report computational findings of an effective stem and cycle ejection chain method for TSP instances containing up to 10,000,000 nodes.

2) Recent Developments in Domination Analysis of Algorithms in Combinatorial Optimization, ***Abraham P. Punnen***, University of New Brunswick, Dept. of Math Sciences, Saint John, NB, E2L 4L5, Canada, punnen@fundy.csd.unbsj.ca

We review recent developments in domination analysis of algorithms for combinatorial optimization problems and in particular, for the TSP. We will discuss domination number of several well-known heuristics for the TSP.

3) Maximum Likelihood Estimation of Linear Models Subject to Linear Restrictions: More Fun than You Might Think, ***Keith Womer***, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, kwomer@bus.olemiss.edu

MLE with normally distributed errors is common in statistics. When the problem involves 2 or more equations with linear restrictions, it can admit multiple local maxima. We investigate several techniques, identify the alternative local maxima and propose some interpretations.

4) Filter & Fan Methods for Combinatorial Optimization, ***Fred W. Glover***, University of Colorado, Sch. of Bus., CB 419, Boulder, CO 80309-0419, fred.glover@colorado.edu, ***Cesar Rego***

Filter and fan methods combine 2 candidate list strategies proposed with tabu search to yield a useful and distinctive search method that is enhanced by adaptive memory tabu search structure. We describe the rationale and decision rules for these combined strategies and report an application to 0-1 ILP and sequencing.

MD13 Interior-Point Methods for LInear & Semidefinite Optimization III

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Kees Roos, TU Delft/University of Leiden, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@its.tudelft.nl

1) Recent Improvements in MOSEK, ***Erling D. Andersen***, EKA Consulting ApS, Fruebjergvej 3, Boks 16, Copenhagen, 2100, Denmark, e.d.andersen@mosek.com

We discuss recent improvements to the linear and conic quadratic interior-point based optimizer in MOSEK. Moreover, we will present computational results comparing versions 1 and 2 of MOSEK.

2) New Proximity Functions for Primal-Dual Interior-Point Methods, ***Kees Roos***, TU Delft/University of Leiden, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@its.tudelft.nl, ***Jiming Peng***, ***Tamas Terlaky***

IPMs can use small- or large-updates of the barrier parameter. Contrary to theoretical results, large-update IPMs are more efficient in practice than small-update IPMs. We discuss theoretical weaknesses of the classic approach and show how better complexity results are obtained by changing the underlying proximity function.

3) Complexity of Convex Optimization using Geometry-Based Measures & a Reference Point, ***Robert M. Freund***, MIT, 50 Memorial Dr., Bldg. E53-357, Cambridge, MA 02142-1347, rfreund@mit.edu

We present a worst-case complexity bound on the computation of an almost-optimal solution of a conic convex optimization problem in terms of natural geometric measures of the primal feasible region. This contrasts with other complexity measures that rely on algebraic measures or on data-based condition numbers.

MD14 Linear Optimization & Health Care

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Allen Holder, Trinity University, Math Dept., 715 Stadium Dr., San Antonio, TX 78212, aholder@trinity.edu

1) Optimization Applications in Health Care, ***Michael W. Carter***, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, carter@mie.utoronto.ca

Health care is the largest single industry in North America, accounting for more than 14% of the GDP in the US, more than $1 trillion annually. Within the industry, there are a wide variety of optimization applications. We will present a survey of a few applications to illustrate the scope.

2) A Multiple Criteria Optimization Approach for Tumor Classification, ***Momiao Xiong***, University of Texas, Health Science Ctr., Genetics Ctr., PO Box 20334, Houston, TX 77225, mxiong@sph.uth.tmc.edu, ***Minghe Sun***

A multiple criteria optimization approach combining multiple classifiers and multiple data sets is proposed for tumor classification. A classification error rate of each classifier is taken as a criterion. The approach is applied to colon and breast cancer diagnosis and compared to Bayesian and maximum weight spanning tree combiners.

3) Multi-Scale Fusion of Megavoltage Electronic Portal Images & Diagnostic Images of Patients in Radiotherapy by Maximizing Mutual, ***Francis Newman***, University of Colorado, Health Sci. Ctr., Cancer Pav., Box 6510, MS F706, Aurora, CO 80010-0510, francis.newman@uchsc.edu, ***Steve Humphries***, ***Merrill Mann***

Radiotherapy patients have images taken of their beam portals from treatment machines once a week. Films are being replaced by EPIs furnishing digital solutions. Ten percent of erroneous EPIs not matching correct diagnostic images are missed. We offer to maximize mutual information over multiple scales as an automated fusion technique.

MD15 Large-Scale Optimization

Cluster: Large-Scale Mathematical Programming
Invited Session

Chair: Nick Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 South Mathews Ave., Urbana, IL 61801, nikos@uiuc.edu

1) Interior-Point Optimization through Trust Regions, ***E. Michael Gertz***, Northwestern University/Argonne National Laboratory, Math & CS Division, 9700 South Cass Ave., Argonne, IL 60439-4844, gertz@mcs.anl.gov

We describe a trust-region approach to non-convex, nonlinear optimization. The method, based on a merit function of Forsgren & Gill, handles nonconvexity correctly and has excellent convergence properties. The algorithm uses off-the-shelf linear equation solvers, allowing us to leverage years of research in numerical linear algebra.

2) Solving Trajectory Optimization Probems as Large-Scale Nonlinear Programs, ***Robert J. Vanderbei***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, rvdb@princeton.edu

We discuss how to formulate and solve trajectory optimization problems as large-scale nonlinear programming problems. Some discretization rules will be compared. Examples from flying, driving, putting and rocketry will be discussed. Numerical results will be presented.

3) Global Optimization of Mixed Integer Nonlinear Programs, ***Mohit Tawarmalani***, Purdue University, Krannert Mgmt. Sch., West Lafayette, IN 47907, mtawarma@mgmt.purdue.edu, http://icdweb.cc.purdue.edu/~mtawarma, ***Nick Sahinidis***

Recent advances in global optimization make possible the solution of "large-scale" MINLPs. We report computational results on a large collection of miscellaneous benchmarks as well as problems arising from pooling and blending in the petrochemical industry, optimization of differential algebraic systems, discrete location and molecular design.

4) Second Order Information in CONOPT: A Large-Scale GRG, ***Arne S. Drud***, ARKI Consulting & Development A/S, Bagsvaerdvej 246A, Bagsvaerd, DK2880, Denmark, adrud@arki.dk

The GRG algorithm is very reliable but can be slow on models with many degrees of freedom (superbasics). We will discuss how analytic second order information can be used. We will concentrate on the large-scale case. Computational results with a new version of CONOPT will be given.

MD16 Process Flexibility & Forecast Evolution in Capacitated Manufacturing Systems

Sponsor: MSOM
Sponsored Session

Chair: Ana Muriel, University of Massachusetts, Dept. of MIE, ELAB 213D, Amherst, MA 01003, muriel@ecs.umass.edu

1) Forecast Band Revision & Capacitated Multi-Period Production Planning, ***Jayashankar Swaminathan***, University of North Carolina, Kenan-Flagler Bus. Sch., Chapel Hill, NC 27599-3490, msj@unc.edu, ***Philip M. Kaminsky***

We present a model for forecast evolution and develop a capacitated production planning model for multiple periods of demand. We characterize the optimal production policy under this forecast evolution process and develop effective heuristics. Finally, we computationally compare the effect of forecast information update patterns on optimal costs.

2) Process Flexibility in Supply Chains, ***Stephen C. Graves***, MIT, Leaders for Mfg. Program, Sloan Sch. of Mgmt., Cambridge, MA 02139-4307, sgraves@mit.edu, ***Brian T. Tomlin***

We develop an effective flexibility deployment policy for multi-product multi-stage supply chains. In doing so, we demonstrate that flexibility must be configured to protect against 2 key multi-stage inefficiencies.

3) Deciphering Demand Signatures in Supply chains, ***Avi Giloni***, Yeshiva University, Syms Sch. of Bus., agiloni@ymail.yu.edu, ***Vishal Gaur***, ***Sridhar Seshadri***

We depict demand data arising from the superposition of multiple retailer demands on a supplier. We show that conventional forecasting techniques are inadequate for deciphering the determinants of the superposed demand. We propose a forecasting model based on inventory theory and discuss the implications for supply chain planning.

4) Capacity & Flexibility Planning in a Make-to-Order Environment, ***Ana Muriel***, University of Massachusetts, Dept. of MIE, ELAB 213D, Amherst, MA 01003, muriel@ecs.umass.edu, ***Ebru Bish***, ***Stephan Biller***

We develop a framework to evaluate capacity and flexibility investment decisions considering the impact they have on the supply chain and the use of different pricing strategies to better match demand with available capacity.

MD17 Principal-Agent Models & Operations Management

Sponsor: MSOM
Sponsored Session
Chair: Robert A. Shumsky, University of Rochester, Simon Grad. Sch. Bus. Admin., Rochester, NY 14627, shumsky@simon.rochester.edu

1) Sales-Force Compensation under Constrained Supply, ***David J. Huff***, University of Rochester, Simon Sch., Rochester, NY 14627, huffda@simon.rochester.edu, ***Sanjog Misra***, ***Nils Rudi***

Traditionally, sales-force compensation has been studied using the principal-agent framework assuming unlimited supply. We consider sales-force incentives under the additional restriction of a supply constraint. We explore the sales commission as it relates to supply and the agent's cost of effort and compare our results to the unconstrained case.

2) Incentives for Disease Management, ***Stefanos Zenios***, Stanford University, Grad. Sch. of Business, Stanford, CA 94305, stefzen@leland.stanford.edu, stefzen@exch-gsb.stanford.edu

We develop a simple principal-agent model to identify efficient reimbursement systems for disease management. The model assumes a risk-neutral principal (a regulator) and a risk-neutral agent (the so-called disease management organization). The agent treats a patient who suffers from a chronic disease. The patient can be in 1 of 2 possible disease-stages and the disease-stage is only observable by the agent.

3) Hospital Operating Room Capacity Expansion, ***William S. Lovejoy***, Michigan Business School, 701 Tappan, Ann Arbor, MI 48109-1234, wlovejoy@umich.edu, ***Ying Li***

We consider optimal participation-inducing contracts for extending hours in existing operating rooms in a client hospital, as an alternative to new construction costs. In so doing, we explicitly consider the different perspectives of hospital administrators and surgical staff for different features of the contract. of hospital administrators and surgical staff for different features of the contract.

4) Gatekeepers & Referrals in a Service Center, ***Robert A. Shumsky***, University of Rochester, Simon Grad. Sch. Bus. Admin., Rochester, NY 14627, shumsky@simon.rochester.edu, ***Edieal Pinker***

We examine services in which gatekeepers may attempt to treat customers or may refer customers to experts. The gatekeepers are heterogeneous in treatment ability and each gatekeeper knows the likelihood of successful treatment while the firm does not. We consider contracts designed to overcome the effects of this information asymmetry.

MD18 Tutorial: Location Modeling

Sponsor: SOLA
Sponsored Session
Chair: Mark S. Daskin, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, daskin@northwestern.edu

1) Tutorial: Location Modeling, ***Mark S. Daskin***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, daskin@northwestern.edu, ***John Current***, ***David Schilling***

We survey the formulation of classic network and discrete location problems and review heuristic, Lagrangian relaxation and dual ascent algorithms for solving such problems. We highlight applications of the models in facility location contexts as well as flexible manufacturing tool selection, product positioning, product procurement and vehicle routing.

MD19 Discrete Optimization in Stochastic Programming

Cluster: Stochastic Programming
Sponsor: Optimization
Sponsored Session
Chair: Suvrajeet Sen, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu

1) Stochastic Vehicle Routing with Random Travel Times, ***David P. Morton***, University of Texas, Grad. Program in OR/IE, Austin, TX 78712-1063, morton@mail.utexas.edu, ***Astrid Kenyon***

We consider stochastic VRPs on a network with random travel times. A fleet of one or more vehicles is available to be routed through the network to serve each node. We develop bounds on optimal solution values, provide conditions under which reductions to simpler models can be made and employ a Monte Carlo sampling-based solution procedure.

2) A Stochastic Programming Approach to Airline Crew Scheduling, ***Andrew J. Schaefer***, University of Pittsburgh, Dept. of IE, 1031 Benedum Hall, Pittsburgh, PA 15261, schaefer@engrng.pitt.edu

Deterministic airline crew scheduling is difficult. Once operational uncertainty is considered, the problem is intractable for even small instances. By making 2 assumptions, we show that the recourse function may be linearized. We indicate other classes of large-scale stochastic integer programs for which such an approximation may be beneficial.

3) On Probabilistic Programs with Discrete Distributions, ***Darinka Dentcheva***, Stevens Institute of Technology, Dept. of Math, ddentche@stevens-tech.edu, ***Andras Prekopa***, ***Andrzej Ruszczynski***

We consider stochastic programming problems with probabilistic constraints involving integer-valued random variables. The concept of a p-efficient point of a probability distribution is used to derive various equivalent problem formulations. Next, we introduce the concept of r-concave discrete probability distributions and analyze its relevance for problems under consideration. These notions are used to derive lower and upper bounds...

MD20 Distinguished Speaker: High Technology Entrepreneurship - What Happening to It & to the Academic Research About It?

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session
Chair: Sarfraz A. Mian, SUNY, Sch. of Business, Swetman Hall, Oswego, NY 13126, mian@oswego.edu

1) High Technology Entrepreneurship: What's Happening to It & to the Academic Research about It?, ***Edward B. Roberts***, MIT, Sloan Sch. of Mgmt.

MD21 Panel: Thought Leadership in Manufacturing Strategy

Cluster: Manufacturing Strategy
Invited Session
Chair: Aleda V. Roth, University of North Carolina, CB 3490, Chapel Hill, NC 27599-3490, aleda_roth@unc.edu

1) Panel: Thought Leadership in Manufacturing Strategy, ***M. Therese Flaherty***, University of Pennsylvania, Wharton Sch. 1310 SH-DH, Philadelphia, PA 19104-6366, flaherty@opim.wharton.upenn.edu, ***Cheryl Gaimon***, Georgia Institute of Technology, 755 Ferst Dr., Atlanta, GA 30332-0520, cheryl.gaimon@mgt.gatech.edu, ***Aleda V. Roth***, University of North Carolina, CB 3490, Chapel Hill, NC 27599-3490, aleda_roth@unc.edu, ***Leroy B. Schwarz***, Purdue University, Krannert Grad. Sch. of Mgmt., West Lafayette, IN 47907, lee@mgmt.purdue.edu

Manufacturing strategy is the art of creating and delivering product value

profitably. Conventional wisdom posits that competitive manufactruing firms are better able to define their business capabilities and link together the right resources as a systemic process of deliberate choices for structural, infrastructural and integration choices...

MD22 Supplier Selection Characteristics

Cluster: Supply Chain Management
Invited Session

Chair: Mohammad Z. Bsat, Jackson State University, Dept. of Mgmt. & Mktg., PO BOx 18230, Jackson, MS 39217-0730, mbsat@mail1.jsums.edu

1) An Empirical Assessment of the Relationship between Cost & Timely Delivery of Manufactured Parts in the Context of Supplier Selection, *Veleanor Ballard*, Jackson State University, Dept. of Mgmt. & Mktg., PO BOx 18230, Jackson, MS 39217-0730, veleanor3@excite.com

We examine the relationship between the cost of manufactured parts and the timely delivery of manufactured parts as they are both considered major determinants of supplier selection. The sample consists of a randomly-selected group of parts manufacturers in the US.

2) Supplier Selection Characteristics & Electric Utilities: Cost & the Consumption Function, *Ulysses J. Brown*, Jackson State University, Dept. of Mgmt. & Mktg., PO BOx 18230, Jackson, MS 39217-0730, ubrown@ccaix.jsums.edu

We examine a group of supplier selection characteristics that electric utility firms consider in the process of vendor selection. A cost model of electricity was formulated and tested, regressing electricity cost on electricity production, consumption and energy losses. Implications for actual practice and future research suggestions are also discussed.

3) An Assessment of the Service Level Characteristic's Role in the Quality Dimension of Industrial Suppliers, *Robert Gillon*, Jackson State University, Dept. of Mgmt. & Mktg., PO BOx 18230, Jackson, MS 39217-0730, robear@netdoor.com

We examine the effect that parts manufacturer service level has on the quality of manufactured parts in the supplier selection process of manufacturing firms. Approximately 30 observations of medium- to large-size manufacturing organizations were surveyed to examine the relationship between these 2 selection characteristics.

4) Assessing the Relationship of Cost & Product Quality in Supply Chain Management, *Don Okhomina*, Jackson State University, Dept. of Mgmt. & Mktg., PO BOx 18230, Jackson, MS 39217-0730

Heightened competition compelled business entities to reconsider comparative advantage. Many companies believe that supply chain management is the panacea for successful and prosperous future. We examine the relationship between product cost and product quality in which the cost variable mediates the relationship between parts assembler and parts supplier behaviors.

5) The Impact of Product-Related Characteristics on the Supplier Selection Process, *Mohammad Z. Bsat*, Jackson State University, Dept. of Mgmt. & Mktg., PO BOx 18230, Jackson, MS 39217-0730, mbsat@mail1.jsums.edu

A sample encompassing a variety of manufacturing firms scattered around the country is surveyed to determine the effect that different product-related characteristics have on supplier selection. A multiple regression is utilized to determine the importance that each of these characteristics has in the supplier selection process of manufacturing firms.

MD23 Stochastic Optimization & Risk Management

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: Gyana Parija, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598

1) A Forecasting & Optimization Procedure for the Multi-Family Housing Industry, *Ahmet Kuyumcu*, Manugistics Group, Inc., Overlook II, 2839 Paces Ferry Rd. SE, 1000, Atlanta, GA 30339, akuyumcu@manu.com

Multi-family housing industry has specific characteristics, such as low number of transactions and longer lengths of stay, which lead to technical challenges for forecasting and optimization procedures. We explore some of these challenges and propose a forecasting and optimization approach.

2) Optimal Pricing & Capacity Rationing in Rentals, *Sergei Savin*, Columbia University, 404 Uris Hall, 3022 Broadway, New York, NY 10027, svs30@columbia.edu

We analyze a problem of sharing rental capacity between "contract" customers, who expect a fixed pre-negotiated rental fee and high quality of service, and "walk-in" customers, which have no specific service expectations and are "shopping for price." We formulate this rental management problem as a problem in stochastic.

3) Supply Contract Allocation, *Bala Ramachandran*, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, rbala@us.ibm.com, ***Gyana Parija***

We consider the allocation of a firm's supply requirements over a strategic time horizon, between a range of supply sources - different types of supply contracts and spot markets, subject to the uncertainties in demand and prices. We present a model that develops a supply portfolio, considering the risks of procurement costs exceeding a specified budget.

4) Accepting Bids under Uncertain Future Demands, *Jayant Kalagnanam*, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, jayant@us.ibm.com, ***Gyana Parija***, ***Monalisa Mohanty***

We provide a novel method for developing optimal sales plans for multiple products, i.e., multiple attributes and price classes, etc., contingent on different realizations of uncertain demand over multiple periods with the objective of maximizing expected revenue over using constrained capacity. These contingent plans satisfy business rules such as service level agreements etc.

5) Flexible Pricing in Reverse Logistics, *Yingdong Lu*, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10549, yingdong@us.ibm.com, ***Markus Ettl***, ***Richard Lawrence***, ***Grace Lin***, ***David D. Yao***

A multi-stage dynamic planning problem is considered. At each stage, we receive machines and parts that are either out-of-lease or excess inventory. They can be sold as machines, but can also be disassembled into parts, which usually yield higher return. The parts and machines can be sold through several distribution channels, dynamic decisions upon pricing within channel and allocation between channels are allowed...

MD24 Optimization in Supply Chains

Cluster: Manufacturing Systems & Supply Chain Integration
Invited Session

Chair: H. Edwin Romeijn, University of Florida, Dept. of ISE, PO BOx 116595, 303 Weil Hall, Gainesville, FL 32611-6595, romeijn@ise.ufl.edu

1) An Integer Linear Programming Model for Production & Delivery Planning in Supply Chain Systems, *Srisawat Supsomboon*, University of Washington, Dept. of IE, Box 362560, Seattle, WA 98195-2650, supsombo@u.washington.edu, ***Zelda B. Zabinsky***, ***Benita Beamon***

We propose an integer linear optimization model in a deterministic multi-item, multi-stage generalized network supply chain system. The model uses a kanban control system to plan and allocate production and delivery thoughout the supply chain. A trade-off analysis is presented, contrasting shortage cost with operating and inventory cost.

2) Solution Methods for a Production Capacity Allocation Problem in a Supply Chain, *Elif Akcali*, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907-1287, akcali@purdue.edu, ***Reha Uzsoy***

We present an MILP model for a supply chain with multiple plants and multiple warehouses to allocate production capacity, where there is a limit both on the number of warehouses that a plant can serve and on the number of plants a warehouse can be served by. We discuss exact solution methods and heuristics for the problem.

3) Assignment Problems in Supply Chains, *H. Edwin Romeijn*, University of Florida, Dept. of ISE, PO BOx 116595, 303 Weil Hall, Gainesville, FL 32611-6595, romeijn@ise.ufl.edu, ***Dolores Romero Morales***

We consider a framework for modeling and solving assignment-type problems in supply chains, focusing on the assignment of retailers to suppliers in a dynamic environment. In particular, we consider problems where suppliers face finite (production) capacities and inventories are held at both the suppliers and the retailers.

MD25 Scheduling II

Contributed Session

Chair: Iiro K. Harjunkoski, Carnegie Mellon University, Dept. of Chem. Eng., 5000 Forbes Ave., Pittsburgh, PA 15213, iiro@andrew.cmu.edu

1) A Hybrid Constraint Programming/MILP Strategy for Multi-

Stage Scheduling, ***Iiro K. Harjunkoski***, Carnegie Mellon University, Dept. of Chem. Eng., 5000 Forbes Ave., Pittsburgh, PA 15213, iiro@andrew.cmu.edu, ***Ignacio E. Grossmann***

An approach is presented for combining CP with MILP for multistage scheduling. The proposed hybrid approach assigns orders to equipment with an MILP subproblem and performs sequencing with CP. Special cuts are proposed for the MILP subproblem. Order of magnitude reductions are obtained.

2) Resource Constrained Project Scheduling by a Real-Time Search & Learn Algorithm, ***Mohammad K. Ahsan***, Tokyo Institute of Technology, Tsao Lab., Dept. of IE & Mgmt., 2-12-1 O-okayama, Meguro-ku, Tokyo, 152-8552, Japan, mkahsan@ie.me.titech.ac.jp, ***De-bi Tsao***

We develop the real-time search feature for the SLA in solving resource constrained project scheduling problems. As node selection criteria of SLA resource utilization is considered as one of the important factors. Analysis of computational performance justifies the use of the proposed heuristics compared to the previous solution of SLA.

3) Heuristic Algorithms for Minimizing Lmax on Parallel Machine Scheduling, ***Grisselle Centeno***, University of Central Florida, 4202 East Fowler Ave., ENB 118, Tampa, FL 33620-5350, gcenteno@eng.usf.edu, ***Robert L. Armacost***

We develop algorithms for minimizing lateness on parallel machines when release time, due date and machine eligibility constraints are present. We evaluate which algorithm works best under slack or tight due dates and whether the degree of nesting for the machine eligibility restriction affects the performance of the algorithms.

4) Computational Results in Single Machine Scheduling with Sequence- Dependent Setup Times using an Ant Colony Algorithm, ***Caroline Gagne***, University of Quebec, Dept. of Info. & Math, Chicoutimi, Quebec, G7H 2B1, Canada, caroline.gagne@gigger.net, ***Marc Gravel, Wilson L. Price***

We describe a multiple-criteria version of our ant-colony algorithm for scheduling a single machine with sequence dependent setups and we present our current computational results. Our implementation incorporates a number of indicators for local decisions as well as a look-ahead capability. An industrial application is outlined.

MD26 OOTW Toolbox

Sponsor: MAS
Sponsored Session
Chair: Dean S. Hartley, III, Hartley Consulting, 106 Windsong Lane, Oak Ridge, TN 37830, dshartley3@home.com

1) DMSO OOTW Toolbox, ***Dean S. Hartley, III***, Hartley Consulting, 106 Windsong Ln, Oak Ridge, TN 37830, dshartley3@home.com

During the past 5-6 years, the DoD community has become increasingly aware of the need for modeling, simulation & general tool support for OOTWs - and with the general lack of said tools. The Defense Modeling and Simulation Office is creating an architecture to support the creation and use of OOTW tools, called the OOTW Toolbox. We will discuss the current status of the OOTW Toolbox.

2) Tools for the DMSO OOTW Toolbox, ***Dean S. Hartley, III***, Hartley Consulting, 106 Windsong Ln, Oak Ridge, TN 37830, dshartley3@home.com

Several potential tools for the DMSO OOTW Toolbox will be described. The audience will be invited to comment on the desirability of the tools and suggest revisions to the concepts.

MD27 TRAC OR

Sponsor: MAS
Sponsored Session
Chair: James Treharne

1) Literature Review of the Impacts of Digitization, ***Randy Zimmerman, James Treharne***

No abstract supplied.

2) Impacts of C4 and ISR Modernization, ***James Treharne***

No abstract supplied.

MD28 MCDM Applications & Issues

Cluster: Multi-Criteria Decision Making
Invited Session
Chair: Lorraine R. Gardiner, Auburn University, Dept. of Mgmt., 401 Lowder Bus. Bldg., Auburn, AL 36849, gardilr@auburn.edu

1) withdrawn 9/20: Stability in Data Envelopment Analysis: Watch your Measurement Scales!, ***Mitchell Robinson***, Wyle Laboratories, 128 Maryland St., El Segundo, CA 90245, mrobinson@wylelaboratories.com

2) MCDM in Practice: Developing a Mobile Teletriage System for Pediatric Emergencies, ***Wojtek Michalowski***, University of Ottawa, Fac. of Admin., Ottawa, Ontario, K1N 6N5, Canada, wojtek@admin.uottawa.ca, ***Steven Rubin, Roman Slowinski, Szymon Wilk***

We present a mobile teletriage system for nurse practitioners to use to evaluate selected pediatric emergencies. Using ER data from the Children's Hospital of Eastern Ontario and Alberta Children's Hospital, we apply a variety of methodologies to identify the most relevant clinical attributes and signs for triage of the children's condition. This information forms a basis of the support system implemented on the PDA device.

3) Integrated Enterprise Decision Support through Self-Building Simulation-Based Operational Modules, ***John M. Walters***, Dynamics Research Corp., 1755 Jefferson Davis Hwy, Ste. 200, Arlington, VA 22202, mwalters@drc.com, ***Robert S. Monahan***

Optimized decision support has not performed well in a dynamic multi-departmental enterprise environment with competing decision makers. We explore multi-criteria decision support integrated through a "self-building" simulation core with recursive optimization. The concept is explored through the examination of current DSSs coupled with a core modeling capability.

4) The Role of Multiple Criteria Decision Methods in Project Management, ***Lorraine R. Gardiner***, Auburn University, Dept. of Mgmt., 401 Lowder Bus. Bldg., Auburn, AL 36849, gardilr@auburn.edu, ***Dagmar Gluckaufova***

Project management in practice involves decisions throughout the project life cycle that require consideration of multiple criteria. Prominent methodology and software do not, however, provide comprehensive support for these decisions. We describe critical decision points in the project management process. For each, we outline potentially useful multi-criteria methods.

MD29 IIE Transactions

Sponsor: QSR
Sponsored Session
Chair: Elsayed A. Elsayed, Rutgers University, Dept. of IE, 96 Frelinghuysen Rd., Piscataway, NJ 08854-8018, elsayed@rci.rutgers.edu

1) Modeling the Design Quality Competition for Durable Products, ***Panos Kouvelis***, Washington University, Olin Sch. of Business, CB 1133, 1 Brookings Dr., St. Louis, MO 63130-4899, kouvelis@olin.wustl.edu, ***Samar K. Mukhopadhyay***

Competition on design quality is modeled in a duopolistic non-co-operative game theoretic framework. Design quality and price of the product life cycle are the 2 control variables and also influence the market penetration by the 2 firms. Optimal quality and pricing policies are reported from both analytical and numerical analysis.

2) The Generalized Likelihood Ratio Test for Statistical Process Control of Auto-Correlated Processes, ***Daniel W. Apley***, Texas A&M University, Dept. of IE, 3131 TAMU, College Station, TX 77843-3131, apley@tamu.edu, ***Jianjun Shi***

We discuss an SPC technique, based on a GLRT, for detecting and estimating mean shifts in autocorrelated processes. The GLRT involves the residuals of an appropriate auto-regressive integrated moving average (ARIMA) process model. Its performance is compared to residual-based Shewhart and CUSUM charts, with the conclusion that the best residual-based method depends on the particular ARIMA model used to describe the autocorrelation...

3) Maximizing Customer Satisfaction by Optimal Specification of Engineering Characteristics, ***Ronald G. Askin***, University of Arizona, Dept. of SIE, Tucson, AZ 85721-0020, ron@sie.arizona.edu, ***Donald W. Dawson***

The House of Quality has been widely discussed as a mechanism for converting customer attributes into engineering specifications. In the past, this process has been subjective and heuristic. We present a mathematical programming model for determining optimal settings for engineering characteristics based on value functions to capture customer preferences.

4) An Economic Model for Integrated APC & SPC Control Charts, ***Wei Jiang***, HKUST, Dept. of IE/EM, Clear Water Bay,

Kowloon, Hong Kong, jiangwei@ust.hk, ***Kwok L. Tsui***

We develop an economic model for SPC monitoring of an APC controlled processes. We also develop an economic loss-based criterion, the AQC to evaluate the performance of SPC charting methods. The AQC and the traditional average run length of 3 common SPC charts are compared.

MD30 Decision Analysis Awards

Sponsor: Decision Analysis
Sponsored Session

Chair: L. Robin Keller, University of California, 350 Grad. Sch. of Mgmt., Irvine, CA 92697-3125, lrkeller@uci.edu, http://www.gsm.uci.edu/~keller

1) Decision Analysis Awards, *L. Robin Keller*, University of California, 350 Grad. Sch. of Mgmt., Irvine, CA 92697-3125, lrkeller@uci.edu, http://www.gsm.uci.edu/~keller

The Decision Analysis Society of INFORMS will announce the recipients of the 2001 Ramsey Medal for lifetime contributions to decision analysis, 2001 publications award for best publication in the year 1999 and the 2001 student paper award. Each winner will be invited to speak briefly. The winner of the Decision Analysis Practice award will also be announced. The practice award competitors will make their presentations in an earlier session.

MD31 Belief Functions in Expert Systems

Cluster: Belief Functions: Advances & Applications
Invited Session

Chair: Prakash P. Shenoy, University of Kansas, School of Bus., Lawrence, KS 66045, pshenoy@ku.edu, htt://lark.cc.ukans.edu/~pshenoy/

1) Including Default & Non-Monotonic Rules in Belief Structures, *R. R. Yager*, Iona College, Machine Intelligence Inst., New Rochelle, NY 10801, yager@panix.com

Within the Dempster-Shafer framework, a concept that plays a central role is the compatability relation that provides knowledge about the allowable solutions to one variable given information about another. A fundamental inference schema within the Dempster-Shafer theory involves the use of a compatability relation and a belief structure on one of the variables, the primary variable, to infer a belief structure on the secondary variable...

2) Modeling the Representativeness Heuristic by the Theory of Hints, *Hans Wolfgang Brachinger*, University of Fribourg, Dept. of Quantitative Econ., Ave. de Beauregard 11, Fribourg, CH-1700, Switzerland, hanswolfgang.brachinger@unifr.ch

A mathematical model of the "representativeness" heuristic is developed. This heuristic can be considered as the degree of support of mental models. The model is well-suited to explain the usual behavior in the so-called "Linda problem," the best-known empirical example for violation of the conjunction rule of probability theory.

3) Supporting Elicitation & Consensus Building for Dempster-Shafer Decision Models, *Kweku-Muata Bryson*, Virginia Commonwealth University, Info. Systems Research Inst., Richmond, VA 23284, kwekumuata@isy.vcu.edu

Many decision models based on Dempster-Shafer belief functions involve the elicitation of subjective probability judgments from a group of experts based on qualitative preferences. Given that a major reason for using a group is the belief that the combined group judgment is likely to be superior to individual judgment, the issues of synthesis and consensus assessment and building become important...

MD32 Modeling & Optimization in Finance I

Cluster: Financial Engineering
Invited Session

Chair: Stanislav Uryasev, University of Florida, Dept. of ISE, PO Box 116595, 303 Weil Hall, Gainesville, FL 32611-6595, uryasev@ise.ufl.edu

1) A Hybrid Simulation/Tree Stochastic Optimization Model for Dynamic Asset Allocation, *Norio Hibiki*, Keio University, Dept. of Admin. Eng., 3-14-1 Hiyoshi Kohoku-Ku, Yokohama, 223-8522, Japan, hibiki@ae.keio.ac.jp

We propose a multi-period stochastic linear programming model with a hybrid structure using simulated paths and a decision tree for dynamic asset allocation. Large-scale problems can be solved in practice. The model can be also used for asset and liability management, and other financial optimization problems.

2) Optimal Portfolio Liquidation Strategy: A Sample-Path Approach, *Pavlo Krokhmal*, University of Florida, Dept. of ISE, PO Box 116595, 303 Weil Hall, Gainesville, FL 32611-6595, krikhmal@ufl.edu, ***Stanislav Uryasev***

We consider the problem of portfolio liquidation with the aim of maximization of the expected return. The risk is constrained using CVaR risk functions. The model combines sample-path simulation approach with optimization techniques. The approach was used to optimize performance of a trading strategy.

3) Classification using Optimization: Application to Credit Card Scoring, *Vlad Bugera*, University of Florida, Dept. of ISE, PO Box 116595, 303 Weil Hall, Gainesville, FL 32611-6595, bugera@ufl.edu, ***Stanislav Uryasev, Hiroshi Konno***

We consider an approach for classification of objects, based on optimization of utility function which characterizes quality of classification. The approach is demonstrated with a credit card scoring application.

4) Asset & Liability Management for Endowments with Guarantees, *Stavros A. Zenios*, University of Cyprus, Hermes Ctr. in Comp. Finance, & Economics, PO Box 20537, Nicosia, 1678, Cyprus, zenioss@ucy.ac.cy

We discuss a scenario-based optimization model for managing endowments with guarantees and its use for a web-based system for personal financial planning.

MD33 Roundtable: Where is OR/MS in the Present Crises in Health Care Delivery? Cost, Quality of Care & Access Issues

Sponsor: Health Applications
Sponsored Session

Chair: William P. Pierskalla, UCLA, Anderson Sch., 110 Westwood Plaza, Ste. B411, Los Angeles, CA 90095-1481, william.pierskalla@anderson.ucla.edu

1) Where is OR/MS in the Present Crises in Health Care Delivery? A Roundtable on Cost, Quality of Care & Access Issues in Health Care, *Eugene Litvak*, Boston University, Dept. of Operations Mgmt., Sch. of Mgmt., 595 Comm. Ave., Boston, MA 02215, ***William P. Pierskalla, Ronald L. Rardin, Francois Sainfort***

There are major cost, quality and access crises facing patients today from Massachusetts to California. Severely ill patients cannot get beds. If they do get beds, over 100,000 will die unnecessarily. Costs are rising at two to four times the rate of inflation. Most of these problems occur not because of resource shortages but because of uncontrolled variability and poor processes of delivery...

MD34 Optimization Applications in Air Transportation

Sponsor: TSS
Sponsored Session

Chair: Jian Yang, NJIT, Dept. of IME, Newark, NJ 07102, yang@adm.njit.edu, http://www-ec.njit.edu/~yang

1) Class Scheduling for Pilot Training, *Jonathan Bard*, University of Texas, Dept. of Mech. Eng., Austin, TX 78712-1175, jbard@mail.utexas.edu, ***Xiangtong Qi, Gang Yu***

We study the pilot training class scheduling problem for a major airline. Different from most timetabling models, this is a class scheduling problem over a long time period. We will present the complexity, modeling, solution techniques as well as computational results for this problem.

2) Strong Formulations in Airline Schedule Design & Fleet Assignment, *Amr A. Farahat*, MIT, OR Ctr., 77 Massachusetts Ave., Rm. E40-130, Cambridge, MA 02139, afarahat@mit.edu, ***Cynthia Barnhart***

We address the problem of determining flight times and fleet types to assign to an airline's flight network. These problems can be modeled as huge mixed-integer programs whose solution are computationally challenging. We present new formulations with tight LP relaxations and provide preliminary results based on data drawn from a major US airline.

3) Aircraft Routing under Weather Uncertainty, *Arnab Nilim*, University of California, Dept. of EECS, 262M Cory Hall, Berlekey, CA 94720, nilim@robotics.eecs.berkeley.edu, ***Mark Hansen, Laurent El Ghaoui, Vu Duong***

Convective weather causes delay and disruption in the national airspace system, in part because of the difficulty in forecasting it. We consider the problem of optimal aircraft routing under weather uncertainty. Our approach employs Markov decision processes and a dynamic programming algorithm that will provide a routing strategy that minimizes the expected delay.

MD35 Transportation Science I

Sponsor: TSS
Sponsored Session
Chair: Anton J. Kleywegt, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton@isye.gatech.edu

1) A Branch & Cut Algorithm for the Multiple-Depot Vehicle Scheduling Problem, ***Paolo Toth***, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 40136, Italy, ptoth@deis.unibo.it, ***Matteo Fischetti***, ***Andrea Lodi***

The MDVSP consists of determining a min-cost assignment of time-tabled trips to vehicles located in different depots. We propose new valid inequalities and the corresponding separation procedures. These results are used within a B&C scheme whose performance is evaluated throughout extensive computational results on real-world and random instances.

2) Time Constrained Dynamic VRP for E-Markets, ***Monica Gentili***, University di Roma "La Sapienza", Dip. di Stat. Prob. e SA, Ple. A Moro, Rome, 00185, Italy, gentili@pow2.sta.uniroma1.it, ***Paolo Dell'Olmo***, ***Guglielmo Lulli***

The e-commerce phenomena is inducing the need for technologies that support real-time decision making in the field of logistics. In particular, carriers and shippers are continually facing the problem of rapid "reconfiguration" of the transportation systems' operations in order to satisfy the new demand and to reduce costs. In this new setting, dynamic models play an increasingly important role...

3) Stabilized Column Generation for Crew Scheduling Problems, ***Jacques Desrosiers***, GERAD, Ecole des HEC, Montreal, Quebec, H3T 2A7, Canada, jacques.desrosiers@hec.ca, ***Marius M. Solomon***, ***Julie Roy***, ***Hatem Ben Amor***

The stabilized version of a problem introduces bounded surplus and slack variables. These are penalized in the objective function. We present the theoretical aspects of the stabilized column generation approach and some recent computational results for the airline crew pairing problem and the bus driver scheduling problem in urban transit.

4) Models & Algorithms for Scheduling Aircraft in the Terminal Maneuvering Area, ***Lucio Bianco***, University di Roma "Tor Vergata", Info. Sistemi e Produzione, Via di Tor Vergata 110, Rome, I-00133, Italy, ***Paolo Dell'Olmo***, ***Stefano Giordani***

We propose scheduling model and real-time algorithms to optimize the management of the TMA. The model is capable of representing the progression of aircraft flows on all the prefixed routes in the area, different runway configurations and other procedural constraints. Performance analysis on some international airport TMAs is discussed.

MD36 Airline Routes & Prices

Sponsor: Aviation Applications
Sponsored Session
Chair: Bill Swan, The Boeing Company, PO Box 3707, MC 21-28, Seattle, WA 98124, bill.swan@boeing.com

1) Future Airline Schedules for Air Traffic Management Concept Analysis, ***Matthew E. Berge***, The Boeing Company, PO Box 3707, MS 7L-21, Seattle, WA 98124-2207, matthew.e.berge@boeing.com, ***Craig A. Hopperstad***

A method for creating future airline schedules for air traffic management concept analysis will be presented. The approach depends on analysis of current schedules, forecasts from the Boeing Current Market Outlook and algorithms for realizing the resultant schedules in an "optimal" way. Both methodology and results will be discussed.

2) Automated Fare Response: An International Pricing Problem, ***Abdulkadir Sarac***, United Airlines, PO Box 66100, Chicago, IL 60666, ***Sairam Rayaprolu***, ***Krishnan Saranathan***, ***Srini Ramaswamy***

Airline fares for international markets are made up of 2 fare components - gateway fare and add-on fare. This international pricing problem has been formulated as an LP, which minimizes the total penalty across fare network. The objective of the automated response system is to systematically determine responses to competitor's fare actions.

3) withdrawn 10/9: An Integer Formulation for the Aircraft Routing Problem, ***Roberto C. V. Pontes***, Rio-Sul Airlines, roberto.carlos@rio.rsl.com.br, ***Nelson F. Maculan***, ***Abilio Lucena***, ***Lucidio Cabral***

4) Forecasting Future Airlines Services: Statewide Planning & Evaluation, ***Peter Chen***, University of Illinois, Dept. of Civil & Environ. Eng., Urbana, IL 61801, pschen@uiuc.edu, ***Hank Hsing***

We present a special purpose simulation-assignment model for medium- to long-term forecasting of "optimal" airline scheduled network, modeling both passenger travel demand and supply-side constraints. General planning and evaluation framework for a statewide aviation study as well as an implication for infrastructure and technology investment decisions will be discussed.

MD37 Applications of Auctions & Revenue Management

Sponsor: Revenue Management & Pricing
Sponsored Session
Chair: Dietrich Chen, McKinsey & Company, Inc., 100 SE 2nd St., Ste. 4400, Miami, FL 33131, dietrich_chen@mckinsey.com

1) Portfolio Exploitation for Optimal Bidding in Business-to-Business Transactions, ***David C. Frye***, Manugistics PRO, Overlook II, Ste. 1000, 2839 Paces Ferry Rd. SE, Atlanta, GA 30339, dfrye@manu.com

We examine 2 distinct methods for exploiting portfolio data for optimizing bids in B2B transactions. Portfolio market response modeling uses information about other products in the bid portfolio to better predict the win probability. Portfolio profit optimization simultaneously sets prices for all products to optimize total profit of the portfolio.

2) Multi-Unit Capacity Auctions in the Context of Corporate Hotel Contracts, ***Mike Freimer***, Cornell University, Sch. of OR, Ithaca, NY 14853-3801, mfreimer@orie.cornell.edu, ***Woonghee Huh***, ***Amar Sapra***

Corporate accounts are often a large fraction of a hotel property's business. One mechanism for allocating a hotel's limited capacity to corporate customers is via a multi-unit capacity auction. Such auctions have been applied to markets for electricity and manufacturing capacity. We examine how such an auction could be structured in the hospitality context.

3) Managing Hotel Distribution Channels from Revenue Management Perspectives, ***Sunmee Choi***, Cornell University, Statler Hall, Ithaca, NY 14853, sc128@cornell.edu, ***Sherri Kimes***

With the size of business from internet-enabled distribution channels growing bigger, revenue management practitioners in the hotel industry are facing a new challenge. We address how the evolving new channels can affect the traditional hotel revenue management practices and how the current approaches can be modified to address the impact.

MD38 Queueing Networks

Sponsor: Applied Probability
Sponsored Session
Chair: John J. Hasenbein, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712-1063, jhas@mail.utexas.edu

1) Heavy Traffic Analysis of Open Processing Networks: Asymptotic Optimality of Discrete Review Policies with Complete Resource Pooling, ***Baris Ata***, Stanford University, Grad. Sch. of Bus., Stanford, CA 94305-5015, bata@stanford.edu, ***J. Michael Harrison***, ***Sunil P. Kumar***

We consider an open processing network in heavy traffic, assuming that the Brownian network obtained as a formal limit has a 1-dimensional equivalent workload formulation. Under mild additional assumptions, it is shown that a particular discrete review policy is asymptotically optimal under diffusion scaling.

2) Existence Conditions & Pathological Examples for the Diffusion Approximations of Priority Queueing Networks, ***Hong Chen***, University of British Columbia, Commerce & Bus. Admin., 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, chen@hong.commerce.ubc.ca, ***Heng Qing Ye***

We present a sufficient condition and a necessary condition for the existence of the diffusion approximation for multi-class queueing networks under priority service disciplines. Especially, the sufficient condition relates to the stability condition of the high priority classes of the fluid networks that correspond to the queueing networks under consideration, which we call the SHP condition...

3) Instability of Fluid & Queueing Networks, ***John J. Hasenbein***, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712-1063, jhas@mail.utexas.edu

Recent examples by Bramson (1999) and Dai, Hasenbein & VandeVate (2001) have shown that the mean-value fluid model of a given stochastic network may not be sharp in determining stability under a given dispatch policy. We introduce a class of queueing networks for which instability of the fluid model

implies global instability of a corresponding discrete stochastic network.

4) A Decomposition Result for M/G/1 Vacation Models with Working Vacations, ***Leslie David Servi***, MIT Lincoln Laboratory, 244 Wood St., Lexington, MA 02420, servi@ll.mit.edu

Reconfiguring wavelengths of a WDM access link results in the performance associated with servers having multiple service speeds. This is addressed by generalizing the classic M/G/1 vacation model decomposition to a new decomposition for the case of service at a reduced but non-0 speed during the vacation period.

MD39 Software Demonstration IV

Chair: To be announced

1) Software Demonstration: Mathematica in OR & MS, ***Silve Parviainen***, Wolfram Research, 100 Trade Center Dr., Champaign, IL 61820, silvep@wolfram.com, ***Anton Rowe***

Mathematica is a fully integrated technical computing system that combines fast, high-precision numerical and symbolic computation with data visualization and programming capabilities. We will cover the basic principles of Mathematica, tour our latest features and explore ways of applying Mathematica to problems in operations and management. Using application examples, we will illustrate how Mathematica seamlessly connects to environments...

MD40 OR/MS in Forestry IV

Cluster: Forestry
Sponsor: ENRE
Sponsored Session
Chair: Jeffrey D. Camm, University of Cincinnati, QAOM Dept., Cincinnati, OH 45221-0130, jeff.camm@uc.edu

1) The Effect of Existing Reserves on Optimal Network Design, ***Jeffrey L. Arthur***, Oregon State University, Dept. of Statistics, 44 Kidder, Corvallis, OR 97331-4606, arthur@stat.orst.edu, ***Darek J. Nalle***, ***John Sessions***

The influence of regions already under protection on the design of a complete reserve network is examined through the use of an optimization model that addresses compactness and contiguity of the resultant network subject to budget and representation constraints. Results for an area in southwest Oregon are presented.

2) Locating Production Possibility Frontiers of Economic & Biological Outputs, ***Darek J. Nalle***, University of Nevada, Applied Economics & Stats., Reno, NV 89557-0105, nalle@cabnr.unr.edu, ***Jeffrey L. Arthur***, ***Claire Montgomery***, ***Nathan H. Schumaker***, ***Steven Polasky***

Trade-offs between the economic output of timber production and the biological outputs of species survival for 3 species with different spatial habitat affinities are modeled on a 2 million ha landscape over a 100-year planning horizon. Solution quality from different heuristics with spatially constrained search neighborhoods is reported and compared

3) Rolling Planning Horizons & Uncertainty in the Forest, ***Ugo Feunekes***, Remsoft, Inc., 332 Brunswick St., Fredericton, NB, E3B 1H1, Canada, ugo@remsoft.com, ***Andrew Cogswell***

It is very difficult, if not impossible, to account for all uncertainty in forest management plans, and as a result, many forest management plans simply ignore these issues. Constructing forest models with rolling planning horizons offers the opportunity to explore the effects of ignoring these issues. We present examples that demonstrate the benefits and pitfalls of including uncertainty in the planning process.

4) Finding All Optimal Solutions in Reserve Site Selection, ***Jeffrey D. Camm***, University of Cincinnati, QAOM Dept., Cincinnati, OH 45221-0130, jeff.camm@uc.edu, ***Sriram Kannan***, ***Robert L. Pressey***

We develop a dual-augmented Balasian algorithm to find all alternate optimal solutions to 2 types of reserve site selection problems. In cases where numerous optimal solutions exist, our approach is able to find all solutions in many cases where cut-based procedures fail.

MD43 Education V: INFORMS Case Competition 2001: Finalists 3 & 4

Sponsor: INFORMED
Sponsored Session
Chair: Christopher J. Zappe, Bucknell University, Dept. of Mgmt., Lewisburg, PA 17837, zappe@bucknell.edu

1) INFORMS Case Competition 2001: Finalists 3 & 4

During this special open session, the last two of the four finalists in INFORMS 2nd Annual Case Competition will deliver 30-minute presentations of their entries before a panel of judges. The judges will select the winning entry from the cases presented during this session and the preceding session.

MD45 Operations Management IV

Contributed Session
Chair: Jinn-Tsair Teng, William Paterson University, 300 Pompton Rd., Wayne, NJ 07470-2103, tengj@wpunj.edu

1) Inventory Models for Deteriorating Items & Stock-Dependent Demand, ***Jinn-Tsair Teng***, William Paterson University, 300 Pompton Rd., Wayne, NJ 07470-2103, tengj@wpunj.edu, ***Maw-Sheng Chern***

It is not appropriate to minimize the costs in an inventory system with an inventory-level-dependent demand rate, as suggested by Mandal & Phaujder. We then propose an inventory policy that maximizes the profits and use numerical examples to show the significant differences between these 2 distinct objectives.

2) Optimum Ordering Policies in Multi-Product Inventory Systems with Several Resource Restrictions, ***John Moussourakis***, Rider University, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648, moussourakis@rider.edu, ***Cengiz Haksever***

Making the assumption of independent cycle times for each of the various products of the inventory system, as well as the assumption that all products will eventually reach a simultaneous pick, we suggest a MIP model that optimizes the system subject to any number of resource restrictions.

3) Storage/Retrieval in a Forest Sawmill Production Warehouse: Resolution by Tabu Search, ***Lorena Pradenas***, Universidad de Concepcion, Casilla 160-c Concepcion, Concepcion, Chile, lpradena@mail.udec.cl, ***Jacques A. Ferland***, ***Aldo Lopez***

Since the 1960s, several authors have studied the storage/retrieval operations in large warehouses. These operations induce a high cost to store and retrieve the items. We introduce a real world problem and its mathematical formulation to minimize the total operating cost of forest sawmill production warehouses.

4) withdrawn 10/1: Lot-Sizing Techniques for Co-Products, ***Ram Rachamadugu***, University of Toledo, West Bancroft, Coll. of Bus. Admin., Toledo, OH 43606, rracham@utnet.utoledo.edu, ***Carlo A. Mora-Monge***

5) A New Finite-Memory Algorithm for Estimating the Variance of the Sample Mean, ***Wheyming T. Song***, National Tsing Hua University, 1110 10th St., Apt. F, Bldg. 16, Albany, CA 94710-1229, wheyming@hotmail.com, ***Tsu-Kuang Yang***

Estimating the variance of the sample mean is a classic problem of stochastic simulation. We propose dynamic partial-overlapping batch means estimators requiring 0-1 storage space.

MD46 Simulation

Contributed Session
Chair: Jan Adem, Katholieke Universiteit Leuven, Naamsestraat 69, Leuven, 3000, Belgium, jan.adem@econ.kuleuven.ac.be

1) Analyzing Airline Network Punctuality with Simulation, ***Jan Adem***, Katholieke Universiteit Leuven, Naamsestraat 69, Leuven, 3000, Belgium, jan.adem@econ.kuleuven.ac.be, ***Jurgen Martens***

Punctuality of an airline company is an important competitive issue. We present a simulation model for evaluating the impact of published block time, aircraft turn around time, departure delay rates, spare aircraft availability and aircraft swapping rules on the overall network punctuality. Empirical results are given and discussed.

2) Improving Simulation Input Models through VARTA, ***Bahar Deler***, Northwestern University, 2145 Sheridan Rd., Rm. C223, Evanston, IL 60208-3119, bahar@iems.nwu.edu, ***Barry L. Nelson***

We discuss the critical role of accurate and automated input modeling support in building a large-scale discrete-event stochastic simulation model. We present the major pitfalls in input modeling packages and explain how VARTA software takes reliable input modeling out of the domain of statistical specialists and puts it into the hands of everyday simulation users.

3) Boot In/Boot Out, ***Omer F. Demirel***, Sakarya University, Esentepe Kampusu, Adapazari, 54040, Turkey, demiro2@alum.rpi.edu, ***Thomas R. Willemain***

We summarize recent work applying the bootstrap to inference in simulation experiments, both for input analysis and output analysis. On the input side, the bootstrap provides a way to enhance the inferential power of trace-driven

simulations. On the output side, the bootstrap provides a way to analyze single-replication experiments.

4) MicroGrids: A New Power System Paradigm, ***Chris Marnay***, Berkeley National Laboratory, MS 90-400, Berkeley, CA 94720-8061, c_marnay@lbl.gov, eetd.lbl.gov/ea/emp, ***Kristina Hamachi, Ouglal Boubekeur***

Emerging small-scale (under 500 kW) generators that are competitive with grid-delivered electricity, especially with combined heat and power, could change our paradigm of electricity supply radically. Small clusters of generators could operate semi-autonomously from the established power system, or macrogrid, matching power quality and reliability closely to local end-use requirements.

Tuesday 08:15-09:45

TA01 AI Applications

Sponsor: **Artificial Intelligence**
Sponsored Session
Chair: Anurag Agarwal, University of Florida, PO Box 117169, Gainesville, FL 32611, aagarwal@ufl.edu

1) withdrawn 10/9: Applying Machne Learning to Prioritize the Delivery of Military Information, ***James C. Reynolds***, Teknowledge, 842 Santmyer Dr., Leesburg, VA 20175, reynolds@teknowledge.com

2) Chaos-Based Random Number Generators, ***Murali S. Shanker***, Kent State University, PO BOx 5190, Kent, OH 44242, mshanker@kent.edu, ***Marvin Troutt, Greg Madey***

We propose a large class of chaos functions to generate random numbers. Comparisons are made between these and more established random number generators.

3) Dimensionality Reduction with Neural Networks on a Distributed System, ***Haibo Wang***, Mississippi Center for Supercomputing Research, PO Box 1588, University, MS 38677, chwang@rain.vislab.olemiss.edu, ***John Johnson***

This project is to apply neural networks approach on a distributed system such as Beowulf cluster to solve the dimensionality reduction problems. A parallel GA will be designed for this project and will be compared with other methods on dimensionality reduction.

4) Neural Networks for Various Scheduling Problems, ***Anurag Agarwal***, University of Florida, PO Box 117169, Gainesville, FL 32611, aagarwal@ufl.edu

A new neural network framework is proposed for solving various scheduling problems. The framework allows integration of heuristics (greedy and non-greedy) and learning approaches. The mathematical formulation and empirical results are provided.

TA02 Optimization Services on the Internet II

Cluster: **OR/MS & the Internet**
Invited Session
Chair: Robert Fourer, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.northwestern.edu

1) Development of Web-Enabled Decision Support Systems, ***Andres Medaglia***, SAS Institute, Inc., SAS Campus Dr., Cary, NC 27513, andres.medaglia@sas.com, ***Charles B. Kelly, Radhika Kulkarni, Yi Liao***

Distributing processes across multiple tiers is an efficient way to solve large analytical problems and to exploit the vast potential of the Internet. SAS provides software that streamlines the development of such Web-enabled DSSs. We discuss and illustrate the potential of several frameworks for Web-based optimization.

2) Leveraging Optimization Skills via e-Optimization.com, ***Christelle Colin***, ILOG, Inc., 1080 Linda Vista Ave., Mountain View, CA 94043, ccolin@e-optimization.com

The e-Optimization.com website offers a wide range of programs that help both new and experienced participants leverage their skills and experience. The site presents a growing collection of news, chat forums, practical case studies and events as well as contact information for key people in industry and academia.

3) Use of Optimization & the Web for Business IT Coordination & Planning, ***ManMohan S. Sodhi***, Gandiva Inc., 124 Race St., San Jose, CA 95126, mohansodhi@aol.com

I will describe the synergistic use of optimization and the Web for an application for enterprise-wide business-IT coordination and planning. This Web-based application has resource-constrained project scheduling in its planning core that requires optimization. I will also present design considerations and implementation issues resulting from the use of the Web.

4) Optimization Service Provision: A European Union Project, ***Gautam Mitra***, Brunel University, Dept. of Math Sci., Cleveland Rd., Uxbridge, Middlesex, UB8 3PH, UK, gautam.mitra@brunel.ac.uk, ***Triphonas Kyriakis, Nikitas-Spiros Koutsoukis, Patrick Valente***

The OSP project aims to provide practitioners access to optimization software tools and optimization-based vertical solutions (for several domains) on a subscription basis. We use the Internet as a platform and adopt the ASP model to develop an OSP for both analysts and end users.

TA03 Boolean Functions

Cluster: **Data Mining**
Invited Session
Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) On the Regularization of Monotone Boolean Functions, ***J. C. Bioch***, Erasmus University Rotterdam, Dept. of Comp. Sci., FEW H9-30, The Netherlands, bioch@few.eur.nl

We derive explicit formula's for the regular sandwich consisting of the largest regular minor and the smallest regular major of a monotone Boolean function using an operator which we call the delta-operator. Properties of this operator and application to Boolean optimization are also discussed.

2) Decision Lists & Related Boolean Functions, ***Thomas Eiter***, Technische Universitaet Wien, Favoritenstr 9-11, Vienna, A-1040, Austria, eiter@kr.tuwein.ac.at

We consider Boolean functions represented by decision lists and their relation to other classes of Boolean functions including disguised Horn, read-once, threshold, 2-monotonic and nested concept differences. We also address the extension problem for partially defined Boolean functions in 1-DL, which is linear time, and algorithms for enumerating all extensions.

3) Minimal Integer Pseudoweightings for Boolean Functions, ***William Zwicker***, Union College, Dept. of Mathematics, Schenectady, NY 12308, zwickerw@union.edu, ***Josep Freixas***

Threshold graphs have unique minimal integer vertex weightings. What is the analogous result for Boolean functions? We show that every monotonic function with a complete Winder order has a unique minimal integer PSA pseudoweighting. Pseudoweights behave like weights for threshold functions, but with weaker additivity properties.

4) Variable Ranking for Partially Defined Boolean Functions, ***Peter L. Hammer***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu, ***Sorin Alexe***

A polynomial algorithm is proposed for ranking the variables of a partially defined Boolean function, based on their importance in distinguishing the binary vectors where the value of the function is 1, from those where it is 0. The usefulness of the proposed method is illustrated through its applicability to the logical analysis of data.

TA04 Online Auctions

Cluster: **Auctions**
Invited Session
Chair: Alok Gupta, University of Minnesota, 30365 Carlson Sch. of Mgmt., 321 19th Ave. South, Minneapolis, MN 55455, alokgupta@acm.org

1) Calibrating Dynamic Online Pricing Mechanisms, ***Gilbert Karuga***, University of Connecticut, 368 Fairfield Rd., Unit 2041-IM, Storrs, CT 06269-2041, karuga@sba.uconn.edu, ***Paulo B. Goes, Alok Gupta***

We address the concerns regarding the general appropriateness of online pricing mechanisms. We provide an overview of existing online pricing mechanisms, from static pricing systems to dynamic pricing systems. We provide an analysis of the more commonly used mechanisms and characterize the incentive structure offered to the agents. For each system, we contrast its online use with its traditional theoretical counterpart from the economics literature. ..

2) A Multi-Agent Approach for Modeling Electronic Auctions, ***Kumar Mehta***, University of Connecticut, 368 Fairfield Rd., Unit 204-IM, Storrs, CT 06269-2041, kmehta1@uic.edu, ***Siddhartha Bhattacharyya***

B2C electronic auction markets deal with a large number of competing buyers

on one hand and multiple sellers on the other. Modeling this scenario to gain an understanding of and developing an operational strategy for such auctions poses a challenge in terms of the complexity involved, making an analytical solution impossible. We propose an agent-based computational approach...

3) What Factors Drive Final Price in Internet Auctions? An Empirical Assessment of Coin Transactions on eBay, ***Charles A. Wood***, University of Notre Dame, Mendoza Coll. of Bus., cwood@umn.edu, ***Robert J. Kauffman***

We explore how different factors, e.g., reputation scores, pictures and sale timing, affect the prices at which coins trade in Internet auctions. We use a Tobit model to deal with the problem of censored observations, in conjunction with software agent-based data collection. The latter permitted us to collect panel data involving different buyers and sellers over a 2-year period.

TA05 Recent Advances in Convexification

Cluster: Generalized Convexity/Generalized Monotonicity
Invited Session

Chair: Nick Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 South Mathews Ave., Urbana, IL 61801, nikos@uiuc.edu

1) Branch & Cut Methods for Two-Stage Stochastic IP, ***Suvrajeet Sen***, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu, ***Hanif D. Sherali***

We extend the B&C framework to decomposition algorithms for 2-stage SIP. Both continuous and integer variables are allowed in both stages, although the integer variables are restricted to be binary. The branching and cutting operations are allowed in both stages and partial, i.e., non-integer, solutions are allowed during the iterative process.

2) Convex Envelopes of Nonlinear Functions, ***Mohit Tawarmalani***, Purdue University, Krannert Mgmt. Sch., West Lafayette, IN 47907, mtawarma@mgmt.purdue.edu, http://icdweb.cc.purdue.edu/~mtawarma, ***Nick Sahinidis***

We develop a unifying framework for domain reduction that applies to mixed integer non-linear programs. As a result, we consider new techniques for identifying sub-optimal regions. Through computational experience on various application problems, we demonstrate that the developed techniques significantly improve the convergence of global optimization methods.

3) Disjunctive Cutting-Plane Algorithms for Mixed 0-1 Convex Programs, ***Joao Soares***, Universidade de Coimbra, Dept. of Math., Coimbra, Portugal, jsoares@mat.uc.pt

We propose a disjunctive cutting-plane-based algorithm for a mixed convex 0-1 program and present some computational results. Cuts are derived from solving the dual of the separation oracle by column generation algorithms and numerical linear algebra techniques are employeed to speed up the cut generation process.

TA06 Modeling of OR Problems

Cluster: Operations Research: In Honor of Saul I. Gass
Invited Session

Chair: Kweku-Muata Bryson, Virginia Commonwealth University, Info. Systems Research Inst., Richmond, VA 23284, kwekumuata@isy.vcu.edu

1) Integer Programming & Arrow's Impossibility Theorem, ***Rakesh V. Vohra***, Northwestern University, Kellogg Sch. of Mgmt., Evanston, IL 60208-2009, rvv684@casbah.acns.nwu.edu

We show how Arrow's impossibility theorem as well as a number of other important results in social choice theory can be derived in a simple and unified way, using integer programming. This is based on joint work with J. Sethuraman & T. C. Piaw.

2) Using Linear Programming to Support Test Problem Development, ***Anito Joseph***, University of Miami, Coral Gables, FL 33124, ajoseph@exchange.sba.miami.edu

We describe how LP can be used to develop test problems for linear optimization problem classes. The advantage of LP is that it allows solution properties to be incorporated as an integral part of the development process. Therefore, in addition to solution information, the use of LP provides another dimension for study in computational experiments...

3) Stigler's Diet Problem, ***Susan Garille***, Ernst & Young LLP, 1225 Connecticut Ave. NW, Washington, DC 20036, susan_garille@yahoo.com

We review Stigler's diet problem, its impact on LP and OR and determine minimum cost diets using updated nutritional and cost data. We also discuss how Stigler's diet problem formulation and its extensions have influenced dieticians and nutritionists in their search for more wholesome but cost-effective diets.

4) Math Modeling: It's a Gass, ***Edward K. Baker***, University of Miami, MS Dept., 417C Jenkins Bldg., Coral Gables, FL 33124, ebaker@miami.edu

Throughout his career, Saul Gass has been a major proponent and expositor of a rigorous mathematical modeling process. We will review some of Dr. Gass's major contributions to this area and illustrate how his ideas have help shape the practice of modeling within the fields of MS and OR.

5) A Common Technique for Optimally Solving Some Information Systems Problems, ***Kweku-Muata Bryson***, Virginia Commonwealth University, Info. Systems Research Inst., Richmond, VA 23284, kwekumuata@isy.vcu.edu

Many problems that appear in different contexts are sometimes conceptually similar and so are amenable to solution by a common technique. Three such IS problems are segmentation of computer programs, attribute discretization for decision tree induction and design of hash tables in database systems. We show that they can be formulated as the sequential partitioning problem and solveds optimally using a parametric programming-based approach.

TA07 Telecommunication Network Design & Optimization

Sponsor: Computing
Sponsored Session

Chair: Eli V. Olinick, SMU, CS & Eng. Dept. Sch. of SEAS, PO Box 750122, Dallas, TX 75275-0122, olinick@seas.smu.edu

1) Optimization Methods for Mesh Network Design, ***Rosemary T. Berger***, Level 3 Communications, Global Bus. Optimization, 1025 Eldorado Blvd., Broomfield, CO 80021, rosemary.berger@level3.com, ***Joy Williams***

To benefit from the capacity efficiencies of mesh restoration schemes, next-generation optical transport networks must be well-designed. Planners need models that optimize both the capacity required for working paths and for restoration paths. We present several approaches to solve the mesh network design problem and compare how they perform in practice.

2) Comparison of Survivable Optical Network Architectures, ***Gheorghe Spiride***, Nortel Networks, Global Professional Services, 2400 Lakeside Dr., Richardson, TX 75081, gspiride@nortelnetworks.com, ***Augustyn Ortynski, Ra'ed Awdeh***

We discuss several survivable optical network architectures. We compare ring and mesh based network restoration schemes from the perspective of capacity requirements and network availability in the context of typical long-haul networks and traffic levels.

3) Robust Solutions for the WDM Routing & Provisioning Problem: Models & Algorithms, ***Jeffery L. Kennington***, SMU, Eng. Mgmt., Info & Systems, Dallas, TX 75275-0122, jlk@engr.smu.edu, ***Karen R. Lewis, Eli V. Olinick, Augustyn Ortynski, Gheorghe Spiride***

The WDM routing and provisioning problem with uncertain demands is modeled as a robust optimization problem. Using the metrics of minimum regret and minimum unsatisfied demand in an empirical study, our robust model was superior to a mean-value model, a stochastic programming model and a worst-case model.

4) A Column-Generation-Based Heuristic for the Minimum Cost Ring-Cover Problem, ***Eli V. Olinick***, SMU, CS & Eng. Dept. Sch. of SEAS, PO Box 750122, Dallas, TX 75275-0122, olinick@seas.smu.edu

We consider the minimum-cost ring-cover problem which is an important and difficult optimization problem arising in the design of reliable, high-speed telecommunications networks. We present an integer-programming formulation for this problem, and an empirical analysis of a column-generation-based heuristic for solving it.

TA08 DO-11

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session

Chair: Endre Boros, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, boros@rutcor.rutgers.edu

1) withdrawn 9/19: Solving Sparse Linear Programs using Exact Arithmetic, ***Thomas Herrmann***, ETH Zurich, herrmann@ifor.math.ethz.ch, ***Komei Fukuda, Bernd Gaertner***

2) Binary Encoding in Integer Programming, ***Jon Lee***, IBM TJ Watson Research Center, Math Sciences Dept., PO BOx 218, Yorktown Heights, NY 10598, jonlee@us.ibm.com

In the context of integer programming, it is an old and simple trick to encode general integer variables in binary. I will describe polyhedral methods for some situations of "integer non-convexity" where use of the trick makes sense.

3) Linear & Convex Majorants of Pseudo-Boolean Functions, ***Endre Boros***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, boros@rutcor.rutgers.edu, ***Isabella Lari***, ***Bruno Simeone***

We introduce the notion of best linear and/or convex majorant of a pseudo-boolean function, depending only on k (=3,4,5...) of the variables. We shall demonstrate that such majorants can be generated and used efficiently in unconstrained binary maximization problems.

TA09 DO-17

Cluster: Discrete Optimization
Sponsor: Optimization
Sponsored Session
Chair: Lisa Fleischer, Carnegie Mellon University, GSIA, Rm. 232A, Pittsburgh, PA 15213-3890, lkf@andrew.cmu.edu

1) Algorithmic Approaches for Coping with Selfishness in Networks, ***Tim Roughgarden***, Cornell University, timr@cs.cornell.edu

We study the problem of optimizing the performance of a network shared by selfish, non-cooperative users. Allocating resources according to the interests of individual users typically results in sub-optimal network performance we define and prove results for several optimization problems seeking to contain the negative effects of such selfish behavior.

2) Universal Guarantees for Bandwidth Allocation, ***Amit Kumar***, Cornell University, amitk@cs.cornell.edu

In a large network, we need to simultaneously satisfy the demands of many users. We shall present new ways of measuring fairness and specifying user requirements in virtual private networks. These methods will allow us to optimize over a range of possible bandwidth requirement scenarios.

3) How to Get Across Town by Bus, ***Michael Mitzenmacher***, Harvard, michaelm@eecs.harvard.edu

Suppose we want a plan to get across town by bus in the minimum expected time. When a bus arrives at each station, we must decide whether to take that bus or wait for another one. The correct answer depends on the waiting time distributions for the buses. We show how the optimal plan can be easily calculated for certain IFR distributions.

TA10 New DEA Methods I

Cluster: Data Envelopment Analysis
Invited Session
Chair: Hiroshi Morita, Osaka University, Grad. Sch. of Eng., Suita, Osaka, 565-0871, Japan, morita@ap.eng.osaka-u.ac.jp

1) Variable Selection in DEA, ***John Ruggiero***, University of Dayton, 517 Miriam Hall, Dayton, OH 45469-2251, riggiero@notes.udayton.edu

The DEA literature is largely empirical with numerous applications in various industries. Because DEA is deterministic, care needs to be taken in the selection of variables. We use simulation analysis to develop guiding rules for variable selection. An empirical application is also considered.

2) Imprecise DEA, ***Yao Chen***, Merrimack College, Dept. of Mgmt., Sch. of Bus. & Intl. Commerce, North Andover, MA 01845, ychen@merrimack.edu, ***Lawrence M. Seiford***, ***Joe Zhu***

The standard DEA method requires that the values for all inputs and outputs are known exactly. When some outputs and inputs are unknown decision variables, the resulting DEA model becomes an NLP problem and is called imprecise DEA, IDEA. We discuss issues related to IDEA models.

3) Chance-Constrained DEA Models with Variable Returns-to-Scale, ***Zhimin Huang***, Adelphi University, Sch. of Bus., Garden City, NY 11554, huang@panther.adelphi.edu, ***Susan X. Li***

We present stochastic models in DEA for the possibility of variations in inputs and outputs. The efficiency measure of a DMU is defined via joint probabilistic comparisons of inputs and outputs with other DMUs and can be characterized by solving a chance constrained programming problem. An analysis of stochastic variable returns-to-scale is developed using the idea of stochastic supporting hyperplanes.

4) Parametric Optimization Methods in DEA & Productivity Analysis of Russian Banks, ***Vladimir E. Krivonozhko***, Institute for Systems Analysis, Bolshoy Zlatoustinskiy per 8/7, Office 40, Moscow, 101000, Russia, vladimir@dol.ru, ***O. B. Utkin***, ***A. V. Volodin***, ***I. A. Sablin***

New parametric optimization methods in a DEA framework are proposed. This approach will reduce the analysis of complex systems to the investigation of well-known functions in economics: production function, isoquant, isocost, isoprofit, etc. The proposed methods are applied to the analysis of the efficiency of Russian banks.

TA11 Integer & Combinatorial Optimization Applications to Product & Process Management

Cluster: Integer Programming
Invited Session
Chair: Joseph B. Mazzola, Georgetown University, McDonough Sch. of Bus., 37th & O St. NW, Washington, DC 20008, mazzolaj@georgetown.edu

1) Upgrading High Technology Products to Improve Profit Margins in a Stochastic Environment, ***Purushothaman Damodaran***, Texas A&M University, Dept. of IE, College Station, TX 77843-3131, purush@tamu.edu, ***Wilbert E. Wilhelm***

As competitors introduce innovations, prices for older products erode. One means of compensating is to upgrade a product periodically, incorporating newer technologies. We present a model to prescribe the content and timing of product upgrades with the goal of maximizing profit over the life cycle. Stochastic demand is treated through a deterministic-equivalent approach that allows model structure to be exploited. Computational tests are reported.

2) Incremental Setup Strategies in Printed Circuit Board Assembly under Demand & Supply Uncertainty, ***Valerie Tardif***, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712-1063, vtardif@mail.utexas.edu

We consider different setup strategies in PCB assembly line experiencing uncertainty in demand and supply. We propose a stochastic MIP approach to the problem and present several ways of computing good bounds. We present computational results and insights obtained.

3) A Multi-Criteria Approach Applied to Rearrangeable Multi-Hop Lightwave Networks, ***Darko Skorin-Kapov***, Adelphi University, School of Bus., Garden City, NY 11530, skorin@adelphi.edu, ***Valter Boljuncic***, ***Jadranka Skorin-Kapov***

Optical networks, which can be reconfigured by re-tuning node transmitters and receivers, can be optimized with respect to the often conflicting criteria of network throughput and total network flow. We present an efficient heuristic algorithm that combines both criteria for optimization: throughput maximization as well as total flow minimization. Computational results on some benchmark data sets will be provided.

TA12 Optimization Techniques I

Contributed Session
Chair: Edson L. F. Senne, UNESP/FEG, CP 205, Guaratingueta, SP 12500-000, Brazil, elfsenne@feg.unesp.br

1) withdrawn 10/9:A Column Generation Approach to Capacitated P-Median Problems, ***Edson L. F. Senne***, UNESP/FEG, CP 205, Guaratingueta, SP 12500-000, Brazil, elfsenne@feg.unesp.br, ***Luiz Antonio N. Lorena***

2) Generalized Cone-Subconvexlike Set-Valued Maps & Applications to Vector Optimization, ***Huang Yong Wei***, Chongqing Jianzhu University, Dept. of Fundamental Sciences, Chongqing, 400045, PR China, ywhuang2000@163.net

Cone-convexlike, cone-subconvexlike, generalized cone-subconvexlike set-valued maps are defined by relative ineriors of the ordered cones. Some properties of them and relations between them are discovered. We point out that near cone-subconvexlikeness is equivalent to cone-subconvexlikeness. An alternative theorem involving relative interiors and a necessary optimality condition for set-valued vector optimization are obtained.

3) Pseudonormality & A Lagrange Multiplier Theory for Contrained Optimization, ***Dimitri P. Bertsekas***, MIT, 77 Massachusetts Ave., Rm. 35-210, Cambridge, MA 02139, dimitrib@mit.edu, ***Asuman E. Koksal***

We consider problems with equality, inequality, and abstract set constraints. We explore various characteristics of the constraint set that imply the existence of Lagrange multipliers. We prove a generalized version of the Fritz-John theorem

and introduce new and general conditions that extend and unify the major constraint qualifications. Among these conditions, a new property, pseudonormality, emerges...

4) withdrawn 10/10: Minimax Problems of Mappings for a Class, ***Chuan-Gan Hu***, Nankai University, Dept. of Math., 94 Weijin Rd., Tianjin, 300071, China, chuganhu@public1.tpt.tj.cn

5) On Generating Deep Cuts in Reverse Convex Optimization, ***Khosrow Moshirvaziri***, California State University, 1250 Bellflower Blvd., Long Beach, CA 90840, moshir@csulb.edu, http://www.csulb.edu/~moshir, ***Mahyar A. Amouzegar***

As a standard method in solving certain classes of optimization problems, cutting plane techniques are used to systematically reduce the constraint set and thereby limit the search domain. We present a modification of Tuy-type cuts in the context of linear reverse convex programs. The proposed cuts are dominant and deeper than the original ones and thus viewed as a contributing factor in the design of efficient RCP algorithms.

TA14 Complexity Issues in Convex Optimization & Related Topics

Cluster: Linear & Conic Linear Optimization
Invited Session
Chair: Robert M. Freund, MIT, 50 Memorial Dr., Bldg. E53-357, Cambridge, MA 02142-1347, rfreund@mit.edu

1) Solving Polyhedral Conic Systems with a Finite Precision Machine, ***Javier Pena***, Carnegie Mellon University, Grad. Sch. of IA, Tech & Frew St., Pittsburgh, PA 15213-3890, jfp@andrew.cmu.edu, ***Felipe Cucker***

Assume an mxn matrix A is given. We propose a primal-dual algorithm that determines whether one of the alternative systems $Ax = 0$, $x > 0$ and $yA < 0$ is well-posed and computes a corresponding strictly feasible solution. Our algorithm is numerically stable in the presence of finite-precision arithmetic.

2) Complexity of Solving LPs and Generalization of Tardos' Theorem, ***Jackie C. K. Ho***, University of Waterloo, Dept. of COO, waterloo, Ontario, N2L 3G1, Canada, jc2ho@uwaterloo.ca, ***Levent Tuncel***

In 1986, Tardos proved that linear programming problems with rational data can be solved in time polynomial in the size of only the constraint matrix. I will discuss a generalization of her result to the real number case.

3) The Effect of Conditioning on Some Combinatorial Problems involving Convex Sets, ***Jorge R. Vera***, Pontificia Universidad Catolica de Chile, Dept. of ISE, Sch. of Eng., Vicuna Mackenna 4860, Santiago, Chile, jvera@ing.puc.cl

We show how condition measures defined in the context of continuous convex optimization can be used as well in the context of some combinatorial problems. In particular, we analyze the effect onto the complexity of some combinatorial optimization algorithms. We also conjecture on condition measures specific for combinatorial problems.

4) Computational Testing of the Predictive Value of Condition Numbers for Linear Programming, ***Fernando Ordonez***, MIT, OR Ctr., 77 Massachusetts Ave., Cambridge, MA 02142, fordon@mit.edu, ***Robert M. Freund***

Renegar's condition number provides a theoretical bound on the complexity of solving linear and other conic convex optimization problems. We extend this concept to non-conic problems and compute condition numbers for the NETLIB suite of LP problems in order to test the predictive value of condition numbers for LP.

TA15 Solving Large-Scale Network Optimization Problems

Cluster: Large-Scale Mathematical Programming
Invited Session
Chair: Ravindra K. Ahuja, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, ahuja@ufl.edu

1) The Pseudoflow Algorithm for Large-Scale Maximum Flow & Other Problems, ***Dorit S. Hochbaum***, University of California, Haas Sch. of Bus., Dept. of IEOR, Berkeley, CA 94720-1777, dorit@hochbaum.ieor.berkeley.edu

We introduce a new algorithm that solves the maximum flow problem using pseudoflows with features that distinguish it from all other known algorithms. In addition to its efficient complexity bound, the algorithm offers in practice a significant improvement compared to existing software for solving large-scale maximum flow problems, parametric analysis and warm starts within integer programming.

2) Cyclic Exchange Neighborhood Search Algorithms, ***James B. Orlin***, MIT, Sloan Sch. of Mgmt., 77 Mass Ave., Bldg. E40-147, Cambridge, MA 02139, jorlin@mit.edu, http://web.mit.edu/jorlin/www/, ***Dushyant Sharma***

The cyclic exchange neighborhood search algorithm is an exponential size neighborhood search approach that is very effective for a wide range of partitioning problems. We present recent research on the cyclic exahcnge neighborhood as applied to large-scale partitioning problems.

3) Identifying Subset-Disjoint Cycles, ***Ravindra K. Ahuja***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, ahuja@ufl.edu, ***Irina Dumitrescu***, ***Natashia L. Boland***

While solving large-scale partitioning problems by cyclic exchange neighborhood search, a common subroutine needed is to identify negative cost subset-disjoint cycles. We suggest several exact and heuristic algorithms to solve the subset-disjoint cycle problem along with their computational results. We also present polyhedral results of this problem.

TA16 Inventory Models with Item Substitution & Reuse

Sponsor: MSOM
Sponsored Session
Chair: Seyed Iravani, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., C210 Tech., Evanston, IL 60208, iravani@iems.nwu.edu

1) Optimal Policies for Multi-Echelon Inventory Systems with Product Reuse/Remanufacturing, ***Gregory A. DeCroix***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0210, decroix@mail.duke.edu, ***Paul Zipkin***

Existing results regarding the structure of optimal policies for inventory systems with product reuse/remanufacturing are limited to single-stage systems and simple serial systems. We investigate the structure of optimal policies for more complex multi-echelon systems.

2) An Inventory Anomaly: Risk Pooling may Increase Inventory, ***Hongsuk Yang***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, hongsuk.yang@gsb.uchicago.edu, ***Linus Schrage***

We say product A is a "partial substitute" for product B if only a fraction of the customers who prefer B are willing to accept A when B is out of stock. When demand is uncertain, it is intuitive and true that a larger "willing to substitute" fraction implies larger expected profits. A higher "willing to substitute" fraction allows one to partially pool the risk of individual products...

3) A Heuristic Approach for Assemble-to-Order Systems with Flexible Customers, ***Seyed Iravani***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., C210 Tech., Evanston, IL 60208, iravani@iems.nwu.edu, ***Louis Luangkerson***, ***David Simchi-Levi***

We present a heuristic for computing the performance of an assemble-to-order system with flexible customers. The heuristic decomposes the system into subsystems and iteratively estimates the performance measures of each component and the overall system. The performance of the heuristic is compared against exact methods and simulation.

TA17 Flexibility in Call Centers & Other Service Operations

Sponsor: MSOM
Sponsored Session
Chair: Yong-Pin Zhou, University of Washington, Sch. of Bus. Admin., Box 353200, Seattle, WA 98195-3200, yongpin@u.washington.edu

1) On Call Centers with Adaptive Service Priorities, ***Mor Armony***, NYU, Stern School of Bus., 40 West 4th St., Ste. 7-02, New York, NY 10012-1118, marmony@stern.nyu.edu, ***Nicholas Bambos***, ***George Michailidis***

Consider call centers with multiple customer classes and servers' skills. Customers are impatient and may abandon after some waiting time. We find optimal staffing decision rules and propose a dynamic skills-based routing scheme that provides adaptive priorities to customer classes. In particular, relative priorities increase with the tendency to abandon.

2) Designing Flexibility in Service Systems, ***Zeynep Aksin***, INSEAD, Blvd. de Constance, Fontainebleau, 77305, France, zeynep.aksin@insead.fr, ***Fikri Karaesmen***

While it is known that flexibility in operations is beneficial, the question of what

type of flexibility and where in your system has not been addressed. These questions are explored in the context of cross-training practice design, using an approach that builds on work in dynamic routing in stochastic networks.

3) Two-Class Systems with Batch Arrivals: Admission Control & Preferred Class Properties, ***Apostolos N. Burnetas***, Case Western Reserve University, Dept. of Ops., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu, ***E. Lerzan Ormeci***

We consider dynamic admission control in a Markovian loss system with 2 job classes, different service rates and revenues and batch arrivals. We show some properties of the optimal value function and provide conditions for the existence of a preferred class. These results also hold for Markov arrival processes.

4) A Call Routing Problem with Service Level Constraints, ***Noah F. Gans***, University of Pennsylvania, The Wharton Sch., Philadelphia, PA 19104, gans@wharton.upenn.edu, ***Yong-Pin Zhou***

A call center handles incoming calls and background work. It maximizes the processing rate of background work, subject to a service-level constraint on inbound calls. We analyze the problem as a constrained MDP and extend previous results to account for different service-time distributions for the two types of work.

TA18 SOLA/UPS Dissertation Awards

Sponsor: SOLA
Sponsored Session
Chair: Joy Bhadury, California State University, Sch. of Business & Economics, Dept. of Mgmt. & Finance, Hayward, CA 94542, jbhadury@csuhayward.edu

1) Modeling & Analysis of Issues in the Hub Location Problem, ***Bahar Yetis***, Bilkent University, Dept. of IE, Bilkent, Ankara, 06533, Turkey, bkara@bilkent.edu.tr

We study applications of the hub location problem and clarify assumptions of the real world problems that motivate it. We propose a variant of this model for cargo delivery systems. Finally, we incorporate minimax and covering objectives and demonstrate superior computational performance as compared with traditional linearizations of the basic model.

TA19 Logistics Transportation Efficiency

Sponsor: Logistics
Sponsored Session
Chair: Douglas A. Popken, Systems View, 9139 South Roadrunner St., Highlands Ranch, CO 80129, dpopken@systemsview.com, http://www.systemsview.com

1) Multi-Modal Logistics at Toyota, ***Scott E. Grasman***, University of Missouri, 1870 Miner Circle, Rolla, MO 65409, grasmans@umr.edu, http://www.umr.edu/~grasmans/, ***Ajith Karunakara***

Today's global economy creates a need for advanced logistics systems. Enhanced by modern information technologies, advanced multi-modal logistics may provide a fundamental competitive advantage to firms and increase competitiveness. We present a model for determining reliable transportation strategies, including both transport (road, rail, waterway, air) and intermodal transfer (ports, terminals).

2) Evaluating Logistical Efficiency using Data Envelopment Analysis: The Case of Trois-Rivieres' Harbor Elevators, ***Rene Gelinas***, Universite du Quebec a Trois-Rivieres, Dept. of MS & Econ., CP 500, Trois-Rivieres Quebc, G9A 5H7, gelinare@uqtr.uquebec.ca, ***Julie Robitaille***

A study conducted at the Trois-RiviÒres' Harbour Elevators is presented. A decomposition framework for analysing the efficiency of the logistics process that relies on DEA was used. The activities are broken down into 2 sub-processes and 2 product categories for which various efficiencies are monitored on 12-month rolling windows.

3) A Routing & Load Planning System for Nationwide Automobile Shipping, ***Douglas A. Popken***, Systems View, 9139 South Rdrunner St., Highlands Ranch, CO 80129, dpopken@systemsview.com, http://www.systemsview.com

We recently developed software to improve dispatching operations for an automobile shipping industry client. Our approach combines heuristics and optimization to handle a complex general pickup and delivery problem. The resulting algorithm is dynamic - solutions adapt to the current system state. We discuss practical considerations encountered during development.

4) An Investigation of Stacking Rules at an Automated Container Terminal, ***R. Dekker***, Erasmus University Rotterdam, Sch. of Economics, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, rdekker@few.eur.nl, ***P. Voogd***

We present the results of a large project on the value of container categories for stacking in an automated container terminal. After a discussion of the set-up of the experiments, including a detailed ship and timetable description, we discuss several stacking rules that make use of categories of containers. Within these categories containers can be exchanged without penalties...

TA20 CTO: The Emerging Professional

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session
Chair: George K. Chacko

TA21 Supply Chain Strategies

Cluster: Manufacturing Strategy
Invited Session
Chair: Julia Miyaoka, Stanford University, Dept. of MSE, Stanford, CA 94305-4026, jmiyaoka@stanford.edu

1) Price Competition between Internet & Bricks & Mortar Firms, ***Cheryl Druehl***, Stanford University, Grad. Sch. of Business, 518 Memorial Way, Stanford, CA 94305-5015, cdruehl@stanford.edu, ***Evan L. Porteus***

A manufacturer detemines wheterh to enter the e-commerce space and how to price its offereings on the Internet and in its brick and mortar stores. Additionally, a Stackelberg framework is utilitized to analyze price competition between a brick and mortar firm and an Internet firm.

2) Modeling Forecast-Commitment & Production-Ordering Decisions in Long-Term Customer Supplier Relationships, ***Elizabeth C. Junqueira***, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, junqueir@ieor.berkeley.edu, ***Candace A. Yano***

We study the effect of customer forecasts on a supplier's production quantity when the supplier makes commitments to the customer based on the forecast and the customer's order quantity is contractually tied to the forecast and committed quantity. We characterize the supplier's and customer's optimal strategies and discuss strategic implications.

3) Procurement Strategies in the Presence of Quantity Commitments & Spot Markets, ***Ozlem M. Yuksel***, Stanford University, Dept. of MSE, Stanford, CA 94305-4026, oyuksel@stanford.edu, ***Hau L. Lee***

E-marketplaces enable firms to streamline purchasing operations through a unified tool for their divisions to purchase supplies electronically. Firms may benefit from quantity discounts for common items, while tracking spot market offers. We investigate the tradeoffs involved with incorporating the spot market into long-term contracts with quantity commitments.

4) Why Use "Stale" Forecasts? Because they Sometimes Perform Better!, ***Julia Miyaoka***, Stanford University, Dept. of MSE, Stanford, CA 94305-4026, jmiyaoka@stanford.edu, ***Warren H. Hausman***

Using "stale" or old forecasts sounds silly, but their judicious use in a 2-stage supply chain with nonstationary end-item demand can improve performance under some circumstances. We call this forecast synchronization and we determine when it outperforms the usual sharing of current forecasts of demand.

TA22 Collaboration & Competition in Supply Chain Management

Cluster: Supply Chain Management
Invited Session
Chair: Greys Sosic, University of British Columbia, Fac. of Commerce & Bus. Admin., Operations & Logistics Div., Vancouver, BC, V6T 1Z2, Canada, greys.sosic@commerce.ubc.ca

1) A Bargaining Framework in Supply Chains with Vertical & Horizontal Competition, ***Mahesh Nagarajan***, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089, nmahesh@marshall.usc.edu, ***Yehuda Bassok***

We look at supply chains with suppliers and retailers in which there is both vertical and horizontal competition. We propose a bargaining framework that addresses the issue of profit allocation among the different agents.

2) Formation of Alliances in Internet-Based Supply Exchanges,

Greys Sosic, University of British Columbia, Fac. of Commerce & Bus. Admin., Operations & Logistics Div., Vancouver, BC, V6T 1Z2, Canada, greys.sosic@commerce.ubc.ca, ***Daniel Granot***

We study the problem of formation of alliances among 3 or fewer retailers in Internet-based supply exchanges. We analyze the profitability of membership in such alliances, as a function of product substitutability and quality of suppliers and provide conditions for the stability of such alliances.

3) Optimizing the Distribution Network of a Large Manufacturing Organization: A Case Study in California, ***Stephen A. Clarke***, California State University, Sch. of Bus. & Economics, Hayward, CA 94542, sclarke@jacuzzi.com, ***Joy Bhadury***

We present the results of an applied research project done on the distribution system of a major manufacturing company in California whose supply chain extends across the US. Details presented include: case history, data collection, problem formulation, analysis and recommendations along with potential savings accrued to the company.

TA23 Optimizing Enterprise Supply Chains

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: Markus Ettl, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598, msettl@us.ibm.com

1) Lateral Transshipments in an E-Business Environment, ***Barchi Peleg***, Stanford University, Dept. of MSE, Stanford, CA 94305, barchi@stanford.edu, ***Warren H. Hausman***

We explore the following effects of e-business on the attractiveness of lateral transshipments: shorter communication time allows delayed interaction among business partners until more information is revealed and lower communication cost allows flexibility regarding the number of locations to interact with. We also study the effect of correlation on the model results.

2) A Semiconductor Manufacturing Model for Inventory & Serviceability Management, ***Guillermo Gallego***, Columbia University, IEOR Dept., 302 Mudd Bldg., New York, NY 10027, ggallego@ieor.columbia.edu, ***Kaan Katircioglu***, ***Bala Ramachandran***

We describe the key parameters that impact the inventory and service performance of a semiconductor manufacturing system. We explain the details of the way in which they relate to and interact with each other. We present a high level multi-echelon model that captures the essential dynamics of such a system. The model can quantify the impact of key variables...

3) Multi-Item Inventory Control: The K-Curve Methodology, ***Maike Schwarz***, University of Hamburg, Bundesstr. 55, Hamburg, 20146, Germany, maike.schwarz@math.uni-hamburg.de

We deal with the problem of optimally coordinating the replenishment in a multi-item distribution system. The k-curve methodology represents a way to classify all items into a given number of classes with a common order frequency. Theoretical investigations show that this methodology does not achieve an optimal grouping of the items with respect to the cost function considered in most papers...

4) Managing Risk in Supply Chain Contracts with Quantity Flexibility, ***David D. Yao***, Columbia University, IEOR Dept., 302 Mudd Bldg., New York, NY 10027-6699, yao@ieor.columbia.edu, ***Feng Cheng***, ***Markus Ettl***, ***Grace Lin***

We develop a simple framework that describes the effect of contract terms and conditions on managing supply chain risk. The model considers the efficiency of the whole supply chain and the distribution of gains between buyers and suppliers. We discuss how each party should behave in contract negotiations by numerically investigating the impact of contract parameters such as base price, risk premium and quantity flexibility.

5) Lessons Learned in Designing an Expert Sales System, ***Shubir Kapoor***, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598, shubirk@us.ibm.com, ***Steve Buckley***, ***Kaan Katircioglu***, ***Heng Cao***, ***Guillermo Gallego***, ***Oyedele Oladeji***

Salespeople could save significant time using an expert sales system with the knowledge of a cross-functional sales team. We have developed an expert sales system that IBM uses in its daily sales operations. We will describe our system and relate important lessons that we have learned.

TA24 Supply Chain Management IV

Contributed Session

Chair: Suh-Wen Chiou, Tatung University, 40 Chung-Shan North Rd., Section 3, Taipei, Taiwan, chiou@mis.ttu.edu.tw, http://mis.ttu.edu.tw/~chiou

1) An Optimal Stock Distribution Model for a Supply Chain Network, ***Suh-Wen Chiou***, Tatung University, 40 Chung-Shan North Rd., Section 3, Taipei, Taiwan, chiou@mis.ttu.edu.tw, http://mis.ttu.edu.tw/~chiou

We present an optimized stock allocation and distribution policy for a supply chain network. The objective is to pursue total cost minimization. Development of algorithms based on the minimum cost flows is established. Experiments for a 3-echelon structure are conducted on 2 test networks and good results have been found.

2) A Seamless International Supply Chain Model for US/Mexico Operations, ***Rafael S. Gutierrez***, University of Texas, 500 West University Dr., El Paso, TX 79968-0512, rsgutier@utep.edu, ***Rolando Quintana***

The challenge of a seamless international supply chain is how best to allocate scarce resources among supply chain options which impact on cost and cycle time. The design problem and resulting models are considered as a "seamless" international supply chain. The modeling approach is focused on models that are strategically integrated and which consider multiple echelons.

3) The Impact of Collaborative Planning, Forecasting & Replenishment on End Customer Sales, ***George L. Shipley, Jr.***, 1620 Cole Village, Las Cruces, NM 88001, geoshipl@nmsu.edu

CPFR improves forecasting accuracy through joint planning along the supply chain. This improvement in forecasting accuracy is due to sharing information in real-time across organizational boundaries. We show how the increase in forecasting accuracy is directly related to decreases in stock-out levels and increases in customer sales.

4) Competitive Location & Capacity Decisions for Facilities Serving Time-Sensitive Customers, ***Euthemia Stavrulaki***, Pennsylvania State University, 311 Beam Bldg., University Park, PA 16802, exs37@psu.edu, ***Anthony Kwasnica***

How does increasing order-processing capacity interact with location decisions in a competitive environment? We investigate the competitive equilibria of 2 firms offering a single product to time-sensitive customers and choosing locations and capacities to maximize profits. Each customer incurs a waiting cost, due to both shipping lead-times and queueing congestion delays.

TA25 Scheduling III

Contributed Session

Chair: Oguzhan Alagoz, University of Pittsburg, 1048 Benedum Hall, Dept. of IE, Pittsburg, PA 15261, oga1+@pitt.edu

1) Rescheduling under Machine Eligibility Constraints, ***Oguzhan Alagoz***, University of Pittsburg, 1048 Benedum Hall, Dept. of IE, Pittsburg, PA 15261, oga1+@pitt.edu, ***Meral Azizoglu***

We consider a rescheduling problem under machine eligibility constraints in parallel machine environments. Our aim is to reconstruct a schedule after disruption that considers the trade-off between the efficiency measure, total flow-time and the stability measure, the number of jobs moved to other machines. We propose a B&B algorithm and 2 heuristic procedures to solve the problem.

2) withdrawn 10/10: Scheduling Jobs on Parallel Machines with Sequence-Dependent & Minor Setup Times, ***Dong-Hwan Eom***, Korea University, Eng. Bldg. 550, 5-1 Anamdong, Sungbuk-ku, Seoul, Korea, rokeom@hanmail.net, http://cim.korea.ac.kr/, ***Hyun-Joon Shin***, ***Sung-Schick Kim***

3) The Scheduling Array Proccess in a TFT LCD Factory, ***Jong-Kwan Baek***, Korea University, Dept. of IE, 1 5-Ga, Anamdong, Sungbuk-ku, Seoul, 136-701, Korea, jkbaek@korea.ac.kr, ***Jun-Geol Baek***, ***Sung-Schick Kim***

We present an scheduling scheme for the so-called array process in TFT-LCD manufacturing. The focus of the study is to meet due-date, when producing multiple products with different due-dates and different process flows.

4) On Some Extensions of Johnson's Flow-Up Model, ***Jerzy Kamburowski***, University of Toledo, Coll. of Bus. Admin., 2801 West Bancroft, Toledo, OH 43606, jkambur@utnet.utoledo.edu

In the scheduling literature, some extensions of Johnson's flow-shop model have been proposed. In addition to the job processing times, they included separated setup and removal times. In the case of 2 machines, simple algorithms for minimizing the makespan were developed. In fact, these algorithms can be shown to be equivalent to the well-known algorithm of Johnson...

TA26 Military OR Applications: Operational Modeling & Analysis I

Sponsor: MAS
Sponsored Session
Chair: James W. Chrissis, AFIT, Dept. of Operational Sci., AFIT/ENS, 2950 P St., WPAFB, OH 45433-7765, james.chrissis@afit.edu

1) Routing Applications for Unmanned Aerial Vehicles, ***Raymond Hill***, AFIT

UAVs are becoming an increasingly important Air Force asset particularly in the area of intelligence, surveillance and reconnaissance. The UAV Battlelab (BL) is chartered to develop and deploy innovative concepts for UAVs in a time-compressed, operationally-focused manner. We describe 3 years of research by the Department of Operational Sciences, AFIT, sponsored by the UAV BL aimed at providing an operational routing tool for the air vehicle operators working with the Predator UAV platform...

2) Modeling Force Structuring for a Moderately-Sized NATO Air Force, ***Hakan Bal***, AFIT, ***Richard F. Deckro***, ***James W. Chrissis***

Structuring a nation's forces is a continuing, critical consideration for military and national leadership. We build a force-structuring model for a moderately-sized NATO nation's Air Force. Tailored from existing models, detailed post optimality analysis is used by the model to analyze a national scenario for force structuring.

TA27 Attrition

Sponsor: MAS
Sponsored Session
Chair: Bruce W. Fowler, US Army Aviation & Missile Command, Aviation Missile RD & Eng. Ctr, Advanced Systems Directorate, Redstone Arsenal, AL 35898

1) Comparing Simulation & Models in Attrition Theory, ***Bruce W. Fowler***, US Army Aviation & Missile Command, Aviation Missile RD & Eng. Ctr, Advanced Systems Directorate, Redstone Arsenal, AL 35898

Attrition models and simulations are built from the same core concepts. They differ primarily in the stochastic nature of the simulations and the intricate mathematics of the rate models. We construct test bed simulations of increasing complexity and compare their averaged results with the formalism of rate theory. Of particular interest is the impact of interrupted engagements - a consideration often neglected in rate theory models.

2) Attrition through a Partially Coordinated Area Defense, ***Richard M. Soland***, George Washington University, Dept. of EMSE, School of Eng., Washington, DC 22052, soland@seas.gwu.edu, ***Dhaif K. Al-Mutairi***

An area defense consists of several groups that act independently and do not communicate with each other. Each group has a fixed number of defenders and a controller that optimally allocates these defenders among all the attackers. We analyze the effectiveness of this partially coordinated defense against a simultaneous attack.

TA28 Decision Making with Dependence & Feedback: The Analytic Network Process

Cluster: Decision Making Theory & Applications: AHP/ANP
Invited Session
Chair: Thomas L. Saaty, University of Pittsburgh, Pittsburgh, PA 15213, saaty@katz.pitt.edu

1) Quality Function Deployment for the Good of Soccer, ***Fariborz Y. Partovi***, Drexel University, Dept. of Dec. Sci., Philadelphia, PA 19104, partovi@drexel.edu, ***Rafael A. Corredoira***

We present a model for prioritizing and designing rule changes for the game of soccer. The model integrates quality function deployment, AHP and ANP to determine the required changes to make the game of soccer more interesting. This model can be applied to other sports.

2) Total Quality Management Implementation Assessment & Improvement Suggestions for Turkish Industry: An Analytic Network Approach, ***Birsen Karpak***, Youngstown State University, Dept. of Mgmt., Youngstown, OH 44555-3071, bkarpak@cc.ysu.edu, ***Ozden Bayazit***

We examined TQM implementation in Turkey by using ANP. Our database is based on a survey among the top 100 industrial companies in Turkey. We have identified the determinants of TQM implementation, then clustered them and specified those that directly influence each other. At the end, we identified the impact of changing the importance of determinants on ease of TQM implementation.

3) The Decision on National Missile Defense, ***Thomas L. Saaty***, University of Pittsburgh, Pittsburgh, PA 15213, saaty@katz.pitt.edu

Benefits, opportunities, costs and risks with corresponding criteria were used in the context of the ANP to determine the best of 4 alternatives as to whether the US should develop the most strongly advocated option for national missile defense as one of the 4 options considered. This analysis was complete in the fall of 2000 and apears in the speakers book on ANP in 2001.

TA29 Quality, Management & Design

Sponsor: QSR
Sponsored Session
Chair: Gabriele Arcidiacono, University of Firenze DMTI, via Santa Marta 3, Firenze, 50139, Italy, g.arcidiacono@dmti.unifi.it

1) withdrawn 10/9: Functional Analysis using the Axiomatic Design Theory, ***Gabriele Arcidiacono***, University of Firenze DMTI, via Santa Marta 3, Firenze, 50139, Italy, g.arcidiacono@dmti.unifi.it, ***Gianni Campatelli***

2) Application of RCM Analysis for the Residue Hydroconversion Unit of a Refinery Plant, ***A. Giusti***, Nuovo Pignone, ***Pierro***, ***V. Nuzzolo***, ***Stefano Barbati***

The FMECA is a methodology used for reliability and criticity prediction. We will show an industrial application of this tool to a part of a refinery plant, a RHU. The FMECA results have been summarized in a criticality matrix and from this we have been able to improve the maintenance plan of this plant.

3) The Six Sigma Approach for Transactional Cases, ***Carrere***, VISTEON Interior System, ***Maurizio Vitale***, ***Gabriele Arcidiacono***, ***Gianni Campatelli***, ***Paulo Citti***

The six sigma is an approach to improve the company's global quality. The traditional use is for operational cases (in particular reduction of manufacturing scraps). In this memory we will explain the steps needed to apply the six sigma approach to a transactional case, in particular we will show a project for absenteeism reduction in a manufacturing plant.

4) Improving First Time Yield through Deming's Quality Route, ***Rocio Garcia***, Blue Bird de Mexico SA, Carretera a Laredo Km. 25, Apodaca NL, 66450, Mexico, rgarcia@blue-bird.com, ***Jacobo Fernandez***, ***Bernardo Villarreal***, ***Martin B. Tellez***

The application of the DQR has proven to be a very powerful umbrella under which many improvement techniques and methodologies can be applied. We present results of the ongoing implementation of a total quality system designed around DQR in a Mexican scholar bus assembler.assembler.

TA30 Environmental Applications of Decision Analysis

Sponsor: Decision Analysis
Sponsored Session
Chair: Kara M. Morgan, Research Triangle Institute, 1516 M St. NW, Ste. 740, Washington, DC 20036, kmorgan@rti.org

1) Ecological Risk Ranking: Evaluation of a Method to Improve the Quality of Public Participation in Environmental Decision-Making, ***Henry Willis***, Carnegie Mellon University, Dept. of Eng. & Public Policy, Pittsburgh, PA 15213, hhw@andrew.cmu.edu, ***Michael DeKay***, ***Paul Fischbeck***, ***Baruch Fischhoff***, ***Keith Florig***, ***Granger Morgan***, ***Claire Palmgren***

Our research group has developed a method for ranking risk to health, safety and the environment. The method elicits ranking results using both holistic judgment and a multi-attribute utility model. We describe how the risk attributes were selected and report preliminary ranking results using our method and these attributes.

2) A Framework for Estimating the Value of Improving Toxics Release Inventory Data, ***Charles D. Linville***, American University, Dept. of CS & IS, Washington, DC, linvill@email.clark.american.edu, ***Robert R. Bruno***

Databases of geographically-linked environmental information are of considerable value in environmental protection. We describe a framework for estimating the expected value of improving the information in one such database, the US EPA's Toxics Release Inventory, established by the Emergency Planning and Community Right-To-Know Act and the Pollution Prevention Act.

3) Evaluating the EPA's Toxicological Testing Program for Children's Health: A Decision Analysis Approach, ***Fumie Yokota***,

Harvard School of Public Health, yokota@fas.harvard.edu

A Bayesian decision theory framework is used to characterize the expected value of information from the Voluntary Children's Chemical Evaluation Program. The prior distribution is modeled using a hierarchical Bayesian approach threshold analysis of the posterior distribution will determine the conditions under which VOI exceeds the cost of the program.

4) Connecting Data Quality to Decision Making: Developing a Framework, ***Kara M. Morgan***, Research Triangle Institute, 1516 M St. NW, Ste. 740, Washington, DC 20036, kmorgan@rti.org, ***Malcolm J. Bertoni***

The US Environmental Protection Agency generates a large amount of environmental measurement data. The relationship between data quality and decision making is complex and not well understood by data generators or data users, i.e., decision makers. We investigate methods for using data quality information to improve decision making.

TA31 Belief Functions in Business Decisions

Cluster: **Belief Functions: Advances & Applications**
Invited Session

Chair: Rajendra P. Srivastava, University of Kansas, Auditing Research & Adv. Tech., Sch. of Bus., Lawrence, KS 66045, rajendra@falcon.cc.ukans.edu, http://lark.cc.ukans.edu/~srivasta/

1) Modeling Financial Portfolios using Belief Functions, ***Catherine Shenoy***, University of Kansas, Business Sch., 1300 Sunnyside Ave., Lawrence, KS 66045-7585, cshenoy@ku.edu, ***Prakash P. Shenoy***

Our goal is to demonstrate how the theory of belief functions can be used to model financial portfolios. In particular, we are interested in modeling using belief networks how a portfolio return distribution changes as we learn new informaton about the different factors that impact the portfolio.

2) Dempster-Shafer Theoretic Risk Analysis in Project Profitability Calculus, ***Mieczyslaw A. Klopotek***, Polish Academy of Sciences, Inst. of Comp. Sci., Warsaw, Poland, klopotek@ipipan.waw.pl, ***Slawomir T. Wierzchon***

We argue that existing studies on applications of the Dempster-Shafer theory in decision making processes have avoided intrinsic problems. The Dempster-Shafer theory has long been shown not be a model of interval probabilities except for very special cases when only 1 of the neighboring variables in a dependence network is a true Dempster-Shafer theory variable and the others are traditional (single-valued). Problems with applicability of true belief functions should be sought...

3) The Effectiveness & Efficiency of Belief-Based Audit Procedures, ***Maximilian Jung***, University of Graz, Dept. of Acct. & Auditing, Universitaetsstrasse 15/F1, Graz, A-8010, Austria, maximilian.jung@kfunigraz.ac.at

A simulation study is presented which compares belief-based audit procedures with the "traditional" audit approach. Complex audit situations with 2 types of statistical evidence are generated. With attribute sampling, the frequency of errors in an account is tested. Results are then used to reduce the sample size of subsequent variable sampling carried out in order to test if the account is materially overstated...

TA32 Modeling & Optimization in Finance II

Cluster: **Financial Engineering**
Invited Session

Chair: Stanislav Uryasev, University of Florida, Dept. of ISE, PO Box 116595, 303 Weil Hall, Gainesville, FL 32611-6595, uryasev@ise.ufl.edu

1) Stochastic Dominance & Related Mean-Risk Models, ***Andrzej Ruszczynski***, Rutgers University, Dept. of MS/IS, 94 Rockefeller Rd., Piscataway, NJ 08854, rusz@rutcor.rutgers.edu

We shall discuss primal and dual relations of stochastic dominance and mean--risk models which are consistent with these relations; in particular, semideviations and tail value at risk.

2) Asset/Liability Management for Pension Funds, ***H. Edwin Romeijn***, University of Florida, Dept. of ISE, PO BOx 116595, 303 Weil Hall, Gainesville, FL 32611-6595, romeijn@ise.ufl.edu, ***Erik Bogentoft, Stanislav Uryasev***

We consider a single-period and a multi-period model that optimizes the portfolio allocation and contribution rate setting for pension funds facing uncertain future liabilities. We use conditional-value-at-risk as a tool for controlling the associated risk that the pension fund will not be able to meet its liabilities.

3) Portfolio Optimization with Drawdown Constraints, ***Alexei Chekhlov***, Thor Asset Management, Inc., 551 Fifth Ave., Ste. 601, 6th Fl., New York, NY 10017, a_chekhlov@thorcapital.com, ***Stanislav Uryasev, Michael Zabarankin***

Portfolio drawdown is a drop in the portfolio value compared to the previous maximum. We study a new measure, conditional drawdown-at-risk (CDaR), which is defined as the mean of the worst x% drawdowns. Using CDaR, we solved a real-life portfolio allocation problem (portfolio of derivatives).

4) Solving Semi-Definite Programming Problems for Bounding Option Price by a Cutting Plane Algorithm, ***Jun-Ya Gotoh***, Tokyo Institute of Technology, Advanced Financial Tech. Ctr., 2-12-1 Oh-Okayama, Meguro-ku, Tokyo, Japan, jgoto@me.titech.ac.jp, ***Hiroshi Konno***

Bertsimas & Popescu (1999) showed that a problem for obtaining a tight upper bound of European type call option price can be formulated as a semi-definite programming problem (SDP). We develop a cutting plane algorithm applicable to SDPs and apply it to the option pricing problems. We show it works efficiently for the problems of practical size.

TA33 Modeling Applications in Health Care

Sponsor: **Health Applications**
Sponsored Session

Chair: Michael W. Carter, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, carter@mie.utoronto.ca

1) Optimal Investment in a Portfolio of HIV Prevention Programs, ***Gregory S. Zaric***, University of Western Ontario, Ivey Sch. of Business, London, Ontario, N6A 3K7, Canada, gzaric@ivey.uwo.ca, ***Margaret L. Brandeau***

We develop a model for resource allocation for control of infectious diseases. We investigate the optimal investment in 3 HIV prevention programs, needle exchange programs, condom availability and increased methadone capacity, in a population of injection drug users and non-drug users.

2) Using Monte Carlo Simulation to Determine Combination Vaccine Price Distributions for Childhood Diseases, ***Sheldon H. Jacobson***, University of Illinois, Dept. of MIE, 1206 West Green St., MC 244, Urbana, IL 61801, shj@uiuc.edu, www.staff.uiuc.edu/~shj/shj.html, ***Edward C. Sewell***

We use Monte Carlo simulation with an integer programming model to determine the maximal price distribution of 4 combination vaccines for childhood immunization. The results suggest that combination vaccines warrant cost premiums and that further vaccine manufacturer innovations in this area can provide significant economic and societal benefits.

3) Modeling Nursing Human Resources in Ontario, Canada, ***Chris Neuman***, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, cneuman@mie.utoronto.ca, ***Michael W. Carter***

The strain on health care due to the aging of the baby boom generation has led to a need for accurate human resource staffing models. We discuss the formulation of such a model for nurses in Ontario, driven by demographic information, resource utilization data and trends in the nursing profession.

4) Multi-Objective Capital Budgeting in Hospitals & Health Care Systems, ***Don N. Kleinmuntz***, University of Illinois, Bus. Admin. Dept., 208 Wohlers, 1206 South Sixth St. MC-706, Champaign, IL 61820, dnk@uiuc.edu, ***Catherine E. Kleinmuntz***

The use of multi-objective decision analysis to prioritize hospital capital expenditures is described. The process uses additive multi-attribute value models to assess benefits and integer linear programming to construct optimal project portfolios subject to budget constraints and financial targets. Organizational implementation and impact on hospital-physician relationships are discussed.

TA35 Transportation Science II

Sponsor: **TSS**
Sponsored Session

Chair: Ismail Chabini, MIT, 77 Massachusetts Ave., Rm. 1-263, Cambridge, MA 02139-4307, chabini@mit.edu

1) Designing Optimal VMS Locations under Stochastic Incidents & Information Provision Scenarios, ***Nhan Nuynh***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78751, nhuynh@mail.utexas.edu, ***Yi-Chang Chiu, Hani S.***

Mahmassani

We formulate the VMS location problem as a 2-stage stochastic recourse program. The objective is to design VMS locations to minimize the expected recourse total system travel time in conjunction with different information provisioning scenarios. Experiment results and implications are presented and discussed.

2) Dynamic Micro-Assignment of Travel Demand with Activity/ Trip Chains, ***Ismail Chabini***, MIT, 77 Massachusetts Ave., Rm. 1-263, Cambridge, MA 02139-4307, chabini@mit.edu, ***Andrew Glenn, Stefano Pallottino, Maria Grazia Scutella***

We present an assignment framework for travel demand with activity/trip chains which can be used in conjunction with activity-based travel demand forecasting procedures as well as for traffic operational studies. The framework includes temporal-spatial micro-assignment models for activity/trip chaining in which trip chains are assigned over time and space.

3) Best Routing Policy Problems in Stochastic Time-Dependent Networks, ***Song Gao***, MIT, 77 Massachusetts Ave., Rm. 5-012, Cambridge, MA 02139, songgao@mit.edu, ***Ismail Chabini***

We study the best routing policy problem in a stochastic and time-dependent network with various assumptions about network statistical dependency and information access. We design an exact algorithm to a variant of the problem with perfect online information. Approximation algorithms for the same problem are also presented. Computational tests are given to show the efficiency and effectiveness of the algorithms presented.

4) Re-Optimization Algorithms for Minimum-Time Path Problems in Dynamic Networks, ***Ismail Chabini***, MIT, 77 Massachusetts Ave., Rm. 1-263, Cambridge, MA 02139-4307, chabini@mit.edu, ***Andrew Glenn, Stefano Pallottino, Maria Grazia Scutella***

We design re-optimization algorithms that exploit past computation results to speed up future computations in finding minimum-time paths in a time-dependent network. Numerical results are given. They show that the developed re-optimization algorithms lead to encouraging computation time savings in FIFO networks. Savings ratios in the order of 3 are obtained. Larger run time savings ratios are obtained for non-FIFO networks.

TA36 Models to Support Air Cargo Planning & Operations

Sponsor: Aviation Applications/TSS
Sponsored Session

Chair: Ellis L. Johnson, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ejohnson@isye.gatech.edu

1) The Revenue Performance of Discretized Variants of a Continuous Cargo Revenue Management Model, ***Itir Z. Karaesmen***, Carnegie Mellon University, Grad. Sch. of Ind. Admin., 5000 Forbes Ave., Pittsburgh, PA 15213, itir@andrew.cmu.edu, ***E. Andrew Boyd***

Unlike passenger seats, the defining characteristics of cargo are multidimensional and some are continuousnuous for example, weight and volume. Following up on earlier theoretical work, revenue performance results are presented for discretized variants of a continuous cargo revenue managementgement model. model.

2) A Policy Evaluation Model for Storage & Retrieval of Loose Cargo in an Airport Cargo Terminal, ***Huei-Chuen Huang***, National University of Singapore, isehhc@nus.edu.sg, ***Chew Ek Peng, Ivy Mok***

Loose cargo, if lodged-in early, must be placed in a bin and stored temporarily in a storage system, to bebe retrieved later for retrieved later for palletizing with other loose cargo. To ensure cargo is handled speedily and efficiently,ge and retrieval policies proper storage and retrieval policies of managing loose cargo play a very important role.

3) Air Cargo Load & Allocation Issues, ***Joel S. Sokol***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, jsokol@isye.gatech.edu, ***George L. Nemhauser, Ellis L. Johnson, Huei-Chuen Huang, Chew Ek Peng***

A common practice among many airlines is to allocate cargo space to freight forwarders. We look at several issues and research areas including: allocations that shippers/forwarders should requestquest a short- term forecasting model for actual space needed how freight forwarders accommodate spikes in loads and potential systems to centrally manage the space and benefits from doing so.from doing so.

4) withdrawn 10/9: Revenue Enhancement & Service Reliability Improvement in the Air Cargo Industry, ***Raja Kasilingam***, Sabre, Inc., raja.kasilingam@sabre.com

TA37 Revenue Management Methods & Models

Sponsor: Revenue Management & Pricing
Sponsored Session

Chair: Peter P. Belobaba, MIT, Intl. Ctr. for Air Transport., Rm. 33-215, Cambridge, MA, belobaba@mit.edu

1) Derivative-Free Search Methods for Improved Booking Controls, ***Anton J. Kleywegt***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton@isye.gatech.edu, ***Vijay Bharadwaj***

We propose a number of derivative-free search methods to find improved booking controls that can be used with more general demand models than current methods, that take into account the dependence of demand on the booking controls. Computational results are presented for a collection of dependent products and a simulation model of demand.

2) Monotone Properties of Optimal Booking Control on a Multi-Leg Flight, ***Youyi Feng***, Enron Corp., 1400 Smith St., Houston, TX 77002-7361, youyi.fend@enron.com, ***Ping Lin***

We explore the monotone properties of optimal booking control for a multi-leg flight. We look into the optimal booking scheme derived in a continuous-time environment. The scheme is found to have the monotone properties extended from those of a 2-leg flight we discovered in the previous paper.

3) Equilibrium in Revenue Management Games, ***Serguei Netessine***, University of Pennsylvania, Wharton Sch., OPIM Dept., 1300 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104-6366, netessinse@simon.rochester.edu, ***Robert A. Shumsky***

We examine the competitive seat allocation decisions of two airlines, each with 2 fare classes. When demands for fare classes are strongly negatively correlated, a Nash equilibrium may not exist. We prove existence for special cases and compare the competitive solution with the optimal monopoly decision.

4) Coordination of Origin-Destination Control in Airline Alliances, ***Peter P. Belobaba***, MIT, Intl. Ctr. for Air Transport., Rm. 33-215, Cambridge, MA, belobaba@mit.edu

The revenue gains of origin-destination RM systems in an alliance can be negatively affected when the airline partners apply separate optimization models to their own networks. We use the passenger origin destination simulator to illustrate these potential impacts and demonstrate how an exchange of "bid prices" derived from separate network optimizations can improve total alliance revenues.

TA38 Performance & Stability of Multi-Class Queueing Networks

Sponsor: Applied Probability
Sponsored Session

Chair: Ioannis Paschalidis, Boston University, Dept. of Mfg. Engineering, Boston, MA 02215, yannisp@bu.edu

1) On Performance & Stability of Priority Policies in Multi-Class Queueing Networks, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., Rm. E53-363, Cambridge, MA 02139, dbertsim@mit.edu, ***Aurelie Thiele***

We establish new phenomena that lead to instability of priority policies in MQNETs. We also show that, whenever a K-virtual station with utilization r causes instability, then the expected queue lengths L satisfy: $C/(K-r) < E[L] < G/(K-r)$, where C,G are constants.

2) A Fluid Heuristic for Minimizing Makespan in Job Shops, ***Jim G. Dai***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, dai@isye.gatech.edu, ***Gideon Weiss***

We describe a simple on-line heuristic for scheduling job-shops. We assume there is a fixed set of routes for the jobs, and many jobs, say N, on each route. The heuristic uses safety stocks and keeps the bottleneck machine busy at almost all times, while the other machines are paced by the bottleneck machine...

3) Myopic & Far-Sighted Approaches to the Control of Large Networks, ***Sean P. Meyn***, University of Illinois, Dept. of ECE & CSL, 1308 West Main St., Urbana, IL 61801, meyn@uiuc.edu, ***R. Dubrawski, M. Chen, C. Pandit***

We will explore sources of sensitivity in network planning and control. We show that the sources of highest sensitivity typically involve only the deterministic, core dynamics of the network. Based on this idea, we present some general approaches to network management. In particular, we find that the proposed allocation algorithms are asymptotically optimal under certain

geometric conditions.

4) Target-Pursuing Policies for Multi-Class Queueing Networks, ***Ioannis Paschalidis***, Boston University, Dept. of Mfg. Engineering, Boston, MA 02215, yannisp@bu.edu, ***Michael C. Caramanis***, ***Hang Su***

We propose a new class of target-pursuing policies for MQNETs that "steer" the queue length vector to some appropriately chosen target. We analyze a fluid version and show that the queue length vector converges to the chosen target. For the stochastic system we propose initial target values and develop a simulation-based method to improve upon them...

TA39 Software Demonstration V

Chair: To be announced

1) Software Demonstration: ARENA Applications in the Commercial Enterprise, ***Ted Matwijec***, Rockwell Software, 504 Beaver St., Sewickley, PA 15143, tfmatwijec@software.rockwell.com

We will offer a basic overview of the Arena simulation software and the many applications at an enterprise, specifically focusing on the supply chain, warehouse, contact center and manufacturing applications. A short demo will be provided and an emphasis on real-world case studies, data integration, reporting and benefits of simulation will be discussed.

2) Software Demonstration: Visualization Tools & Techniques, ***Ken Buckingham***, IBM, 4255 South Rd., Poughkeepsie, NY 12601, kenbuck@us.ibm.com

IBM will be demonstrating work to use visualization techniques as a method to refine and more completely understand the impacts of optimization scenarios. Not only will the visualization tools be used to represent the output of the model, they will also serve to refine the input to the models. This work is a continuing effort to link related technologies for enhanced modeling.

TA40 OR/MS in Forestry V

Cluster: Forestry
Sponsor: ENRE
Sponsored Session
Chair: Michael Bevers, USDA Forest Service, Rocky Mt. Research Station, 2150A Centre Ave., Ft. Collins, CO 80526, mbevers@fs.fed.us

1) Multi-Modeling & Everglades Restoration, ***Louis J. Gross***, University of Tennessee, ***Donald L. DeAngelis***

The Across Trophic Level System Simulation (ATLSS) project involves analyzing the ecological impacts of hydrologic planning across the Everglades region. ATLSS is structured as a multimodel, a mixture of modeling approaches based upon the inherent temporal scales and spatial extent of various trophic components, linked together by spatially-explicit information on underlying environmental, biotic and anthropogenic factors

2) A Conservation-Based Planning Model, ***Richard Church***, University of California, Dept. of Geography, 5717 Ellison Hall, Santa Barbara, CA 93106, church@geog.ucsb.edu, ***R. A. Gerrard***, ***M. Gilpin***, ***P. Stine***

We present a prototype model that has been developed for species conservation. The planning model represents a combination of 3 modeling approaches: geographic information systems knowledge-based decision making and integer programming. An overview of the models will be presented along with an application dealing with the preservation of the San Joaquin Kit Fox in 2 Northern California Counties.

3) Spatial Optimization in Ecological Applications, ***John Hof***, USDA Forest Service, Rocky Mt. Research Station, Ft. Collins, CO 80524, jhof@fs.fed.us, ***Michael Bevers***

We summarize a new book, by the same title, that explores formulations capturing nonlinear spatial relationships in linear and integer programming models. This makes it possible to solve large problems with many constraints and choice variables. Case studies include simple proximity relationships, reaction-diffusion dispersal models and population and fire control problems. We use optimization models to develop hypotheses about ecosystems.

4) Spatial Reserve Design: A Comparison of Methods for Determining Optimal Layouts for an Endangered Species, ***Laurel E. Travis***, Metropolitan State University, Minneapolis, MN, laurel.travis@metrostate.edu, ***Michael Bevers***, ***Curt Flather***

We test the hypothesis that deterministic and stochastic optimizations yield identical spatial layouts for an endangered species reserve design problem. We use spatial optimization with a model of black-footed ferret population growth and dispersal to compare the placements of habitat reserves that will maximize long-term ferret populations.

TA41 Train Scheduling with BNSF Railway

Cluster: Unsolved OR Problems in Industry
Invited Session
Chair: Pooja Dewan, BNSF Railway, Info. Systems Services, 2500 Lou Menck Dr., Ft. Worth, TX 76131, pooja.dewan@bnsf.com

1) Train Scheduling within BNSF Railway, ***Pooja Dewan***, BNSF Railway, Info. Systems Services, 2500 Lou Menck Dr., Ft. Worth, TX 76131, pooja.dewan@bnsf.com

Currently due to the inability to predict traffic, trains are annulled, delayed or second sections added periodically with short notice. This variability in train schedules results in unreliable transit time. We will present the problems in creating train schedules and the related impact of it on crews, locomotives, yard and line congestion.

TA42 Open Source Software I

Cluster: Open Source Software
Invited Session
Chair: Robin Lougee-Heimer, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, robinlh@us.ibm.com

1) Computational Experiments using the Volume Algorithm, ***Herman Abeledo***, George Washington University, Dept. of OR & EM/SE, 707 22nd St. NW, Washington, DC 20052, abeledo@gwu.edu, ***Hua Ni***, ***Rudy Sultana***

We use the volume algorithm to solve linear programs coming from quadratic assignment and hop-constrained minimum spanning tree problems. Computational results are presented for randomly generated problems and known instances of the QAP. Experience with heuristics based on approximate primal solutions of the linear program relaxations are reported.

2) OpenTS: An Open Source Java Tabu Search Framework, ***Robert Harder***, 1235 Jefferson Davis Hwy, Ste. 301, Arlington, VA 22202, rharder@usa.net

OpenTS is a Java tabu search framework that helps analysts implement the popular tabu search meta-heuristic in a well-structured, object-oriented design. Among the key advantages: works with any problem type offloads repetitive functions logically organizes the tabu search exploits multi-processor computers and integrates goal programming.

3) Panel: New Directions & Standards for the MPS File Format, ***Bjarni Kristjansson***, Maximal Software Inc., 2111 Wilson Blvd., Ste. 700, Arlington, VA 22201, bjarni@maximalsoftware.com, ***Lloyd W. Clarke***, ILOG, Inc., 33 East Fox Run Circle, Green Bay, WI 54302, lclarke@ilog.com, ***Bob Daniel***, Dash Optimization, Blisworth House, Church Ln, Blisworth, Northants, NN7 3BX, UK, bob.daniel@dashoptimization.com, www.dashoptimization.com, ***Robert Fourer***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.northwestern.edu

The MPS-file format for mathematical programming has been extremely useful, but is showing its age. New technologies such as 64bit hardware, stochastic solvers, and XML require new capabilities in the open standard format. This panel will provide a forum for discussing current problems and proposed solutions.

TA43 OR Modeling in Higher Education

Cluster: OR Modeling in Higher Education
Invited Session
Chair: Robert L. Armacost, University of Central Florida, Univ. Analysis & Plan. Support, 12424 Research Pkway, Ste. 225, Orlando, FL 32826-3207, armacost@mail.ucf.edu

1) A Simulation Analysis of the Undergraduate Admissions Operations of a Major Metropolitan Research University, ***Hector Lopez***, University of Central Florida, Op. Excellence/Assess. Support, 12424 Research Pkway, Ste. 225, Orlando, FL 32826-3207, helopez@mail.ucf.edu, ***Julia Pet-Armacost***, ***Hani Aburas***

The Admissions Office at the University of Central Florida was interested in reducing the time from receipt of application to an admissions decision. We describe how a simulation programmed in ARENA was used to help the Admissions Director understand the effects of various changes in the application processing operations.

2) A Stochastic Programming Model for Optimal College Enrollments, ***Concetta A. DePaolo***, Indiana State University, Sch. of

Bus., Terre Haute, IN 47809, sdcetta@befac.indstate.edu

Each year, an institution must decide which students to admit in order to accomplish its goals, e.g., enrollment, quality, etc., while satisfying various capacity constraints. We describe a stochastic programming approach to this problem as well as an implementation and an approximation algorithm that are both Excel-based.

3) Using Embedded Optimization to Fit a University Enrollment Projection Model, ***Robert L. Armacost***, University of Central Florida, Univ. Analysis & Plan. Support, 12424 Research Pkway, Ste. 225, Orlando, FL 32826-3207, armacost@mail.ucf.edu, ***Alicia L. Wilson***

In a growth environment, historical transition fractions are inadequate to predict future enrollment by category. We describe how an embedded optimization model was used to "fit" transition fractions to improve the performance of an Excel-based enrollment model at a major metropolitan research university.

TA45 Operations Management X

Contributed Session

Chair: Mehmet A. Begen, University of British Columbia, Commerce, Ops. & Logistics, 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, mabegen@coe.ubc.ca, http://coe.ubc.ca/users/mabegen

1) The Effects of Currency Exchange Fluctuation on Inventory Policy, ***Tekle O. Wanorie***, University of Alabama, 800 Energy Center Blvd. #107, Northport, AL 35473, twanorie@cba.ua.edu

Many nations, especially so-called emerging economies, often import raw materials and commodities from other nations. There are many companies operating in nations that are often plagued by price fluctuations resulting from a fall or rise in local currency used to purchase inventory. We seek to develop a currency exchange rate model and show how it can be used to make inventory decisions...

2) Efficient Solution of a Linear Programming Model for Simultaneous Material & Capacity Requirements Planning, ***Kingsley Gnanendran***, University of Scranton, Dept. of OIM, Scranton, PA 18510, skg355@uofs.edu, ***James K. Ho***

We investigate efficient methods for solving a block-angular linear programming model that simultaneously optimizes material and capacity requirements in a multistage production system. Within the overall framework of Dantzig-Wolfe decomposition, significant run-time savings can be acheived by using a novel data structure for storing and updating the subproblem basis.

3) Approximate Analysis of Decentralized Two-Stage Production/Inventory Systems, ***Cigdem Z. Gurgur***, Rutgers University, 821 Davidson Rd., Piscataway, NJ 08854, cigdem@rci.rutgers.edu, ***Tayfur Altiok***

We consider a 2-stage, 1-product pull decentralized manufacturing system where each stage has its own input and output buffer and the material is moved in fixed lot. The system behavior is approximated using a 2-node decomposition and solved with a matrix-geometric approach. The simulation experiments prove the accuracy of the algorithm.

4) Decision Support for Optimal Catch Allocation at JS McMillan Ltd., ***Mehmet A. Begen***, University of British Columbia, Commerce, Ops. & Logistics, 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, mabegen@coe.ubc.ca, http://coe.ubc.ca/users/mabegen, ***Martin L. Puterman***, ***David W. Glenn***

We developed a decision-support tool incorporating linear programming to assist JS McMillan allocate daily fresh salmon catches to various salmon products. The objective is to obtain a production plan that maximizes the profit potential of the catch.

TA46 Agent Foundations & Simulation Applications

Sponsor: Simulation

Sponsored Session

Chair: Kevin L. Stamber, Sandia National Laboratories, Critical Infrastructure Surety, PO Box 5800, Albuquerque, NM 87185-0451, klstamb@sandia.gov

1) The Intellectual Minefield that is the Agent Paradigm, ***Kevin L. Stamber***, Sandia National Laboratories, Critical Infrastructure Surety, PO Box 5800, Albuquerque, NM 87185-0451, klstamb@sandia.gov, ***Laurence R. Phillips***, ***Carmen Pancerella***

The 'agent' as a modeling paradigm is heavily used, perhaps overused. We review the fundamentals of agent technologies and the application of agents to simulation and modeling. Sure to be stimulating discussion includes (but is not limited to) distinctions and commonalties in agent structure, characteristics, behavior and current practice.

2) Analysis of Infrastructure Systems using Agent-Based Microsimulation, ***Dianne C. Barton***, Sandia National Laboratories, Critical Infrastructure Surety, PO Box 5800, Albuquerque, NM 87185-0451, dcmaroz@sandia.gov, ***Eric D. Eidson***, ***Brian D. Murphy-Dye***

Sandia National Laboratories has developed an agent based model that simulates economic exchange between infrastructures using Monte Carlo methods and GA learning classifiers to control decision making. Simulation results show the potential of this approach for analyzing infrastructure complexity and for forecasting the impact of shocks to infrastructure networks.

3) Agent-Based Simulation of Autonomous Robotic Vehicles, ***David A. Schoenwald***, Sandia National Laboratories, Intelligent Systems & Robotics, PO Box 5800, Albuquerque, NM 87185-1004, daschoe@sandia.gov

We describe the use of a simulation framework at Sandia, Umbra, which consists of interconnected modules that represent the physics of the simulation and the 3D visualization. Umbra can simulate robotic agents that independently respond to their surroundings and communicate. We examine several simulation scenarios involving ground-based vehicles.

Tuesday 10:00-11:30

TB01 Tutorial: Knowledge & Knowledge Management

Invited Session

Chair: Milan Zeleny, Fordham University, zeleny@mary.fordham.edu

1) Tutorial: Knowledge & Knowledge Management, ***Milan Zeleny***, Fordham University, zeleny@mary.fordham.edu

TB02 XML in E-Business

Cluster: OR/MS & the Internet

Invited Session

Chair: Oliver Guenther, Humboldt-University zu Berlin, Inst. of IS, Spandauer Str. 1, Berlin, 10178, Germany, guenther@wiwi.hu-berlin.de

1) Dumb Software Agents on an Experimental Asset Market, ***Jens Grossklags***, Humboldt-University zu Berlin, Inst. of IS, Spandauer Str. 1, Berlin, 10178, Germany, jensg@wiwi.hu-berlin.de, ***Carsten Schmidt***, ***Jonathan Siegel***

We analyze the impact of agents and their trading strategies on an experimental electronic market. To this end, we added an XML interface to an existing electronic market and implemented artificial agents which acted as elements of disturbance in the trading process. These artificial traders applied simple and constant strategies which sometimes appear to be "rational" or random to the other traders...

2) SIMPLEX: A Prototype for a Supply Chain Management Platform Enabled by XML, ***Luis Martin***, Freiberg University of Technology, Fac. of Economics, Freiberg, 09596, Germany, luis.martin@bwl.tu-freiberg.de, ***Peter Buxmann***

XML and its related standards have become the key technology to allow a simplified many-to-many integration of ISs. We show how XML can actually be implemented for a Web-based integration in supply chains. We present a java-based prototype that enables document exchange over the Internet using XML-Business-Vocabularies for document representation, XSLT for document conversion, XSL for presentation and DOM and SAX for document processing.

3) XML in an Infrastructure for E-Commerce in Electronic Services, ***D. J. Abel***, CSIRO, Math & IS, ***K. L. Taylor***, ***M. A. Cameron***, ***R. A. Power***, ***D. Devereux***

E-commerce in electronic services such as data supply and prediction, optimization and analysis will become much more attractive if a customer can compose an application from several services offered by autonomous providers. While XML provides a powerful basis for document interchange, it is necessary to cater for documents with customer-specified content and structure. We describe solutions developed in the CSIRO Internet marketplace...

4) adXML: XML for Marketing & Advertising Applications, ***Oliver Guenther***, Humboldt-University zu Berlin, Inst. of IS, Spandauer Str. 1, Berlin, 10178, Germany, guenther@wiwi.hu-berlin.de, ***H.-Arno Jacobsen***

adXML.org is an international open standards group that aims to define XML standards for marketing and advertising applications. asXML v1.X is an XML DTD specification that serves to define XML documents to be exchanged between a buyer and a seller of advertising services and related digital assets. It

addresses the specific needs of a variety of advertising domains with a current focus on the requirements of online media campaigns...

TB03 Boolean Functions & Optimization

Cluster: Data Mining
Invited Session
Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) Surrogate Constraint Guidance for Boolean Optimization Problems, ***Fred W. Glover***, University of Colorado, Sch. of Bus., CB 419, Boulder, CO 80309-0419, fred.glover@colorado.edu, ***Arne Lokketangen***

We describe local search heuristics for the Boolean optimization problem with search guidance based on the use of surrogate constraints. More specifically, we look at how adaptive memory and surrogate constraint processes can be used as guidance for both constructive and local search heuristics for these types of problems.

2) Equivalent Instances of the Simple Plant Location Problem: A Pseudo-Boolean Approach, ***Boris Goldengorin***, University of Groningen, Dept. of Econometrics & OR, Groningen, 9700 AV, The Netherlands, b.goldengorin@eco.rug.nl

An interesting feature of the pseudo-Boolean representation of the simple plant location problem is that we can use it to describe families of instances that share the same optimal solution. We provide a polyhedral description of such families using linear programming. We use this description for extending all classes of polynomially solvable special cases.

3) On Some Network Optimization Models & Related Pseudo-Boolean Problems, ***Michel Minoux***, University of P. et M. Curie, Lab d'Informatique de Paris 6, 4 place Jussieu, Paris Cedex, F-75252, France, michel.minoux@lip6.fr

We present some pseudo-Boolean optimization problems arising as subproblems in network optimization, e.g. in the search for most violated bipartition inequalities, or in the generation of violated polyhedral cuts in the Benders subproblems. A pseudo-Boolean formulation of an optimal routing problem on ring networks will also be discussed.

4) Bounds for Pseudo-Boolean Optimization Problems, ***Gabriel Tavares***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, gtavares@rutcor.rutgers.edu, ***Peter L. Hammer***

Several methods for finding upper and lower bounds for pseudo-Boolean optimization problems are proposed and compared special attention is given to their use in solving weighted MAX-SAT and weighted maximum stability problems in graphs. Extensive computational results are presented.

TB04 Competitive Bidding Applications

Cluster: Auctions
Invited Session
Chair: Michael H. Rothkopf, Rutgers University, Faculty of Mgmt. & RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu

1) Auction Speed as a Design Variable for Internet Auctions, ***Otto Koppius***, Erasmus University of Rotterdam, Dept. of DIS, F1-32, Box 1738, Sch. of Mgmt., Rotterdam, 3000, The Netherlands, ***Virpi Tuunainen, Eric van Heck***

Internet auctions have become a popular model for e-commerce. We propose auction speed as an important design variable that has received little attention thus far. We conducted 3 sets of laboratory experiments in which the auction mechanism (Dutch and English), the clock stepsize and clock speed were varied. Results show that speed has a significant effect on the winning prices.

2) Pay-as-Bid vs. Market-Clearing Price Electricity Auctions: The Role of Uncertainty, ***William R. Stewart***, College of William & Mary, Sch. of Bus., Williamsburg, VA 23187-8795, william.stewart@business.wm.edu, ***Michael H. Rothkopf, Benjamin F. Hobbs, Richard P. O'Neill***

We compare short-term electricity auctions in the face of uncertain demand under 2 payment rules: pay-as-bid and market clearing price. We show that when there is no short-term demand elasticity and no market power, these 2 payment rules are revenue neutral for different aggregate marginal cost curves, e.g. linear/convex.

3) An Auction Design to Control Market Power in Electricity Supply, ***Michael H. Rothkopf***, Rutgers University, Faculty of Mgmt. & RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu

Deregulation has led to auction spot markets for electricity. Short-run demand for electricity is inelastic. When demand is high, suppliers with a relatively small percentage of the industry total capacity have extreme market power. We propose a narrowly targeted, automatic remedy to keep such suppliers from setting the market-clearing price.

TB05 Simulation Output Analysis Methods

Chair: David Goldsman, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu

1) To Batch or Not to Batch?, ***Christos Alexopoulos***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, ***David Goldsman***

We give general results and specific examples to lend insight as to when batching might be preferred over independent replications. We conclude, as do other classic references, that in the context of estimation of the steady-state mean or variance parameter, batching is usually the wiser way to go.

2) Confidence Interval Estimation using Replicated Batch Means, ***Sigrun Andradottir***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, sa@isye.gatech.edu, ***Nilay T. Argon***

We propose a new method for obtaining confidence intervals for steady-state simulations in which the observations that are collected from a small number of independent replications are further grouped into batches. We investigate this new method both analytically and empirically and compare it with the standard batch means method.

TB06 Stochastic Decision Processes

Sponsor: Applied Probability
Sponsored Session
Chair: Esma S. Gel, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, esma.gel@asu.edu

1) Controlled Markov Chains with Risk-Sensitive Average Cost Criterion: The Non-Irreducible Case, ***Agustin Brau-Rojas***, University of Sonora, Dept. of Math, Hermosillo, Mexico, ***Emmanuel Fernandez***

We study discrete controlled Markov chains with finite state and action spaces. The performance of control policies is measured by a risk-sensitive criterion, the exponential average cost (EAC). The main result is the characterization of the EAC corresponding to an arbitrary stationary deterministic policy in terms of the spectral radii of suitable irreducible matrices.

2) The 1/f Phenomenon in Time Series Data, ***Cindy Greenwood***, Arizona State University, Dept. of Math, Tempe, AZ 85287-5906, pgreenw@graph.la.asu.edu

In many settings time series of errors or divergences have the property called 1/f. The spectral density based on the periodogram approximates a power alpha of the function 1/f for some alpha between 0.5 and 1.5 over several decades. We present several models with this property and discuss common features.

3) Optimal Work Sharing in Systems with Hierarchical Cross-Training, ***Esma S. Gel***, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, esma.gel@asu.edu, ***Wallace J. Hopp, Mark P. Van Oyen***

We study worksharing systems in which workers have increasing or decreasing skill sets along a flowline. Using sample path arguments, we characterize the optimal policy for 2 station CONWIP systems with general processing times, which leads us to the "fixed-before-shared" principle for the scheduling of flexible workers.

4) A Periodic-Review Inventory Model with Supply Interruptions, ***Zhaolin Li***, Pennsylvania State University, Dept. of MS/IS, Coll. of Bus. Admin., University Park, PA 16802, zsl110@psu.edu, ***Susan H. Xu***

We consider a stochastic inventory system with an unreliable supply, whose availability is modeled as an alternating renewal process. We first formulate a single cycle problem as a dynamic programming problem and show that the optimal ordering policy is a myopic base-stock policy. We then study the infinite-cycle problem and show that the single-cycle optimal myopic policy is near-optimal for the infinite-cycle problem.

TB07 Applications of Constraint Programming

Sponsor: Computing
Sponsored Session
Chair: Irv Lustig, ILOG, 25 Sylvan Way, Short Hills, NJ 07078-1379, ilustig@ilog.com

1) Optimizing Consumer Loans, ***David Nehme***, ILOG, 2412

West 12th St., Austin, TX 78703, nehme@ilog.com

Given customer credit history, existing debts, the loan optimization problem is to find the size of a loan and the allocation of loan proceeds that best meet the customers needs, while satisfying the lending policies. We describe a constraint-programming model, which has been successfully implemented at a major US bank.

2) Optimizing the Production of Credit Cards, ***Carol L. Tretkoff***, ILOG, 1080 Linda Vista Ave., Mountain View, CA 94043, ctretkoff@ilog.com

Credit cards are produced on machines that need to be in an appropriate "state." MIPs are used to handle the problem of determining a small number of states that "cover" the requirements of all the cards to be produced we use constraint programming to determine their order.

3) Dispatching Technicians: A Constraint Programming Approach, ***Samir Amiouny***, ILOG, 1080 Linda Vista Ave., Mountain View, CA 94043, samiouny@ilog.com

Many service organizations face the problem of dispatching adequately equipped technicians in response to requirements from customers, while keeping costs low and satisfying a variety of constraints. We describe a recent CP-based solution implementation for such a problem.

TB08 Configuration & Advances in Constraint Programming

Cluster: Constraint Programming
Invited Session

Chair: Ulrich Junker, ILOG SA, Les Taissounieres HB2, 1681 route des Dolines, Valbonne, 06560, France, ujunker@ilog.fr

1) withdrawn 10/11: Advanced Product Configuration Systems: The CAWICOMS Project, ***Alexander Felfernig***, University Klagenfurt, Comp. Sci. in Mfg., Universitatsstrase 65-67, Klagenfurt, A-9022, Austria, alexander.felfernig@ifit.uni-klu.ac.at, ***Gerhard Friedrich, Dietmar Jannach, Markus Zanker***

2) Software Configuration with Rules, ***Tommi Syrjanenn***, Helsinki University of Technology, Dept. of CSE, Lab. for Theoretical CSE, FIN 02015, Finland, tommi.syrjanen@hut.fi, ***Ilkka Niemala***

We have developed a rule-based language for modeling configuration systems. The language has a declarative semantics and supports the usual forms of configuration constraints. Based on this approach, we have developed a configurator for the Debian GNU/Linux system. The configurator is capable of finding configurations satisfying user requirements, diagnosing configurations and optimizing them.

3) Optimizing Dynamic Structures: Configuration of Instrumentation & Control Systems, ***Daniel Mailharro***, ILOG SA, rue de Verdun, BP 85, Gentilly Cedex, 4253, France, dmailharro@ilog.fr

Ilog Configurator is able to configure complex systems requiring the choice of a structure with an unknown number of components. Our configurator application implements the functions of an instrumentation and control system by dynamically creating and connecting hardware and

4) Preference Programming for Configuration, ***Ulrich Junker***, ILOG SA, Les Taissounieres HB2, 1681 route des Dolines, Valbonne, 06560, France, ujunker@ilog.fr

Preference programming provides a new paradigm for specifying objectives in a local way, for expressing search strategies and for embedding preferences in a constraint and rule language. It addresses configuration problems that lack a clear global objective and that require that preferences and strategies can interactively be edited.

TB09 Fuzzy & Hybrid Dynamic Programming

Cluster: Bellman Memorial Cluster on Dynamic Programming
Invited Session

Chair: Warren E. Hearnes, Lucent Technologies, 2000 NE Expressway, Norcross, GA 30071, whearnes@lucent.com

1) Fuzzy Dynamic Programming: Foundations, Variants & Applications, ***Augustine O. Esogbue***, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, aesogbue@isye.gatech.edu

Fuzzy dynamic programming is a powerful apparatus for dealing with multi-stage decision making and optimization problems under fuzziness (under fuzzy constraints on decisions made and fuzzy goals on states attained). We provide a brief review of basic problem classes and developments and present some applications to assorted OR problems.

2) American Options with Uncertainty of the Stock Prices in Financial Modeling, ***Yuji Yoshida***, University of Kitakyushu, Fac. of Economics & Bus. Admin, Kitakyushu, 802-8577, Japan, yoshida@kitakyu-u.ac.jp, ***Masami Yasuda, Jun-ichi Nakagami, Masami Kurano***

A mathematical model for American options is developed under a fuzzy dynamic system inspired by dynamic programming. Both randomness and fuzziness are evaluated using a probabilistic expectation and a linear ranking function. Assuming an optimal exercise time, we show the seller's optimal fuzzy price is a solution of an optimality equation.

3) Threshold Probabilities through a Dual Dynamic Programming Method, ***Seiichi Iwamoto***, Kyushu University, Dept. of Economic Eng., Grad. Sch. of Economics, Fukuoka, 812-8581, Japan, iwamoto@en.kyushu-u.ac.jp

Through both primal and dual methods, we maximize the threshold probability that the additive (total) reward is greater than or equal to a given lower level on a controlled Markov chain. The primal method is based upon "accumulated past rewards" and the dual upon "diminishing future level." Both dynamic programming methods yield a common optimal solution.

TB10 DEA Applications

Cluster: Data Envelopment Analysis
Invited Session

Chair: Timothy R. Anderson, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, tima@emp.pdx.edu

Co-Chair: Keith B. Hollingsworth, Morehouse College, 830 Westview Dr.SW, Atlanta, GA 30314, khollingsworth@morehouse.edu

1) Efficiency & Effectiveness in Military Recruiting, ***Michael J. Kwinn, Jr.***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, mike-kwinn@usma.edu, ***Patrick L. Brockett, William W. Cooper***

Previous studies of military recruitment have generally failed to account for the efficiency of the recruitment operations. For instance, the "Advertising Mix Test," fails to mention this topic or incorporate it into design. Therefore, we statistically correct for this design deficiency by using a combination of regression analysis and DEA.

2) Measuring the Rate of Innovation & Predicting Future Performance in the Enterprise Database Market using DEA, ***Timothy R. Anderson***, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, tima@emp.pdx.edu, ***Keith B. Hollingsworth, Lane Inman***

We used standard benchmark information on databases from 1995 - 2000 to measure the rate of innovation and then predict future performance. Data from 2001 was used to test the model and results will be presented.

3) withdrawn 9/20: Assessing the Efficiency of Spanish Tax Collection Offices through DEA, ***Francisco Pedraja-Chaparro***, Universidad de Extremadura, Dept. Econ. Apps.y Org. Emp., Av. de Elvas s/n, Badajoz, 06071, Spain, pedraja@unex.es, ***Javier Salinas-Jiminez, Peter Smith***

TB11 Integer Programs Arising in Scheduling, Routing & Capital Budgeting

Cluster: Integer Programming
Invited Session

Chair: Warren Adams, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-0975, wadams@clemson.edu

1) Minimizing the Weighted Number of Early & Tardy Jobs in the Stochastic Single Machine Scheduling Problem, ***Hossein H. Soroush***, Kuwait University, Dept. of Stats. & OR, PO Box 5969, Safat, 13060, Kuwait, hsoroush@kuc01.kuniv.edu.kw, ***Talal M. Al-Khamis***

We study a single machine scheduling problem in which job processing times are random variables and fixed weights (penalties) are imposed on early and tardy jobs. The objective is to find an optimal schedule which minimizes the expected total weighted number of early and tardy jobs. The general problem is hard to solve; however, some special cases are solvable exactly.

2) Optimal Routing of International Calls, ***Mohamed A. El-Wakeel***, Kuwait University, Coll. of Sci., Dept. Stats/OR, PO Box 5969, Safat, 13060, Kuwait, wakeel@kuc01.kuniv.edu.kw

We present a comparative study between 3 different strategies for call routing in a telecommunications network. We present some results for networks with pure load sharing and networks with alternative routes.

3) Integer Programming Approaches for Batch Sizing & Scheduling, ***Siqun Wang***, University of Pennsylvania, Dept. of OPIM, Wharton Sch., Philadelphia, PA 19104-6366, siqun@wharton.upenn.edu, ***Monique Guignard***

Discrete and continuous time MILP formulations have been built for minimizing makespan in capacitated batch sizing and scheduling problems in process industries. Good feasible solutions and tight lower bounds are very difficult to get as demands get large. We discuss heuristic and hybrid methods based on decomposition and bottleneck analyses.

4) Comparisons & Enhancement Strategies for Linearizing Mixed 0-1 Quadratic Programs, ***Warren Adams***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-0975, wadams@clemson.edu, ***Richard Forrester***, ***Fred W. Glover***

Motivated by applications in capital budgeting, we examine the classic linearization method of Glover (1975) for mixed 0-1 quadratic programs in light of the more recent reformulation-linearization technique. We compare the structures of the respective linearizations and demonstrate how a suitable rewrite of the quadratic program leads to formulations that are concise and promote tight bounds.

TB12 Optimization Techniques II

Contributed Session

Chair: Tharat Ittharat, Texas Tech University, Dept. of IE, Lubbock, TX 79409-3061, tharat@email.com

1) The Substitutable Products Newsboy Problem, ***Tharat Ittharat***, Texas Tech University, Dept. of IE, Lubbock, TX 79409-3061, tharat@email.com, ***Arisa Kosadat***, ***Wisut Supithak***

We present 2 substitutable products newsboy problems with stochastic independent demands. An example is the situation where two units of one 32MB RAM can be used to replaced one unit of 64MB RAM at a higher cost. The objective is to find the optimal ordering quantity for both components.

2) Multi-Objective Combinatorial Optimization with Metaheuristics, ***Jacques Teghem***, Faculte Polytechnique de Mons, 9 rue de Houdain, Mons, B-7000, Belgium, teghem@mathro.fpms.ac.be

We will survey new developments of the adaptation of simulated annealing and tabu search in a multi-objective framework. The aim is to approximate the set of efficient solutions for multi-objective combinatorial optimization problems. In particular, we will present numerical results obtained with MOSA and MOTAS methods on MO assignment problems, knapsack problems and scheduling problems.

3) Using Error Bounds to Select the Aggregation Strategy, ***Ada M. Alvarez***, Universidad Autonoma de Nuevo Leon, Pedro de Alba s/n, Cuidad Universitaria, San Nicolas de Garza, CP 66450, Mexico, aalvarez@uanl.mx, ***Oscar Chacon***, ***Igor S. Litvinchev***

A family of a priori and a posteriori error bounds for the customers aggregation in the generalized transportation problem was derived. A computational experiment was conducted that indicates a significant correlation between the a priori bound and the actual error. This fact is used to select the appropriate aggregation level.

4) A Branch & Bound Approach for Solving the MAXCUT Problem using Positive Semi-Definite Relaxations, ***Yuriy Zinchenko***, Cornell University, Dept. of OR/IE, Rhodes 292, Ithaca, NY 14853, yzinchen@orie.cornell.edu, ***Steve Benson***, ***Jean-Pierre Goux***

We present the developed algorithm for solving the MAXCUT problem in a B&B setting using positive semi-definite relaxation. The use of positive semi-definite programming obtains a much tighter bound for the relaxed problem, therefore significantly reducing the number of nodes explored in the tree.

TB13 Primal-Dual Interior Point Methods for Linear Optimization over Cones & their Applications

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Masakazu Kojima, Tokyo Institute of Technology, Dept. of Math. & CS, Oh-Okayama Meguro-ku, Tokyo, 152-0033, Japan, kojima@is.titech.ac.jp

1) Primal-Dual Interior Point Methods for Second-Order Conic Optimization based on Self-Regular Proximities, ***Jiming Peng***, McMaster University, Dept. of Computing & Software, 1280 Main St. West, Hamilton, Ontario, L8S 4L7, Canada, pengj@mcmaster.ca, ***Kees Roos***, ***Tamas Terlaky***

We extend the notion of self-regularity to second-order cones. General analytical functions associated with second-order cones are introduced and analyzed. Based on the novel concept of self-regular proximities, new large-update primal-dual IPMs are proposed for solving SOCO problems with an analogous polynomial iteration bound as their LO counterpart.

2) Second-Order Cone Programming & Linear Programming Relaxations of Semidefinite Programs, ***Sunyoung Kim***, Ewha Women's University, Dept. of Mathematics, Dahyuun Dong, Seoul, 120-750, Korea, skim@mm.ewha.ac.kr, ***Masakazu Kojima***

With current continuing efforts for solving large-scale SDPs, some difficult issues still remain to be resolved. We investigate the use of SOCP relaxation for approximating solutions of SDPs. The effectiveness of SOCP relaxation will be examined and compared to LP relaxation with numerical results.

3) A Lagrangian Dual Interior-Point Method for Semidefinite Programs, ***Masakazu Kojima***, Tokyo Institute of Technology, Dept. of Math. & CS, Oh-Okayama Meguro-ku, Tokyo, 152-0033, Japan, kojima@is.titech.ac.jp, ***Mituhiro Fukuda***, ***Masayuki Shida***

We present a new predictor-corrector interior-point method for a class of SDPs, which traces the central trajectory in a space of Lagrange multipliers. A distinguishing feature of the method is an application of the CG method with an effective preconditioning matrix induced from the BFGS quasi-Newton method. effective preconditioning matrix induced from the BFGS quasi-Newton method.

TB14 Extensions of LP

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Katya Scheinberg, IBM TJ Watson Research Center, Yorktown Heights, NY 10598, katyas@watson.ibm.com

1) The Solution of Linear Programs by Generating Krylov Spaces, ***Sanjay Mehrotra***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, mehrotra@iems.nwu.edu, ***Zhifeng Li***

We present an approach to solving LP by considering vectors from an appropriately defined Krylov space in primal-dual methods. The method can be viewed as generalization of Mehrotra's predictor-corrector method. We present promising computational results on LPs based on this approach.

2) Optimal Moment Bounds for Special Classes of Continuous Distributions via Semidefinite Programming, ***Ioana Popescu***, INSEAD, Tech. Mgmt. Dept., Blvd. de Constance, Fontainebleau Cedex, 77305, France, ioana.popescu@insead.fr

We propose an SDP approach to compute sharp bounds on probabilities, fractiles and functional expectations given generalized moments. Using conic duality, we extend recent results of Bertsimas & Popescu to special continuous distributions classes, such as unimodal, symmetric and mixtures. The corresponding extremal distributions are more realistic, the bounds sharper.

3) The Volumetric Barrier for Symmetric Cones, ***Stefan Schmieta***, Axioma Inc., 501F Johnson Ferry Rd., Ste. 450, Marietta, GA 30068, sschmieta@axiomainc.com

The volumetric and combined logarithmic-volumetric barriers for polyhedral sets have self-concordance numbers that compare favorably with the logarithmic barrier. Nesterov & Nemirovski, and subsequently Anstreicher, showed that those barriers can be extended to semidefinite programming. We generalize their results further to include all symmetric cones.

4) Solving Convex QP arising in Training of Support Vector Machines, ***Shai Fine***, IBM TJ Watson Research Center, Yorktown Heights, NY 10598, fshai@us.ibm.com, ***Katya Scheinberg***

Training of support vector machines often can be formulated as a large-scale convex QP with a dense Hessian. Often classic approaches are inapplicable due to high CPU and memory cost. We discuss a parametric QP approach that makes use of the fact that the optimal solution lies on a low-dimensional face.

TB15 Topics in Decision Analysis

Sponsor: Decision Analysis
Sponsored Session

Chair: Ralph L. Keeney, University of Southern California, 101 Lombard St., Ste. 704W, San Francisco, CA 94111, keeneyr@aol.com

1) What Question to Ask Next to Aid Multi-Attribute Alternative Selection, ***Hillary A. Holloway***, University of Michigan, 1205 Beal Ave., IOE Bldg., Ann Arbor, MI 48109-2117, hhollowa@engin.umich.edu, ***Chelsea C. White, III***

We examine the problem of what question to ask next when the decision model imprecisely specified multi-attribute value theory is applied in an interactive decision-aiding environment. We formulate the problem as a dynamic program and illustrate how it can be applied in a computationally efficient manner.

2) Real Options Valuation using Decision Trees & Net Present Value, ***Zeger Degraeve***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, zdegraeve@london.edu, ***Bert De Reyck***

We reject the claim that flexibility in investments necessarily has to be evaluated using real option methodology and show that the net present value framework can still be used for a sound investment analysis. We extend decision tree analysis by determining appropriate discount rates at different chance nodes, reflecting the project's unique and market risk at that stage.

3) Stimulating the Creation of Design Alternatives using Customer Values, ***Ralph L. Keeney***, University of Southern California, 101 Lombard St., Ste. 704W, San Francisco, CA 94111, keeneyr@aol.com

Knowing your customers' desires, you can create alternatives better for them that also increase your organization's profits and market share. We elicited objectives and desired characteristics from knowledgeable individuals and customers for cell phone and cellular phone plans. Techniques using these objectives and characteristics illustrate how to identify new alternatives.

TB16 Pricing, Service Quality & Market Structure in Delay-Sensitive Markets

Sponsor: MSOM
Sponsored Session
Chair: Philipp Afeche, Northwestern University, MEDS Dept., kellogg Grad. Sch. of Mgmt., Evanston, IL 60208-2001, p-afeche@kellogg.nwu.edu

1) Channel Conflict in a Hybrid Make-to-Order/Make-to-Stock Manufacturing System, ***Mor Armony***, NYU, Stern School of Bus., 40 West 4th St., Ste. 7-02, New York, NY 10012-1118, marmony@stern.nyu.edu, ***Erica Plambeck***

A manufacturer sells directly to online customers and through retail channels. The retailer's inventory assortment and stocking decisions influence online as well as retail sales. Sequencing decisions by the manufacturer affect leadtimes for online customers and the retailer. We consider the design of an incentive contract between the 2 parties.

2) Dynamic Pricing for a Make-to-Order Queue, ***Constantinos Maglaras***, Columbia University, 409 Uris Hall, 3022 Broadway, New York, NY 10027, c.maglaras@columbia.edu, ***Jan A. van Mieghem***

Consider a firm that produces multiple products, and operates in a monopoly market. Using a hierarchy of fluid and diffusion approximations, we study the problem of how to construct an optimal state dependent pricing strategy and analyze its performance.

3) Competing through Quality Differentiation in Data Network Markets, ***Philipp Afeche***, Northwestern University, MEDS Dept., kellogg Grad. Sch. of Mgmt., Evanston, IL 60208-2001, p-afeche@kellogg.nwu.edu

Internet access price and quality differentiation is currently quite limited. This constrains the choices of quality-sensitive consumers and service providers' ability to differentiate themselves from their competitors. We study the design and competitive benefits of various price and service differentiation schemes.

TB17 Production & Inventory Management

Sponsor: MSOM
Sponsored Session
Chair: Izak Duenyas, University of Michigan Business School, Ann Arbor, MI 48109, duenyas@umich.edu

1) When Does Higher Demand Variability Lead to Lower Safety Stocks?, ***Saif Benjaafar***, University of Minnesota, Dept. of Mech. Eng., Minneapolis, MN 55455, saif@me.umn.edu, ***William L. Cooper***, ***Joon-Seok Kim***

We examine the effect of demand variability in the context of a multi-item production-inventory system. We show that counter to intuition, high variability in end demand always leads to lower variability in lead-time demand. Consequently, we show that the fraction of total stock kept as safety stock is generally decreasing in the variability of end demand. Under certain conditions, we show that higher demand variability leads to the elimination of safety stock altogether.

2) A Near-Optimal Inventory Allocation Rule in an Assemble-to-Order System, ***Yalcin Akcay***, Pennsylvania State University, Dept. of MS & IS, Coll. of Bus. Admin., University Park, PA 16802, yxa105@psu.edu, ***Susan H. Xu***

We formulate a stochastic programming problem to determine the optimal base-stock policy and component allocation rule in an ATO system. We propose a greedy-like, product-based component allocation policy and show it is near-optimal. Based on the result, we determine the optimal base-stock levels for components. Computational results show that our policy significantly outperforms existing methods..

3) Optimal Production Control with Uncertain Capacity, Demand Information & Outsourcing, ***Xinxin Hu***, University of Michigan Business School, Ann Arbor, MI 48109-1234, huxinxin@bus.umich.edu, ***Izak Duenyas***, ***Roman Kapuscinski***

For a finite-horizon dynamic inventory model with uncertain capacities, the manager can improve the reliability of the system by obtaining advanced demand information or using outsourcing. We derive conditions under which order-up-to policies are optimal under both scenarios and study when these 2 options are most beneficial.

4) Supply Systems with Advance Demand Information & Random Lead Times, ***Fikri Karaesmen***, Ecole Centrale Paris, Lab. Productique Logistique, Grande Voie des Vignes, Chatenay-Malabry, 92295, France, fikri@pl.ecp.fr

Advance demand information enables potential improvements in inventory-related performance of supply systems. It is, however, not trivial to coordinate order release and inventories in order to achieve the potential benefits. We present a characterization of optimal order release and inventory control decisions for a continuous review system with random lead times.

TB18 Location Analysis III

Sponsor: SOLA
Sponsored Session
Chair: Trevor S. Hale, Ohio University, Dept. of IMSE, 275 Stocker Ctr., Athens, OH 45701, halet@ohio.edu

1) On the Optimal Location of a Central Warehouse, ***Carlton H. Scott***, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697, ***Jing-Sheng Song***, ***Zvi Drezner***

We find the best location of a central warehouse, given a fixed number and locations of local warehouses and inventory cost. Our objective is to minimize the total cost of transportation, inventory, and service. We propose models to address this question. Computational results are presented for location on the plane.

2) Minisum Location with Closest Euclidean Distances, ***J. Brimberg***, University of Prince Edward Island/GERAD, Sch. of Bus. Admin., Charlottetown, PEI, C1A 4P3, Canada, ***G. O. Wesolowsky***

We consider the problem of locating a facility among demand regions, e.g. market areas, to minimize the sum of weighted Euclidean distances to the closest points of the demand regions. We assume that internal distribution within the areas is "someone else's problem." We examine problem properties and solution algorithms.

3) The Data Surrogation Error in p-Median Models, ***John Hodgeson***, University of Alberta, Earth & Atmospheric Sciences, Edmonton, Alberta, T6G 2E3, Canada, john.hodgeson@ualberta.ca

Where, in location-allocation, an inappropriate variable is used to stand in for a target population's demand, surrogation error can result. With data for 25 Canadian cities, I demonstrate that significant surrogation error can occur if general population is used in place of children or senior populations.

4) On the Dwell Point Location in Carousel Storage Systems, ***Dale T. Masel***, Ohio University, Dept. of IMSE, 275 Stocker Ctr., Athens, OH 45701, masel@ohio.edu, ***Trevor S. Hale***

We solve the dwell point location problem for an idle bi-directional carousel storage system to minimize the expected value of the next transaction time. Using a continuous approximation of the carousel's individual storage locations and assuming a randomized storage location policy, we derive a closed form solution.

TB19 Optimization Approaches in Logistics

Sponsor: Logistics
Sponsored Session
Chair: Hugo T. Yoshizaki, University of Sao Paulo, Dept. of Production Eng., Rua Corinto 739, Apt. 74A, Sao Paulo, SP, 05586, Brazil, hugo@usp.br

1) A Mathematical Model on the Timing of Resource Allocation in Logistics, ***Andrew M. Stapleton***, University of Wisconsin, Mktg. Dept., Coll. Bus. Admin., 318-E West Carl Wimberly Hall, La Crosse, WI 54601, ***Milerad Novicavec***

No abstract supplied.

2) A Polyhedral Approach to the Capacitated Network Flow Problem with Piecewise Linear Concave Costs, ***Alper Atamturk***, University of California, Dept. of IE/OR, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, atamturk@ieor.berkeley.edu, ***Simge Kucukyavuz***

We give strong valid inequalities for the capacitated network flow problem with piecewise linear concave costs and present a special case where these inequalities are sufficient to solve the problem as a linear program. We report computational results on facility location and transportation problems.

3) Experiments with Branch & Price on the Capacitated Facility Location Problem with Single Sourcing, ***Syam S. Menon***, Oklahoma State University, Coll of Bus., Rm. 309, Stillwater, OK 74078, smenon@mstm.okstate.edu

Facility location models have received considerable attention over the past many years. Applications involving these models are encountered in fields ranging from distribution and transportation to telecommunications network design. We present a set partitioning formulation for the capacitated facility location problem with single sourcing, which is then solved via column generation and B&P.

4) Modeling the Impact of Regional Taxes on Brazilian Logistics, ***Hugo T. Yoshizaki***, University of Sao Paulo, Dept. of Production Eng., Rua Corinto 739, Apt. 74A, Sao Paulo, SP, 05586, Brazil, hugo@usp.br

Differences in Brazilian regional taxes lead to less efficient logistics to save taxes, placing a factory or depot away from demand. We developed an MILP model to evaluate the influence on the design of distribution networks. Results support that conclusion. Strong empirical evidence shows that Brazilian firms behave accordingly.

TB20 Modularity Management

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session
Chair: Juliana Hsuan Mikkola, Copenhagen Business School, Dept. of IE & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, jh.ivs@cbs.dk

1) New Incentives for Interfirm Cooperation in Modular Architectures in the New Economy, ***Ron Sanchez***, IMD, Chemin de Bellerive 23, Lausanne, CH-1001, Switzerland, ron.sanchez@imd.ch

Recent years have witnessed significant expansions of interfirm cooperation to include adoption of shared modular architectures and common components. I examine both demand-side and supply-side incentives that are driving technical cooperation deeper into the product and process architectures of firms as a way of achieving "global interoperability" among firms.

2) Bridging the Disciplines: Modularity in Psychology, Biology, American Studies, Mathematics, Technology & Management, ***Melissa A. Schilling***, Boston University, Strategy & Policy Dept., 595 Commonwealth Ave., Boston, MA 02215, bijoux88@earthlink.net

A general systems theory of modularity could be equally relevant for multiple disciplines. Towards this end, the use of modularity in psychology, biology, American studies, mathematics, technology and organizational design is reviewed. Several pervasive themes emerge, as well as some distinct differences in how modularity is used and defined.

3) Trade-Offs between Modularity, Integrity & Upgradability, ***Raghu Garud***, NYU, Stern Sch. of Bus., Dept. of Mgmt., New York, NY 10012, rgarud@stern.nyu.edu, ***Arun Kumaraswamy***

For modular designs to deliver expected benefits, one needs to pay attention to the integrity (architecture) of the entire system. Yet, as Schumpeter pointed out, any system designed to be efficient at a point in time is likely to be inefficient over time. In other words, a modular system designed to enhance integrity may compromise on upgradability...

4) Modularity Assessment of Product Architecture, ***Juliana Hsuan Mikkola***, Copenhagen Business School, Dept. of IE & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, jh.ivs@cbs.dk

The degree of modularity in a given product architecture is assessed with a mathematical function, with the following variables: number of components, number of interfaces and substitutability factor. Two distinct sets of product architectures are illustrated: Chrysler Jeeps' WIPERs and Schindler elevators. Some managerial implications are discussed based on the analysis.

TB21 Empirical Investigations in Product Development & Supply Chain Design

Cluster: Manufacturing Strategy
Invited Session
Chair: Larry Menor, University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St. North, London, Ontario, N6A 3K7, Canada, lmenor@ivey.uwo.ca

1) Towards Understanding the Dynamics of Manufacturing Strategy & Competitiveness, ***Shekhar Jayanthi***, Colorado School of Mines, Div. of Economics & Bus., Golden, CA 80401, sjayanth@mines.edu, www.mines.edu/Academic/econbus/sjayanthi.html

Firms are facing a competitive gridlock despite implementing strategic changes. We develop a model that focuses on dynamically balancing the short-term and long-term firm and manufacturing level changes. As environmental uncertainty increases, elements of the bounded set of drivers of competitiveness tend to be closely integrated across the two levels.

2) Influence of Knowledge-based Resource Variety on Process Flexibility & Product Innovation: Empirical Evidence from North American & Europe, ***Larry Menor***,.University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St. North, London, Ontario, N6A 3K7, Canada, lmenor@ivey.uwo.ca

We posit that process flexibility and product innovation result from leveraging competitive strengths on diverse knowledge-based resources, the set of which we call "K-B resources variety." We empirically assess our operationalization of the K-B resource variety construct and test the invariance of the proposed research model across several geographic regions.

3) withdrawn 10/10: Analyzing Collaborative Order Fulfillment Strategies with Strategic Partners, ***Sitki Timucin***, Hewlett-Packard Co., 1501 Page Mill Rd., MS 6UX, Palo Alto, CA 94304, sitki_timucin@hp.com

4) The Path Dependent Effects of Supply Chain Choice on the Evolution of Product Line Structure, ***Taylor Randall***, University of Utah, Eccles Sch. of Bus., Salt Lake City, UT 84112-9403, acttr@business.utah.edu

Operational strategies advocate the concurrent design of supply chains and product lines to ensure long-term viability of organizations. Yet, investment patterns in many industries suggest that the economic life of supply chain assets outlasts that of product lines. We explore the effects of supply chain decisions on the evolution of product lines.

TB22 Integrating Production & Distribution Decisions in the Supply Chain

Cluster: Supply Chain Management
Invited Session
Chair: Ana Muriel, University of Massachusetts, Dept. of MIE, ELAB 213D, Amherst, MA 01003, muriel@ecs.umass.edu

1) Integrated Production Planning & Market Selection Decisions, ***Joseph Geunes***, University of Florida, Dept. of ISE, geunes@ise.ufl.edu, ***H. Edwin Romeijn***, ***Zuo-Jun Shen***

We consider planning decisions for a producer that can select from a number of markets with known demands over a finite horizon. The producer incurs concave production and distribution costs and collects revenue for each unit sold. Our models maximize net profit resulting from market selection and production planning decisions.

2) Coordination of Inventory & Shipment Release Decisions, ***Sila Cetinkaya***, Texas A&M University, IE Dept., College Station, TX 77843-3131, sila@tamu.edu

We analyze a class of inventory policies where shipment release and stock replenishment decisions are coordinated under vendor-managed inventory and time definite delivery agreements. We address the question of under what conditions coordination works and attempts to render insights into distribution

policy design.

3) Coordination of Production, Inventory & Transportation Decisions in the Supply Chain, *Ana Muriel*, University of Massachusetts, Dept. of MIE, ELAB 213D, Amherst, MA 01003, muriel@ecs.umass.edu, ***Lap Mui Chan, Zuo-Jun Shen, David Simchi-Levi, Chung Piaw Teo***

We address the problem of coordinating production, inventory and transportation decisions in a network composed of manufacturing facilities, distribution centers and stores. Production and shipping costs exhibit economies-of-scale that are modeled using piece-wise linear cost functions. Both incremental and all unit discounts are considered.

4) Demand Allocation in Multiple-Product, Multiple-Facility Make-to-Stock Systems, *Mohsen ElHafsi*, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, mohsen.elhafsi@ucr.edu, ***Saif Benjaafar***

We consider the problem of allocating demand arising from N customer classes to M heterogeneous production facilities with finite capacity and load-dependent lead times. Demand is satisfied immediately if there is on-hand inventory. Otherwise, it is backlogged with the production facility to which it is assigned. We develop models for optimal demand and customer allocation under varying assumptions.

TB23 Sense & Respond Supply Chain Management

Cluster: Supply Chain & E-Market Optimization
Invited Session

Chair: Grace Lin, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, gracelin@us.ibm.com

1) Price Optimization for RFQ Response, *Richard Lawrence*, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598, ricklaw@us.ibm.com, ***Harriet Cao, Roger R. Gung, Yunhee Jang, Grace Lin, Yingdong Lu***

We are developing an analytical capability to determine the optimal price to bid in response to a competitive RFQ for a specific computer configuration. Historical bid outcomes are used to construct an expected probability of winning the bid as a function of bid price. The optimal response price is computed by maximizing the expected profit based on the winning probability and known costs...

2) Optimizing Pricing/Promotion Decisions for Components of End-Products, *Gyana Parija*, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, ***Ying Tat Leung, Aliza Heching, Menachem Levanoni***

We address component pricing and promotion decisions faced by a vendor with multiple product offerings. Products are designed to customer specification and are built-to-order. Each end-product consists of a number of components. The vendor has infinite production capacity and components can be procured Just-In-Time, so that there is no need to store inventory...

3) Potential Impact of E-Auctions on the Supply Chain, *Brian T. Eck*, IBM Integrated Supply Chain, Rte. 52, Hopewell Junction, NY 12533, brianeck@us.ibm.com, ***Grace Lin, Kaan Katircioglu, Feng Cheng, Markus Ettl***

E-marketplaces saw a flurry of activity spurred by dot.com mania over the past 2 years. Now that the dust has settled, real businesses are exploring these new mechanisms of trade, including on-line auctions. We describe an approach to sizing the impact of e-auctions as a channel and review recent experiences, lessons learned and challenges from IBM's participation in e-auctions.

4) "Sense & Respond" Supply Chain Management, *Grace Lin*, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, gracelin@us.ibm.com, ***Steve Buckley, Heng Cao, Nathan Caswell, Markus Ettl, Shubir Kapoor, Anil Nigam, Bala Ramachandran***

Orchestrating the research results from stochastic process control, risk management and business intelligence, a new "sense and respond" supply chain management paradigm will be introduced, which is able to sense the complex business environmental changes then responds quickly with the best policies/processes for achieving the business objectives.

5) A Distributed Computational Framework for "Sense & Respond" Supply Chain Management, *Heng Cao*, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598, ***Grace Lin***

We will present a multi-agent computational framework for a sense and respond supply chain management. This agent-based approach endows system objects self-organization and learning abilities and provides rapid responsive and dynamic reconfigure structures to facilitate flexible and efficient supply chain coordination and optimization in a rapidly changing environment.

TB24 Supply Chain Management V

Contributed Session

Chair: Hyun-Soo Han, Hanyang University, Coll. of Info. & Communication, 17 Haengdang-Dong Seongdong-Gu, Seoul, 133-791, Korea, hshan@hanyang.ac.kr

1) Inventory Management Policies for Supply Chains, *Hyun-Soo Han*, Hanyang University, Coll. of Info. & Communication, 17 Haengdang-Dong Seongdong-Gu, Seoul, 133-791, Korea, hshan@hanyang.ac.kr, ***Agha I. Ali***

We identify policies for inventory levels in light of multiple management objectives and show that trade-offs among them can be significant with far reaching industry impact across the supply chain. Comprehensive data analysis with issues of integrating multiple mathematical models are illustrated from the Korean steel industry.

2) Demand Forecast Sharing in Supply Chains, *Srinivasan Raghunathan*, University of Texas at Dallas, Sch. of Mgmt., JO4. 816, Richardson, TX 75083-0688, sraghu@utdallas.edu, ***Barry Mishra, Xiaohang Yue***

We assess the benefits of sharing demand forecast information in a supply chain consisting of a manufacturer and a retailer. The demand is a linear function of retail price. The primary demand is unknown. Both the manufacturer and the retailer set their prices based on their forecasts of the primary demand. In this setting, we investigate the value of sharing demand forecasts...

3) withdrawn 10/5: Synchronization & Pooling in a Multi-Echelon Multi-Retailer Supply Chain: A Simulation Study, *Brian Hwarng*, National University of Singapore, Dept. of Dec. Sci., FBA1 15 Law Link, Singapore, 117591, Singapore, fbahhl@nus.edu.sg, ***Thomas F. Burgess, Cynthia Chong***

4) Integrating the Warehousing & Transportation Functions of the Supply Chain, *P. Mauricio Ribera*, University of Arkansas, 4207 Bell Eng. Ctr., Fayetteville, AR 72701, pribera@uark.edu, ***Scott J. Mason***

Companies are ill-equipped to make effective use of data from warehouse management systems and transportation management systems. These systems are key factors to integrate the physical flow of goods along the extended supply chain. We discuss the benefits of integrating the warehousing and transportation functions of the supply chain.

5) A Postponement Model for Demand Management, *Vinayak V. Deshpande*, Purdue University, Krannert Sch. of Mgmt., West Lafayette, IN 47907, vinayak@purdue.edu, ***Ananth V. Iyer, Zhengping Wu***

We analyze demand postponement as a strategy to handle demand contingencies. The basic idea is that by pre-empting stock-outs through demand postponement, we can reduce overall stock-out costs. We formulate and solve a 2-stage capacity planning problem under demand postponement.

TB25 Production & Scheduling III

Contributed Session

Chair: Marcelo S. Nagano, University of Sao Paulo, Av. Dos Bandeirantes 3900, Ribeirao Preto, SP, 14040-901, Brazil, drnagano@usp.br

1) A New Lower Bound for Minimal Makespan Flow Shop Sequencing, *Marcelo S. Nagano*, University of Sao Paulo, Av. Dos Bandeirantes 3900, Ribeirao Preto, SP, 14040-901, Brazil, drnagano@usp.br, ***Joao V. Moccellin***

We propose a makespan lower bound for flow shop sequencing, based on a lower bound for the waiting times of a job v between its operations on successive machines when an arbitrary job u immediately precedes job v. Computational results concerning the lower bound effectiveness are presented.

2) Scheduling on Rigidly Linked Assembly Lines with Three Serial Duplicate Stations, *Mehmet Savsar*, Kuwait University, College of Eng., PO Box 5969, Safat, 13060, Kuwait, mehmet@kuc01@kuniv.edu.kw, ***Ali Allahverdi***

We present 2 scheduling algorithms for assembly lines with rigidly linked 3 serial duplicate stations. Total completion time, makespan and station idle times are considered as the performance measures. It is shown that any regular performance measure can be minimized by only considering simultaneous assignment of 3 jobs to 3 duplicate stations.

3) A Hierarchical Scheduling Approach for Semiconductor Assembly Facilities, *Heinrich Kuhn*, Catholic University of

Eichstaett-Ingolstadt, Auf der Schanz 49, Ingolstadt, 85049, Germany, heinrich.kuhn@ku-eichstaett.de, http://www.wfi.edu/ABWLPW, ***Daniel Quadt***

We consider the assembly process in semiconductor manufacturing and suggest a specialized procedure for scheduling the weekly demand of standard lots in the main backend assembly stages with several unrelated parallel machines. A planning approach, a heuristic procedure to minimize the mean flow time and first results are presented.

4) Scheduling with Controllable Processing Times, ***Selim Akturk***, Bilkent University, Dept. of IE, Bilkent, Ankara, 06533, Turkey, akturk@bilkent.edu.tr, www.bilkent.edu.tr/~akturk

On a CNC machining center, we can determine the required processing times by adjusting the operational parameters of cutting speed and feed rate for a given performance measure. We know that scheduling decisions are quite sensitive to the processing times, hence we can optimize the scheduling and machining related measures simultaneously.

5) Dynamic Lot Sizing with Learning & Forgetting, ***Suresh Chand***, Purdue University, 1310 Krannert Bldg., Rm. 536, West Lafayette, IN 47907, suresh@mgmt.purdue.edu, ***James E. Ward***, ***Sunantha Teyarachakul***

We consider a discrete-time finite-horizon dynamic lot-sizing problem under deterministic and dynamic demand. In our analysis, Wright's learning function and our proposed discrete-time forgetting function have been applied. We present an optimal lot-sizing algorithm for the case when the zero inventory property holds. Optimal lot-sizing under learning only, no forgetting, can be obtained by Wagner-Whithin algorithm...

TB26 Military OR Applications: Operational Modeling & Analysis II

Sponsor: MAS
Sponsored Session
Chair: James W. Chrissis, AFIT, Dept. of Operational Sci., AFIT/ENS, 2950 P St., WPAFB, OH 45433-7765, james.chrissis@afit.edu

1) Experimentation with Evoloving C2 Operation Centers: Implications for the Human Element, ***Michael W. Garrambone***, Veridian Engineering, ***Michael S. Goodman***

Twenty-first century warfare has mandated the need to integrate orders of magnitude more information into a coherent picture of the battlespace and to formulate C2 responses in a distributed environment. We describe the assessment approach and methodology employed by the Air Force Research Laboratory's Warfighter Training Research Division researchers as they observed the C2 operators in the time-critical targeting cell during JEFX 2000... observed the C2 operators in the time-critical targeting cell during JEFX 2000...

2) Incorporating Utilization Information to Size Aircraft Support Inventories, ***Raymond Hill***, AFIT

In austere budget environments, organizations can ill afford excess or unused assets. In the Air Force, limited budgets are forcing re-examinations of the inventory levels of a myriad of items, including support equipment used to maintain combat and cargo aircraft. These support equipment serve the maintenance community during peacetime and wartime or crisis...

TB27 Army OR

Sponsor: MAS
Sponsored Session
Chair: William Tarantino, Center for Army Analysis, US Army, 6001 Goethals Rd., Ft. Belvoir, VA 22060, tarantin@caa.army.mil

1) Optimal Stationing of Army Forces, ***William Tarantino***, Center for Army Analysis, US Army, 6001 Goethals Rd., Ft. Belvoir, VA 22060, tarantin@caa.army.mil, ***Rob Dell***

OSAF is an ILP that examines alternatives for stationing Army force structures for the Quadrennial Defense Review and future Army stationing studies. The model considers a set of force structure requirements, installation capabilities and stationing restrictions while minimizing the net present value of stationing costs. Types of installations considered include maneuver, training areas, command and control, training schools, etc...

2) Apache Recapitalization, ***Daniel Briand***, Sandia National Laboratory, PO Box 5800, MS 1176, Albuquerque, NM 87185, dbriand@sandia.gov

Sandia National Laboratories is working with the Army's Apache Helicopter Project Manager's Office to identify Apache components that most impact readiness, safety and cost. Detailed reliability modeling will help predict the impact of proposed recapitalization upgrades and optimize subsets of upgrades to provide the greatest performance improvement within budget constraints.

TB28 Theory & Application of the AHP

Cluster: Decision Making Theory & Applications: AHP/ANP
Invited Session
Chair: Luis G. Vargas, University of Pittsburgh, 314 Mervis Hall, Katz Grad. Sch. of Bus., Pittsburgh, PA 15260, vargas@katz.pitt.edu

1) On the Use of Information Criteria in AHP, ***Indrani Basak***, Pennsylvania State University, Smith Bldg., Altoona, PA 16601, i8b@email.psu.edu

We discuss how model selection procedures such as Akaike's information criteria (AIC) can be used for selecting the most appropriate one out of several existing statistical models. Once the appropriate model is selected, a procedure is proposed on the basis of AIC for statistical ranking of the alternatives.

2) Interval Preferences & Euclidean Centers, ***Ami Arbel***, Tel Aviv University, Dept. of IE, Tel Aviv, 69978, Israel, ami@eng.atu.ac.il, ***Luis G. Vargas***

We apply Euclidean centers to an interesting problem that appears assessing priorities with the AHP when the decision maker is unable to state his preference exactly due to, perhaps, uncertainty or when groups of decision makers cannot reach consensus on a single scale value to represent their joint preference.

3) An Alternative Measure of Consistency for Positive Reciprocal Matrices, ***Jose Ignacio P. Sanchez***, Universidad de Malaga, ETSI Informatics, Depto. Lenguajes y CS, Spain, jignacio@lcc.uma.es

AHP provides a decision maker with a way of examining the consistency of entries in a pairwise comparison matrix and the hierarchy as a whole through the consistency ratio measure. We present an alternative consistency measure and demonstrate how it is applied in different types of matrices.

4) Rank Reversal in a Distributive Model of AHP for Sparse Data Grids, ***Richard M. Cotman***, 3366 Lake View Circle, Melbourne, FL 32934, richard.cotman@patrick.af.mil, ***Reginald K. Fox***

Significant rank reversal occurs between AHP ideal and distributive modes when the data grid is sparse. Relatively low-scored alternatives under the ideal mode can be highly promoted in the distributive mode. Incomplete data (even or low-weight criteria) will produce these unexpected results, e.g., the ideal alternative 209 promoted to 54 out of 251.

TB29 Statistical Analysis & Computation

Sponsor: QSR/Computing
Sponsored Session
Chair: Matthew J. Saltzman, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, mjs@clemson.edu

1) A Blackboard Architecture Applied to Maximum Likelihood Clustering, ***Torsten Reiners***, Technical University of Braunschweig, Informationsmanagement, Abt-Jerusalem-Str. 7, Braunschweig, 38106, Germany, treiners@tu-bs.de, ***David L. Woodruff***

We describe an algorithm that performs maximum likelihood clustering for large, high-dimensional datasets. Our algorithm combines heuristic search strategies via a blackboard architecture that it exploits connections between continuous and discrete spaces.

2) Information Engineering with Optimization-Based Alternatives to Classic Multivariate Statistical Models, ***Richard S. Barr***, SMU, Sch. of Eng., Dallas, TX 75275, barr@engr.smu.edu, ***Fred W. Glover***, ***Betty L. Hickman***

For today's information engineer, there exist a large number of nonparametric, optimization-based models for data analysis, some with established multivariate-statistics counterparts, i.e., regression, discriminant analysis, clustering and some without, i.e., DEA, SVM, microdata merging. We survey optimization methodologies and describe new mathematical-programming models and algorithms for extracting information from datasets.

3) Robust Linear Regression for Censored Data with Application to Algorithm Performance Analysis, ***Matthew J. Saltzman***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, mjs@clemson.edu, ***Marie Coffin***

In empirical performance analysis of computer codes for difficult problems, censored observations occur when a CPU time limit is exceeded before a test problem is solved. We present and analyze a technique for estimating the regression line that is robust against censored data and an optimal algorithm for

computing the estimators.

TB30 DA Arcade I

Sponsor: Decision Analysis
Sponsored Session

Chair: Elissa Ozanne, Stanford University, Dept. of MSE, Terman Engineering Ctr., Stanford, CA 94305-4023, elissa@stanford.edu

1) A Simple Mixture Model for Approximating Binary Dependence, ***Donald L. Keefer***, Arizona State University, Dept. of Supply Chain Mgmt., Tempe, AZ 85287-4706, don.keefer@asu.edu

We propose a new simple model for approximating positive probabilistic dependence among binary events such as project success/failures. This model is a mixture between high and low dependence models and requires assessment of just one conditional probability in addition to the n marginals.

2) A Strategy for Regulating Environmental Risk, ***Rex V. Brown***, George Mason University, Sch. of Public Policy, 2018 Lake Breeze Way, Reston, VA 20191, rbrown@gmu.edu

We present an approach to formulating environmental regulations that balances public protection, cost and effective enforcement, and builds on existing judgment of responsible regulators. They set a hierarchy of "redundant" requirements that decrease in stringency. A personalist extension of conventional Probabilistic Risk Assessment tests whether hazardous activites comply with them.

3) Telephone Utility Assessment of Cancer Pain Health States, ***Scott B. Cantor***, University of Texas, Anderson Cancer Ctr., 1515 Holcombe Blvd., Box 196, Houston, TX 77030-4009, sbcantor@mdanderson.org, ***Guadalupe R. Palos***, ***LuAnn Aday***, ***Tito R. Mendoza***, ***Charles S. Cleeland***

We evaluated the feasibility of performing utility assessment by telephone for health state related to cancer pain and its treatment. We elicited preferences using the numerical rating scale method for 302 adults. We evaluated the validity of the methodology and analyzed the trade-offs between pain severity and adverse side effects.

4) A Clinical Decision Model for Breast Cancer Prevention Decisions, ***Elissa Ozanne***, Stanford University, Dept. of MSE, Terman Engineering Ctr., Stanford, CA 94305-4023, elissa@stanford.edu, ***Ronald A. Howard***, ***Laura Esserman***

Using a structured consultation plan focused on patient education, individual risk estimation, and preference assessment we are integrating decision analysis into real-time constraints of a clinic, toward improving decision quality for patients at high risk for breast cancer. We present an overview of the method and results of pilot tests.

TB31 Belief Functions in Management Information Systems

Cluster: Belief Functions: Advances & Applications
Invited Session

Chair: Liping Liu, University of Akron, Coll. of Bus. Admin., CBA Bldg. 351, Akron, OH 44325-4801, liu@acm.edu

1) A Case Study for WebTrust Assurance Service under the Belief-Function Approach to Evidential Reasoning, ***Rajendra P. Srivastava***, University of Kansas, Auditing Research & Adv. Tech., Sch. of Bus., Lawrence, KS 66045, rajendra@falcon.cc.ukans.edu, http://lark.cc.ukans.edu/~srivasta/, ***Lili Sun***, ***Theodore J. Mock***

We extend the work of Srivastava & Mock (1999-2000) to demonstrate how the evidential reasoning approach can be applied to a real WebTrust assurance case. The Dempster-Shafer theory of belief functions is used to represent the uncertainty in the evidence collected by the assurance provider. A network of variables, i.e., WebTrust principles, assurance objectives, sub-objectives, etc., and items of evidence pertinent to these variables for the case are created and analyzed...

2) Rapid Process Performance Modeling with Gaussian Belief Function, ***Jim Nelson***, University of Utah, Sch. of Acct. & IS, 1645 East Camput Ctr. Dr. 108, Salt Lake City, UT 84112, actjn@business.utah.edu

Considerable advances have been made in shortening the systems development life cycle. Early attempts focused on the coding phase with the introduction of software reuse. Today, the entire systems development life cycle has been shorted through the use of rapid applicatoin development techniques. Projects that took many months or years are now able to deliver solutions to customers in as little as 3 months...

3) A Meta-Analysis on Technical Acceptance Models, ***Liping Liu***, University of Akron, Coll. of Bus. Admin., CBA Bldg. 351, Akron, OH 44325-4801, liu@acm.edu, ***Qingxiong Ma***

We analyzed more than 40 empirical studies by Davis (1989) and others on the 2 important MIS constructs, ease-of-use and usefulness, and their relationships to user acceptance and actual usage behavior of ITs. We synthesized the mixed empirical findings using both the traditional meta-analysis method (Hunter & Schmidt 1990) and the Gaussian belief function approach (Liu 2001).

4) A Conceptual Framework & Belief-Function Approach to Assessing Overall Information Quality, ***Matthew Bovee***, University of Kansas, Sch. of Business, Lawrence, KS 66045, mbovee@ukans.edu, ***Rajendra P. Srivastava***, ***Brenda Mak***

We present a conceptual model based on a user-centric view of IQ and a version of the model as an evidential network under the belief framework to permit explicitly tracking user assessment of the level of assurance. We explore algorithms for combining these assessments into an overall IQ measure.

TB32 Risk Management & Derivatives

Cluster: Financial Engineering
Invited Session

Chair: Erhan Cinlar, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, ecinlar@princeton.edu

1) Risk Management with Weather Derivatives or Taming Mother Nature, ***Rene Carmona***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, rcarmona@princeton.edu

After reviewing several examples of contracts, we shall focus on the modeling and pricing issues involved in the design and the trading of weather derivatives. and pricing issues involved in the design and the trading of weather derivatives.

2) On Credit Ratings & Default, ***Kian Esteghamat***, Princeton University, Dept. of OR & Financial Eng., Princeton, NJ 08544, kestegha@princeton.edu

Payoffs of certain financial instruments are designed to be explicitly sensitive to changes in credit ratings of entities assigned by rating agencies. We discuss an approach for analyzing and pricing the risks of such instruments based on a model of default consistent with observed credit spreads and past rating transitions.

3) Option Pricing under a Double-Exponential Jump-Diffusion Model, ***Steven G. Kou***, Columbia University, Dept. of IE/OR, New York, NY 10027, kou@ieor.columbia.edu, ***Hui Wang***

The underlying asset's price is modeled by Brownian motion plus jumps with double-exponential sizes. The model captures both the leptokurtic feature and the volatility smile observed empirically. For a variety of option pricing problems, analytic solutions are provided and their numerical implementation is discussed.

TB33 Optimization Applications in Health Care

Sponsor: Health Applications
Sponsored Session

Chair: Michael W. Carter, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, carter@mie.utoronto.ca

1) The Home Care Districting Problem, ***Sophie D. Lapierre***, Ecole Polytechnique de Montreal, CRT, CP 6079, Succ. Centre-ville, Montreal, Quebec, H3C 3A7, Canada, sophiel@crt.umontreal.ca, ***Marko Blais***, ***Gilbert Laporte***

We present the districting problem that home care agencies are faced with. It involves fairly dividing the territory and the medical staff into p-districts. We present a model and its application to a community health care agency in Montreal, Canada.

2) Integer Programming for Scheduling Physicians in an Emergency Room, ***Bernard Gendron***, Universite de Montreal, DIRO/CRT, PO 6128 Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, gendron@iro.umontreal.ca, ***Jacques A. Ferland***, ***F. Forget***

Scheduling physicians in the emergency room is a complex task, which requires taking into account a large number of (often conflicting) rules. We describe a computer system that facilitates this task and present its application to the case of a major hospital of the Montreal region. The system integrates a graphical interface and a database with an optimization approach based on IP.

3) Operating Room Allocation at Mount Sinai Hospital with Integer Programming, ***John T. Blake***, Dalhousie University, Dept.

of IE, Halifax, Nova Scotia, B3J 2X4, Canada, ***Joan Donald***

We describe an integer-programming model and post-solution heuristic that equitably allocates operating room time to the 5 surgical divisions at Mount Sinai Hospital. The model provides managers with the flexibility to generate and review alternative schedules and was implemented using readily available desktop tools. Our presentation will include a demonstration.

4) Predicting & Controlling Bed Availability in an Underbedded Acute Care Hospital, ***Yaron Derman***, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, derman@mie.utoronto.ca, ***Michael W. Carter***

Creating an accurate predictive model of future bed availability can aid an under-bedded hospital in its admission scheduling activities. Our model will consider the aggregate conditional LOS distributions (considering variations) to predict discharges and emergency arrivals, for use in the control of elective admissions for the following day.

TB34 Transportation I

Contributed Session

Chair: Tom Van Woensel, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, B2000, Belgium, tom.vanwoensel@ufsia.ac.be, www.ufsia.ac.be/~tvanwoensel

1) Modeling Uninterrupted Traffic Flows with Queueing Systems, ***Tom Van Woensel***, University of Antwerp UFSIA, Prinsstraat 13, Antwerp, B2000, Belgium, tom.vanwoensel@ufsia.ac.be, www.ufsia.ac.be/~tvanwoensel, ***Nico J. Vandaele***

We present the modeling of uninterrupted traffic flows by means of queueing systems. In past work, we developed a queueing model to describe traffic flows at one point on the road. We model a road network as a queueing network. Results obtained depend mainly on the properties of the queueing model used. The properties are investigated in detail...

2) Airline Fleet-Mix Cum Fleet Allocation for Feeder Routes, ***Balram Avittathur***, Indian Institute of Management Calcutta, Joka PO, Kolkata, West Bengal, 700104, India, balram@iimcal.ac.in, www.iimcal.ac.in/faculty/facpage.asp?ID=balram, ***Bani Sinha***

Our aim is to formulate the airline fleet-mix cum aircraft allocation problem for low passenger density feeder routes of a hub and spokes arrangement. The modeling attempts to provide a methodology for evaluating fleet-mix combinations with an objective of minimizing total operational costs.

3) Minimization of the Number of Vehicles Involved & Maximization of the Load Rate in a VRP using the Electrostatic Algorithm, ***Javier Faulin***, Public University of Navarra, Dept. of Stats & OR, Campus Arrosadia, Pamplona, Navarra, 31006, Spain, ffaulinf@nexo.es, http://www.unavarra.es, ***Alejandro G. del Valle***, ***Eduardo Guillen***

We focus on the development of a new procedure for the classic VRP: the electrostatic algorithm. This method was initially inspired by the electrostatic law of Coulomb and seeks to obtain high qualified routes. The quality of these routes is shown by their ease of implementation in the real world, the number of vehicles involved and the use of the whole capacity of each vehicle...

4) withdrawn 9/18: Open Vehicle Routing in the Multi-Depot System, ***Wisut Supithak***, Texas Technical University, Dept. of IE, Lubbock, TX 79409, wsupithak@hotmail.com

TB35 Transportation II

Contributed Session

Chair: Angelica Lozano, UNAM, Inst. de Ingenieria, Apdo Postal 70-472, Mexico City, 04510, Mexico, alc@pumas.iingen.unam.mx

1) Identification of Urban Freight Transport Corridors without an O-D Matrix, ***Angelica Lozano***, UNAM, Inst. de Ingenieria, Apdo Postal 70-472, Mexico City, 04510, Mexico, alc@pumas.iingen.unam.mx, ***Francisco Granados***, ***Juan Pablo Antun***

We present the problem of identifying the main freight transport corridors in a metropolitan network without O-D matrix, but with observed link counts. Estimated traffic flows on links are obtained through a cyclical process solving a series of distribution/assignment problems.

2) A Shortest-Path Algorithm for Fleet Management in Underground Mines, ***Michel Gamache***, Ecole Polytechnique de Montreal, CP 6079 succ. Center-Ville, Montreal, Quebec, H3C 3A7, Canada, michel.gamache@courriel.polymtl.ca, ***Louis-Philippe Bigras***, ***Paul Cohen***

The fleet management system that we have developed assigns tasks in real-time to load-haul-dump (LHD) vehicles in underground mines. Each dispatching decision takes into account the traffic on the road segments (bi-directional or unidirectional) of the mine network and ensures that each LHD arrives in the right position at loading and dumping points...

3) The Admission & Dispatching Control of a Two-Terminal Transportation System, ***Hairong Chen***, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, Hong Kong, chenhr@ust.hk, ***Yat-Wah Wan***

We consider both admission and dispatching control of a 2-terminal transportation system with a single constant-speed vehicle. With Poisson arrivals, random rewards, fixed penalties, linear holding and transportation costs, we show the optimal policies are of threshold type. Our study extends the scope and complexity of similar models in literature.

4) The Measurement of Position & the Size of Flowing Vehicles with Stereo Image Sensors, ***Toshiharu Hasegawa***, Nanzan University, 27 Seirei Cho, Seto, Aichi, 489-0863, Japan, hasegawa@iq.nanzan-u.ac.jp, ***Shin'ichi Matsuda***, ***Kazuhiro Morisaki***, ***Hiroyku Takada***

A measuring technology of road traffic parameters with stereo image sensing is proposed and tested. We deal with the results of our experiments to measure the position and size f flowing cars on the street and the statistical performance evaluation of this stereo image sensor system.

TB36 Strategies & Tactics of NAS Agents

Sponsor: **Aviation Applications/TSS**

Sponsored Session

Chair: Mark Hansen, University of California, NEXTOR, Civil/Environ. Eng., 107B McLaughlin Hall, ITS, Berkeley, CA 94270, mhansen@newton.me.berkeley.edu

1) An Airline's Choice of Aircraft Size in a Competitive Environment, ***Wenbin Wei***, University of California, NEXTOR, Civil/Environ. Eng., 107B McLaughlin Hall, ITS, Berlekey, CA 94720, wenbin@ce.berkeley.edu, ***Mark Hansen***

We consider airlines' choice of aircraft size and service frequency in competitive environment. Using empirically estimated cost, airline market share and demand functions, we apply various game-theoretical models to find competitive equilibria in duopoly markets.

2) Aircraft Routing under Weather Uncertainty, ***Arnab Nilim***, University of California, Dept. of EECS, 262M Cory Hall, Berlekey, CA 94720, nilim@robotics.eecs.berkeley.edu, ***Mark Hansen***, ***Laurent El Ghaoui***, ***Vu Duong***

Convective weather causes delay and disruption in the national airspace system, in part because of the difficulty in forecasting it. We consider the problem of optimal aircraft routing under weather uncertainty. Our approach employs Markov decision processes and a dynamic programming algorithm that will provide a routing strategy that minimizes the expected delay.

3) A Methodology for Airport Capacity Valuation, ***Mark Hansen***, University of California, NEXTOR, Civil/Environ. Eng., 107B McLaughlin Hall, ITS, Berkeley, CA 94270, mhansen@newton.me.berkeley.edu, ***David A. Knorr***

The benefits of increased airport capacity are traditionally assessed by quantifying the resulting change in delay and then monetizing this change based on aircraft direct operating cost. This approach may not be adequate in situations where users (airlines) adjust their schedules to take advantage of the added capacity. We consider alternative valuation methodologies that take such schedule adaptations into account.

4) Analyzing the Impact of Slot Controls: The Case of San Francisco International Airport, ***Shomik Mehnidratta***, Charles River Associates, 200 Clarendon St., Boston, MA 02116, srm@crai.com, ***Mark Kiefer***, ***George Eads***

We present an analysis of the possible impact of the application of slot controls as a demand management measure at San Francisco International Airport. We describe the methodology used to analyzed the potential impact of slot controls and present our findings on their predicted impacts on arrival delays and the nature and level of scheduled passenger air service at the airport...

5) Airline Irregular Operations Control: An Organizationally-Oriented Decision-Making Approach, ***Sheng-Chen Huang***, University of California, NEXTOR, Civil/Environ. Eng., 107 McLaughlin Hall, Berkeley, CA 94720, schuang@ce.berkeley.edu, ***Adib Kanafani***

When encountering disturbances, airline decisions in the operations recovery are made at more than one level. Local station managers and a system-wide airline operations center share the responsibilities of schedule adjustment. The research presents a centralized model and a bi-level decision-making model considering

the recovery of the flights, origin-destination passengers, and connecting passengers.

TB37 Applications of Pricing & Revenue Management

Sponsor: Revenue Management & Pricing
Sponsored Session

Chair: Jeffrey I. McGill, Queen's University, Sch. of Business, Kingston, Ontario, K7L 3N6, Canada, jmcgill@business.queensu.ca

1) Revenue Management in Multi-Service Communication Networks, ***Ioannis Paschalidis***, Boston University, Dept. of Mfg. Engineering, Boston, MA 02215, yannisp@bu.edu, ***Yong Liu***

We consider a multi-service communication network with fixed routing. We consider both problems of revenue and welfare maximization and show that a simple static policy is asymptotically optimal. We develop a simulation-based approach to efficiently compute the optimal static prices. Our analysis can accommodate demand substitution effects.

2) When is Yield Improvement Really an Improvement?, ***Diwakar Gupta***, University of Minnesota, Dept. of Mechanical Eng., Minneapolis, MN 55455, guptad@me.umn.edu, ***William L. Cooper***

We show that some common notions of yield improvements do not guarantee better expected profits, even when contingent operational decisions are made correctly. We also identify stochastic orders of yield rates (in the manufacturing context) and demand distributions (in the service context) that do guarantee improved expected profits.

3) On the Role of a Spot Market in a Two-Echelon Supply Chain, ***Shiming Deng***, University of California, IEOR Dept., Berkeley, CA 94720-1777, dengsm@ieor.berkeley.edu, ***Shi-Jie Deng***, ***Candace A. Yano***

We investigate how a component spot market effects inventory decision and the coordination of a supplier-manufacturer supply chain. The manufacturer can contract the component supply and/or procure it through a spot market. We find that a forward contract may better coordinate the chain than a spot market does.

4) Revenue Management in Shipment Consolidation, ***Jeffrey I. McGill***, Queen's University, Sch. of Business, Kingston, Ontario, K7L 3N6, Canada, jmcgill@business.queensu.ca, ***James H. Bookbinder***

We present results on revenue management approaches to the consolidation of unit loads in freight shipment, with particular focus on freight trucking.

TB38 Applied Stochastic Optimization & Control

Sponsor: Applied Probability
Sponsored Session

Chair: Bernard F. Lamond, Universite Laval, Dept. of OSD, Quebec, Quebec, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca

1) Using Markov Decision Models to Optimize the Survival Probabilities of Start-Up Companies, ***L. C. Thomas***, University of Southampton, Southampton, UK, lt2@socsci.soton.ac.uk, ***T. W. Archibald***, ***J. Betts***

Existing operations management models seek to maximise the expect profit or minimise the expected cost of the operation to the firm be it inventory control decisions or production level decisions. For start-up companies with limited amounts of capital, however, it may not be sensible to take the risk of choosing these optimal return strategies...

2) Order Acceptance, Capacity Management & IPO Stopping, ***Matthew J. Sobel***, Case Western Reserve University, Dept. of Operations, WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, mjs13@weatherhead.cwru.edu

A self-financed manufacturer grows until its Initial Public Offering of stock. Sales prospects are profitable but impose opportunity costs (use of capacity). Capacity constrains sales and working capital constrains capacity expansion. An MDP formulation leads to algorithms and properties of optimal decision rules for expanding capacity and accepting and rejecting sales prospects.

3) Determining Flood Control Rule Curves for Several Reservoirs in Series & in Parallel, ***Andre Turgeon***, Hydro-Quebec (IREQ), Varennes, Quebec, Canada, turgeon.andre@ireq.ca

We present a method that determines lower and upper bounds to assign to weekly reservoir releases in order to maintain the risk of flooding below a predetermined level. The bounds can be determined for several reservoirs in series and in parallel, using the probability distributions of the inflows to the reservoirs or synthetic inflow sequences. The results of applying this method to QuÕbec's La Grande river, which has several reservoirs in series and in parallel, are described.

4) Concavity Conditions & Optimal Decision Rules for a Reservoir with Head Effect, ***Bernard F. Lamond***, Universite Laval, Dept. of OSD, Quebec, Quebec, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca

We examine the optimality conditions for a long-term operating policy of a single reservoir with head effect, stochastic inflows received continuously, and piecewise linear concave rewards. We show that under a suitable change of variables, an approximate model based on the mean head during the period has a concave reward function. The computational simplifications thus obtained are examined.

TB39 Software Demonstration VI

Chair: To be announced

1) Software Demonstration: Nonlinear & Global Optimization in Microsoft Excel, ***Daniel H. Fylstra***, Frontline Systems, Inc., PO Box 4288, Incline Village, NV 89450, dfylstra@frontsys.com

Frontline Systems' Premium Solver products are compatible upgrades to the Excel Solver featuring linear, integer and nonlinear programming, global optimization, constraint programming and genetic and evolutionary algorithms. Our Solver DLL products make optimization easy to use in any Windows application program. At INFORMS Miami, we'll demonstrate our most powerful nonlinear optimizers ever.

2) Software Demonstration: Standard & Poor's Applied Decision Analysis, ***Lubna Chunawala***, Standard & Poor's Applied Decision Analysis, lubna_chunawala@standardandpoors.com, ***Pavel Mizenin***

No abstract supplied.

TB40 Supply Chain Management

Contributed Session

Chair: Terry P. Harrison, Pennsylvania State University, Dept. of MSIS, 306 Beam BAB, University Park, PA 16802, tharrison@psu.edu, http://silmaril.smeal.psu.edu/tph

1) Global Capacity Planning for Plastics, ***Rajesh Tyagi***, General Electric R&D, 1 Research Circle, KWC 278, Niskayuna, NY 12309, rajeshtyagi@yahoo.com

We present a capacity planning system developed for GE Plastics Lexan business. The system minimizes production and distribution costs for 2-level production facilities to serve global customers. The primary use of the system is to help with capacity expansion decisions over the next 5 years.

2) Control of Capacity Utilization using Dynamic Pricing, ***Peter L. Jackson***, Cornell University, Sch. of OR/IE, Ithaca, NY 14853, pj16@orie.cornell.edu, ***Amar Sapra***

We have shown how pricing can be used to maximize capacity utilization in the case of a single supplier and a single customer. Assuming that total demand over certain time period remains fixed, the effect of pricing as a controlling tool to temporarily alter the cumulative order curve of the customer has been modeled and analytically studied.

3) Pipeline Analysis using Cumulative Inventory Plots, ***Amar Sapra***, Cornell University, Sch. of OR/IE, Ithaca, NY 14853-3801, sapra@orie.cornell.edu, ***Peter L. Jackson***

We have shown how cumulative inventory plots can be used to analyze the causes of stock outs in the supply chain having several warehouses and regional distribution centers. This technique is very simple and we have shown that it was able to pinpoint causes for a significantly large fraction of the stock outs of the service parts division of a major automobile manufacturer.

4) Principles of Global Supply Chain Design, ***Terry P. Harrison***, Pennsylvania State University, Dept. of MSIS, 306 Beam BAB, University Park, PA 16802, tharrison@psu.edu, http://silmaril.smeal.psu.edu/tph

I review principles and methods of global supply chain design from 2 viewpoints. The first perspective focuses on practitioners with interests in an overview of the key concepts and applications of global supply chain design. The second viewpoint assesses research opportunities to extend supply chain design into closely related areas.

TB41 OR at Merrill Lynch

Cluster: Unsolved OR Problems in Industry
Invited Session

Chair: Raj Nigam, Merrill Lynch, raj_nigam@ml.com

1) OR at Merrill Lynch, ***Raj Nigam***, Merrill Lynch, raj_nigam@ml.com, ***Russ Labe***

This group won the 1997 INFORMS Prize and the 2001 Edelman Prize. Our mission is to provide quantitative analyses and modeling that impact strategic decision making. Areas of expertise and projects will be presented. Open problem areas for potential research will be discussed, including customized pricing, product/client matching and portfolio optimization given existing holdings.

TB42 Workshop: Open Source Tools for Branch, Cut & Price

Cluster: Open Source Software
Invited Session

Chair: Laszlo Ladanyi, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, ladanyi@us.ibm.com

1) Workshop: Open Source Tools for Branch, Cut & Price, ***Laszlo Ladanyi***, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, ladanyi@us.ibm.com, ***Ted Ralphs***

BCP techniques are a proven class of cutting-edge approaches for solving difficult, large-scale mixed-integer programming problems. Geared for practitioners and researchers in need of advanced capabilities not available in current commercial solvers, this workshop will focus on implementational issues, as well as potential pitfalls, of BCP techniques. An open source toolkit for developing large-scale, parallel BCP applications will be introduced and its use demonstrated. Software discussed is available at http://www.coin-or.org.

TB43 Education I

Contributed Session

Chair: Ingolf Stahl, Stockholm School of Economics, Box 6501, Stockholm, SE-113 83, Sweden, ingolf.stahl@hhs.se, webgpss.hk-r.se

1) Using Web-Based Simulation software for E-Learning of OR, ***Ingolf Stahl***, Stockholm School of Economics, Box 6501, Stockholm, SE-113 83, Sweden, ingolf.stahl@hhs.se, webgpss.hk-r.se

WebGPSS, available free at webgpss.hk-r.se and very easy to learn and use, has been used in distance courses for teaching different aspects of OR, such as inventory management, testing of LP solutions, analyzing queueing theory, sales forecasting for new products, cash flow forecasting, testing of PERT solutions and simulation-based ABC.

2) withdrawn 9/14: The Admissions Process in a Graduate School of Business, ***Andrew W. Braunstein***, Iona College, Hagan School of Bus., 715 North Ave., New Rochelle, NY 10801, abraunstein@iona.edu

3) Evaluating Online Instruction, ***Ellen S. Jordan***, Tiffin University, 155 Miami St., Tiffin, OH 44883, ejordan@tiffin.edu

We will demonstrate a method to evaluate the learning outcomes of online instruction. Statistical data has been kept on the MBA courses concerning interactive threaded discussions, time expenditure in different online tools, doc sharing sections and lectures in relationship to grades and evaluations.

4) Postgraduate Candidates Selection based on Multi-Criteria Decision Aid, ***Adriana Z. Clericuzi***, Federal University of Pernambuco, CP 7462, Recife PE, 50722-970, Brazil, gpsid@npd.ufpe.br, ***Ana Paula Costa, Adiel T. Almeida***

A multi-criteria decision model has been designed to deal with the postgraduate candidate selection problem. The selection process consists of 2 main steps: the first involves a formal multi-criteria analyses dealing with a choice problem, where a sub-set of candidates is selected. The second step consists of a qualitative analysis involving interview and analyzing research projects...

5) A Methodology for Getting into the Wireless Zone, ***Gredy Garrido***, 720 Riviera Dr., Palm Bay, FL 32905, gredy@yahoo.com, www.gredy.garrido.com/informs

We explore and propose a methodology for implanting WAP at old campuses in order to improve the delivery of contents supporting courses through the Web, using a large Latin American school of business (12,000 students). We demonstrate that a substantial saving can be achieved using a wireless network for student and faculty to access Internet resources. It is also expected that education quality will improve considerably.

TB45 Supply Chain Management IX

Contributed Session

Chair: Thierry Rakotobe-Joel, Ramapo College of New Jersey, Sch. of Admin. & Bus., 505 Ramapo Valley Rd., Mahwah, NJ 07410, trakotob@ramapo.edu, orion.ramapo.edu/~trakotob

1) Information Acquisition in Supply Chains with Uncertain & Censored Demand, ***Arnab Bisi***, University of California, Grad. Sch. of Mgmt., Riverside, CA 92521, arnab.bisi@ucr.edu, ***Martin L. Puterman, David W. Glenn***

We study supply chains with 1 supplier and 2 retailers. Retailers are censored newsvendors with uncertain demand distributions. Using a Bayesian approach, we investigate how the supplier can make use of the combined information gathered from retailers' sales data to increase channel profits. We further show that buy-back contracts coordinate the system.

2) An AHP-Balanced Score Card for Supply Chain Performance Measurement, ***Germaine H. Saad***, Widener University, 1 University Place, Chester, PA 19013, germaine.h.saad@widener.edu

We focus on improving supply chain performance measurement. The contribution thought is twofold. First, inefficiencies in current strategic performance evaluation systems are discussed. Secondly, an AHP model is introduced that overcome basic flaws and inefficiencies in current systems. The model testing results will be presented along with their policy implications.

3) Using Connectivity Theory to Optimize & Measure Supply Chain Performances, ***Thierry Rakotobe-Joel***, Ramapo College of New Jersey, Sch. of Admin. & Bus., 505 Ramapo Valley Rd., Mahwah, NJ 07410, trakotob@ramapo.edu, orion.ramapo.edu/~trakotob

Supply chain performance is one of the most sensitive topics in the area of operations management. At the heart of this difficulty is the nature of the supply chain and the concept of supply chain performance. No longer is performance measurement based on single company performance; it is based on integrated and networked processes across functional, geographical, technological and organizational interfaces...

4) A Network-Based Approach to Decision Making in a Supply Chain, ***Jennifer Blackhurst***, University of Iowa, 2130 Country Club Parkway SE, Cedar Rapids, IA 52403, jvblackh@collins.rockwell.com, ***Tong Wu, Peter J. O'Grady***

A methodology will be presented that can handle both the complexities of a supply chain and the decision-making processes inherent to the operation of the supply chain. This methodology will allow for increased visibility of the entire supply chain, eliminating suboptimzation at each echelon and decreasing problems such as demand amplification.

TB46 Simulation Analysis Methodology

Sponsor: Simulation
Sponsored Session

Chair: Michael C. Fu, University of Maryland, Dept. of DIT, Smith Sch. Bus., Van Munching Hall, College Park, MD 20742-1815, mfu@rhsmith.umd.edu

1) Randomized Lattice Rules for Variance Reduction: Theory & Examples, ***Pierre L'Ecuyer***, Universite de Montreal, DIRO, CP 6128, Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, lecuyer@iro.umontreal.ca

Randomized quasi-Monte Carlo (RQMC) methods can provide lower-variance unbiased estimators than standard Monte Carlo, together with error estimates. We will discuss one class of RQMC methods, randomized lattice rules, and give numerical examples illustrating their effectiveness.

2) New Development of an Efficient Simulation Approach, ***Chun-Hung Chen***, George Mason University, Dept. of SE/OR, 4400 University Dr. MS 4A6, Fairfax, VA 22030, cchen9@gmu.edu, http://mason.gmu.edu/~cchen9, ***Enver Yucesan***

Our efficient simulation approach can be used to either minimize the total computation cost with a constraint that the simulation quality must be higher than a desired level or maximize the simulation quality with the constraint that the total computation cost can not exceed a given budget.

3) Verifying & Exploiting Convexity in Simulation Optimization, ***Julius Atlason***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, ***Marina A. Epelman, Shane G. Henderson***

We investigate the convexity properties of a function where the available information is the function values and/or gradients, or estimates of these, at a finite number of points. The function is typically an objective function or a constraint of a mathematical program and is estimated via simulation.

4) On the Convergence Rate of Ordinal Comparisons of Random Variables, ***Michael C. Fu***, University of Maryland, Dept. of DIT, Smith Sch. Bus., Van Munching Hall, College Park, MD 20742-1815, mfu@rhsmith.umd.edu, ***Xing Jin***

The asymptotic exponential convergence rate of ordinal comparisons follows from large deviations theory, the critical condition being a finite moment generating function. We show that this condition is both necessary and sufficient and how to recover the exponential convergence rate when the moment generating function is not finite.

Tuesday 11:45-12:45

TP47 Edelman Reprise: Pricing Analysis for Merrill Lynch Integrated Choice

Plenary Session

Chair: Gary J. Koehler, University of Florida, Dept. of DIS, Warrington Coll. of Bus., Gainesville, FL 32611, koehler@ufl.edu

1) Edelman Reprise Plenary: Pricing Analysis for Merrill Lynch Integrated Choice, ***Stuart Altschuler***, Merrill Lynch & Co. Inc., ***Donna Batavia***, ***Jeff Bennett***, ***Russ Labe***, ***Bonnie Liao***, ***Raj Nigam***, ***Je Oh***

In early 1999, Merrill Lynch and other full-service financial service firms were under relentless assault. The advent of electronic trading and the commoditization of trading threatened the very core of Merrill Lynch's value proposition - to provide advice and guidance through a financial consultant. In response, management decided to create a new offering to provide investors with more choices. A cross-functional team developed 2 models to evaluate different combinations of product structures and prices. The models showed that revenue at risk to Merrill Lynch ranged from $200 million to $1 billion. The resulting integrated choice strategy enabled Merrill Lynch to seize the marketplace initiative, changed the financial services landscape and mitigated the revenue risk. As of September 2000, client assets reached $93 billion in the new offer. During the first 9 months of 2000, net new assets totaled $11 billion and the number of accounts increased 72%.

Tuesday 13:00-14:00

TK47 Keynote: Rocket Science Retailing - What Research Opportunities Does it Create for Us?

Keynote Session

Chair: Gary J. Koehler, University of Florida, Dept. of DIS, Warrington Coll. of Bus., Gainesville, FL 32611, koehler@ufl.edu

1) Keynote: Rocket Science Retailing - What Research Opportunities does it Create for Us?

Retailing is a big industry. In the US, retail business represents 40% of the economy and is the largest employer. Retail supply chain management is still more art than science, but this is changing rapidly as retailers begin to apply analytic models to the huge volume of data they are collecting on consumer purchases and preferences. This industry-wide movement resembles the transformation of Wall Street that occurred in the 1970s when physicists and other "rocket scientists" applied their analysis skills to investment decisions. The rocket science retailing movement will create enormous opportunities for our profession. To better understand these opportunities, Ananth Raman and I have been working with 32 leading retailers to assess their progress towards rocket science retailing and to accelerate that progress through selected research projects with the retailers. We will describe findings from this work, including: how do retail supply chains function, what decisions arise in retail supply chain management that lend themselves to analysis, a synopsis of prior research on selected topics including managing short life cycle products to manage life cycle profits, merchandise testing and store level assortment planning and what are the exciting future research frontiers.

TK48 Keynote: The Role of Project Management Processes as a Corporate Risk Mitigation Tool at ExxonMobil

Keynote Session

Chair: S. Selcuk Erenguc, University of Florida, Dept. of DIS, Gainesville, FL 32611-7169, erenguc@dale.cba.ufl.edu

1) Keynote: The Role of Project Management Processes as a Corporate Risk Mitigation Tool at ExxonMobil, ***Michael P. Murray***, ExxonMobil, mike.p.murray@exxonmobil.com

Each year, nearly every large corporation invests hundreds of millions of dollars in information systems to improve their operations and competitive position in the global marketplace. As with any other capital investment, IS projects must deliver a product or service that meets requirements within a defined time period at a specified cost. Failure to deliver on any of the 3 performance dimensions increases the risk that a corporation will fall behind competition from a capability, revenue or cost perspective.

Tuesday 14:15-15:45

TC01 Tutorial: Component-Based System Development - Technologies & Implications on System Development

Invited Session

Chair: Hemant K. Jain, University of Wisconsin, School of Bus. Admin., Milwaukee, WI 53201, jain@uwm.edu, www.sba.uwm.edu/h_jain

1) Tutorial: Component-Based System Development - Technologies & Implications on System Development, ***Hemant K. Jain***, University of Wisconsin, School of Bus. Admin., Milwaukee, WI 53201, jain@uwm.edu, www.sba.uwm.edu/h_jain

TC02 Game Theory Applications in E-Commerce

Cluster: OR/MS & the Internet

Invited Session

Chair: Sulin Ba, University of Southern California, Marshall Sch. of Business, Los Angeles, CA 90089, sulin@usc.edu

1) The Implications of Business-to-Business Electronic Marketplaces: A Game-Theoretic Analysis, ***Kevin Zhu***, University of California, 340 Grad. Sch. of Mgmt., Irvine, CA 92697-3125, kzhu@gsm.uci.edu, http://web.gsm.uci.edu/kzhu/

A growing trend in B2B e-commerce is the rapid emergence of Internet-based B2B electronic marketplaces. To gain insights into this phenomenon, we develop a game-theoretic model and examine the competition between a B2B exchange and a bilateral matching market. We derive the best response functions and characterize the market equilibrium in which the buyer-supplier relationship can be very different.

2) Entry & Exit in an Application Service Provider Market, ***Kerem Tomak***, University of Texas, CBA 5.202, B6500, Austin, TX 78712, kerem.tomak@bus.utexas.edu

We study the strategic implications of software renting or application service provision in the context of e-commerce. In economics literature, several recent papers study product bundling strategy's effectiveness as a barrier to entry and report positively. We look at the complementary problem of the effectiveness of unbundling (software) and network externalities as an entry deterrent strategy.

3) The Dynamics of the Electronic Market: An Evolutionary Game Approach, ***Sulin Ba***, University of Southern California, Marshall Sch. of Business, Los Angeles, CA 90089, sulin@usc.edu, ***Andrew B. Whinston***, ***Han Zhang***

The rise of online frauds has prompted the emergence of trusted third parties (TTPs). Will people use the TTps while conducting online transactions? How will the electronic market evolve? We identify the different equilibria of the electronic market using an evolution game theoretic approach and explore the best strategy to do transactions in the electronic market.

TC03 Web Mining

Cluster: Data Mining

Invited Session

Chair: Filippo Menczer, University of Iowa, MS Dept., S320 PBB, Iowa City, IA 52242, filippo-menczer@uiowa.edu

1) Enhanced Search: CLEVER & the Future, ***David Gibson***, University of California, Dept. of Comp. Sci., 581 Soda Hall, Berkeley, CA 94720, dag@cs.berkeley.edu

The next generation of search engines will integrate the Web, presenting it as a single well-authored document, with sophisticated indexes, by combining lexical retrieval with hyperlink analysis. I shall present a theoretical model for combining the eigenvector-based techniques of latent semantic analysis with the clever link analysis algorithm.

2) Mining Entities via Information Extraction, ***David Eichmann***, University of Iowa, Sch. of Library & IS, 3067 Library Bldg., Iowa City, IA 52242, david-eichmann@uiowa.edu

Typical approaches to indexing Web pages fail to capitalize on the rich, if ill-structured, nature of the actual text. Information extraction techniques can provide significant aids in increasing the precision of search results. We describe our approach to search result clustering based upon recognition of named entities.

3) Online Information Finding & WebFind: A Database-Inspired Solution, ***Alvaro Monge***, California State University, Dept. of CE/CS, 532 ECS Bldg., Long Beach, CA 90840, monge@cecs.csulb.edu

In databases, known information from one entity gives access to other entities. This join can be extended to online information, with portals as the entities. By integrating information from portals, the search for information yields higher quality results. We describe how this idea is used in WebFind and other tools.

4) Mining the Web with Query-Driven Adaptive Crawlers, ***Filippo Menczer***, University of Iowa, MS Dept., S320 PBB, Iowa City, IA 52242, filippo-menczer@uiowa.edu, ***Gautam Pant, Padmini Srinivasan, Miguel E. Ruiz***

Effective crawling strategies are essential for topic specific search engines, where crawlers must maximize the number of relevant pages visited given finite bandwidth resources. We describe various different methods to evaluate crawlers and apply these metrics to compare 3 crawling algorithms based on similarity ranking, link analysis and adaptive agents.

TC04 Auction Theory

Cluster: **Auctions**
Invited Session

Chair: Ronald M. Harstad, Duke University/Rutgers University, Fuqua Sch. of Bus., Durham, NC 27708, harstad@duke.edu, harstad@rutcor.rutgers.edu

1) Second-Price Auctions with Power-Related Distributions, ***Luke Froeb***, Vanderbilt University, 401 21st Ave. South, Nashville, TN 37203, luke.froeb@owen.vanderbilt.edu, ***Steven Tschantz, Philip Crooke***

We analyze a class of asymmetric second-price auction models with tractable closed forms. The class can accommodate correlated values by allowing bidders to mix over distributions. The dominant strategy equilibrium implies that auction among bidders with correlated values can be expressed as a mixture of independent auctions.

2) Revenues in Common-Value Auctions, ***Vlad Mares***, Washington University, Dept. of Economics, Olin Sch. of Bus., 1 Brookings, St. Louis, MO 63130, mares@olin.wustl.edu

For a common-value auction, partition the N signals arbitrarily into bidding coalitions of various sizes. I characterize an equilibrium, which subsumes the usual symmetric equilibrium as a special case. Revenues are compared for different coalition structures.

3) Necessary & Sufficient Conditions for Full Surplus Extraction in Common-Value Auctions with or without Signal Affiliation, ***Ronald M. Harstad***, Duke University/Rutgers University, Fuqua Sch. of Bus., Durham, NC 27708, harstad@duke.edu, harstad@rutcor.rutgers.edu, ***Vlad Mares***

We develop an intuitive set of necessary and sufficient conditions for when a common-value auction form fully extracts surplus. The auction forms used are robust to budget constraints. Bidders simply bid their types in equilibrium, and losing bidders make a 0 payment.

TC05 Generalized Convexity & Fractional Programming

Cluster: **Generalized Convexity/Generalized Monotonicity**
Invited Session

Chair: Siegfried Schaible, University of California, Anderson Grad. School of Mgmt., Riverside, CA 92521, siegfried.schaible@ucr.edu

1) withdrawn 10/4: On an Alternative Theorem & its Applications, ***Giuseppe Caristi***, University of Messina, Inst. of Math, Fac. of Econ., Via dei Verdi 75, Messina, 98122, Italy, gcaristi@dipmat.unime.it, ***Massimiliano Ferrara, Anton Stefanescu***

2) Fractional Programming: A Recent Survey, ***Siegfried Schaible***, University of California, Anderson Grad. School of Mgmt., Riverside, CA 92521, siegfried.schaible@ucr.edu

In addition to single-ratio fractional programs, we consider the maximization of the smallest of several ratios and the maximization of a sum of ratios. We report on some recent developments for each of these non-convex models, especially in the analysis and solution of the sum-of-ratios fractional program.

3) Solving the Nonlinear Sum of Ratios Problem via a Sequence of Convex Programming Problems, ***Harold P. Benson***, University of Florida, Warrington Coll. of Bus. Admin, PO Box 117169, Gainesville, FL 32611-7169, benson@dale.cba.ufl.edu

We present a B&B algorithm for globally solving the nonlinear sum of ratios problem. The main computations involve solving a sequence of convex programming problems. To our knowledge, this is the first algorithm of its kind.

TC06 Telecommunications IV

Contributed Session

Chair: Sridhar Narasimhan, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, sri.narasimhan@mgt.gatech.edu

1) Telecommunication Access Network Design, ***Sridhar Narasimhan***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, sri.narasimhan@mgt.gatech.edu, ***Samit Soni, Larry J. LeBlanc***

We address the design of telecommunication access networks with reliability constraints. This problem involves connecting user sites to switches with SONET links and ADM equipment at the nodes. A simulated annealing solution approach is discussed and preliminary computational results are reported for various networks.

2) withdrawn 10/12: A Model for Generating Traffic Quantities, ***Larry E. Stanfel***, Defense Information Systems Agency D85, 10701 Parkridge Dr., Reston, VA 20191, stafell@ncr.disa.mil

3) Optimal Design of SONET Feeder Networks, ***Byung Ha Lim***, York University, 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada, blim@ssb.yorku.ca, ***June S. Park, Larry J. LeBlanc***

We develop a binary integer linear program and simulated annealing-based Lagrangian heuristics for the problem of designing stackable, unidirectional SONET rings to support centralized traffic that arises in such applications as feeder transport networks, Internet service networks and multimedia service networks.

4) Routing of Uncertain Demands, ***Herve Kerivin***, France Telecom R&D, 38-40 rue du General Leclerc, Issy les Moulineaux, 92794, France, herve.kerivin@francetelecom.com, ***Walid Ben-Ameur***

We introduce a new traffic model, the polyhedral model, sufficiently flexible to capture the traffic variations. Demands between nodes can be carried on many paths. Traffic proportions flowing through each path are independent of the current traffic. Minimum cost routing of uncertain demands is computed by LP. Pricing models of uncertain traffic transportation are proposed.

5) Strategic Improvement of Customer Value Added in Telecommunication Services, ***Kwang-Jae Kim***, POSTECH, Dept. of MIE, San 31, Hyoja-Dong, Nam-Gu, Pohang, Kyungbuk, 790-784, Korea, kjk@postech.ac.kr, kayak@postech.ac.kr, ***Hyun-Woo Cho, In-Jun Jeong***

TC07 Bilevel Programming I

Cluster: **Bilevel Programming**
Invited Session

Chair: Stephan Dempe, TU Bergakademia Freiberg, Fac. of Mathematik/Informatik, Freiberg, 09596, Germany, dempe@mathe.tu-freiberg.de

1) withdrawn 10/15: A Successive Convex Relaxation Approach to Bilevel Quadratic Optimization Problems, ***Akiko Takeda***, Tokyo Institute of Technology, Dept. of Math. & CS, Japan, takeda@is.titech.ac.jp, ***Masakazu Kojima***

2) Bilevel Optimization & Generalized Semi-Infinite Programming: A Comparison, ***Oliver Stein***, Aachen University of Technology, Dept. of Mathematics C, Aachen, D-52056, Germany, stein@mathc.rwth-aachen.de

We study connections and differences between BLs and GSIPs. In general, the topology of the feasible sets in these problem classes may differ considerably. However, under a natural assumption, GSIP can be seen as a special case of a BL. We consider the so-called reduction approach for BL and GSIP leading to optimality conditions and Newton-type methods for solving the problems numerically...

3) Optimality Conditions & Efficient Numerical Treatment for Inverse Coefficient Problems for Variational Inequalities, ***Michael Hintermuller***, Universitat Graz, Institut fur Mathematik, Heinrichstr. 36, Graz, A-8010, Austria, michael.hintermueller@kfunigraz.ac.at

Bilevel optimization problems arising from parameter estimation in elliptic variational inequalities are presented. In infinite dimension, a first-order characterization of an optimal solution is derived on the basis of a primal-dual penalization technique, the utilization of complementarity functions and local regularization. For the discretized system, a new numerical approach consisting

of an SQP-type outer loop...

4) Optimality Conditions in Bilevel Programming, ***Stephan Dempe***, TU Bergakademia Freiberg, Fac. of Mathematik/Informatik, Freiberg, 09596, Germany, dempe@mathe.tu-freiberg.de

If the optimal solution of the lower level problem in bilevel programming is not uniquely determined, the problem is not well-posed in the sense that the leader is not able to evaluate (the feasibility and) the objective function value of his own choice prior to the follower selecting one optimal solution in the lower level problem...

TC08 Workforce Scheduling

Cluster: **Constraint Programming**
Invited Session

Chair: Gilles Pesant, University of Montreal, CRT, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, pesant@crt.umontreal.ca

1) Generalization of Disjunctive Construction for Scheduling Problems, ***Jean-Charles Regin***, ILOG, Les Taissounieres HB2, 1681, Route des Dolines, Sophia Antipolis, 06560, France, regin@ilog.fr, ***Thierry Petit***

Scheduling problems involve disjunctive constraints (certain activities can be scheduled after or before other activities). We show how the disjunctive constraint can be efficiently implemented and how it can be generalized. We present an efficient filtering algorithm for the max-sat constraint. This global constraint states that among a set of constraints at least k must be satisfied.

2) Long-Term Workforce Scheduling in Contact Center, ***Etienne Gaudin***, Bouygues eLab, 1 ave. Eugene Freyssinet, St. Quentin Yvelines, 78061, France, egaudin@bouygues.com, ***Benoit Rottembourg***, ***Thierry Benoist***

We present a constraint programming approach for long-term scheduling in a multimedia contact center. The objective is to minimize understaffed situation by smoothing employees weekly working time over a year. Based on a new flow constraint, our approach manages hundreds of employees, complex labor rules and multi skilled demands.

3) withdrawn 10/11: Covering Workloads, ***Nicolas Beldiceanu***, SICS, Lagerhyddsvagen 18, Uppsala, Sweden, nicolas@sics.se, ***Mats Carlsson***

4) A Robust Multi-Shift Rostering System, ***Gilles Pesant***, University of Montreal, CRT, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, pesant@crt.umontreal.ca, ***Gilbert Laporte***

We present a constraint programming algorithm able to construct high-quality rotating schedules over a wide range of restrictions such as shift change patterns, length of work stretches and off weekend distribution. Computational results on a variety of real-life instances attest to the expressiveness and efficiency of the approach.

TC09 Neuro-Dynamic Programming

Cluster: **Bellman Memorial Cluster on Dynamic Programming**
Invited Session

Chair: Augustine O. Esogbue, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, aesogbue@isye.gatech.edu

1) Neurodynamic Programming: Overview & Research Opportunities, ***Paul Werbos***, NSF, 4201 Wilson Blvd., Ste. 675, Arlington, VA 22230, pwerbos@nsf.gov

NDP is the newest name for a decades-old stream of research, owing much to Howard's classic work on iterative dynamic programming. NDP has demonstrated benefits in areas such as multi-stream inventory control, aerospace control, electric power, manufacturing and brain modeling. SDF seeks proposals on several high-priority topics.

2) A Fuzzy-Neuro Adaptive Controller: Design Overview & Some OR Applications, ***Augustine O. Esogbue***, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, aesogbue@isye.gatech.edu

We discuss the development of a self-learning fuzzy-neuro controller that learns online, does not require an exact plant model, operates without the benefit of what is considered optimal, does not need a set of predefined control rules, uses feedback optimally and is computationally inexpensive. Controller properties and applications are reviewed.

3) Learning to Control Continuous Set-Point Regulator Problems, ***Warren E. Hearnes***, Lucent Technologies, 2000 NE Expressway, Norcross, GA 30071, whearnes@lucent.com, ***Augustine O. Esogbue***

The use of approximate dynamic programming generalized with a fuzzy additive model to learn near-optimal control policies for continuous set-point regulator problems is discussed. Heuristic stopping criterion for the learning and reduction of approximation error are evaluated. The controller is extended to multiple-input/multiple-output control problems. Some properties and examples are shown.

TC10 New DEA Methods II

Cluster: **Data Envelopment Analysis**
Invited Session

Chair: John Ruggiero, University of Dayton, 517 Miriam Hall, Dayton, OH 45469-2251, riggiero@notes.udayton.edu

1) Efficiency Measure based on Target Units, ***Tarja T. Joro***, University of Alberta, 3-40F Business Bldg., Alberta, T6G 2R6, Canada, tarja.joro@ualberta.ca

From a managerial point of view, the radial projections provided by DEA might not always be the best possible targets for the DMUs. We propose the use of multi-criteria optimization to set targets and present an approach to determine radial upper and lower bounds for a non-radial efficiency measure.

2) Testing for Productive Efficiency with Errors-in-Variables, ***Thierry Post***, Erasmus University Rotterdam, H14-11, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, gtpost@few.eur.nl, ***Timo Kuosmanen***, ***Stefan Scholtes***

We develop a nonparametric test of productive efficiency that accounts for the possibility of errors-in-variables. The test allows for statistical inference based on the extreme value distribution of the YL norm. In contrast to the test proposed by Varian, H. (1985), our test can be computed using simple enumeration algorithms or LP. An empirical application for the Dutch electricity sector illustrates the proposed test procedure.

3) A Pre-Processor for the CCR Model in DEA, ***Mahboob Shaheen***, University of Windsor, 3233 Peter St., Windsor, Ontario, N9C 1H6, Canada, shaheen1000@yahoo.com

We present a computational procedure to reduce a problem to identify the efficient DMUs in DEA for the CCR model. That is, the procedure can be used to identify some inefficient DMUs with a little effort and reduce the problem to identify the efficient DMUs. The result of checking a linear system for every element of its generators determines whether the vector is efficient or not in the model...

4) Selection of Alternatives for a Hydropower Development Project by the Value-Focused DEA, ***Ming Li***, Norwegian School of Management, Dept. of Strategy, Elias Smith vei 15, Box 580, Sandvika, N-1301, Norway, ming.li@bi.no

We present an application case in which the value-focused DEA is applied to the MCDA for the Sauda hydropower project in Norway. The application case shows that combining decision-maker's value preferences with DEA is an effective way to solve complex MCDA problems.

TC11 Computational Integer Programming

Cluster: **Integer Programming**
Invited Session

Chair: Gabor Pataki, University of North Carolina, Dept. of OR, Smith Bldg., CB 3180, Chapel Hill, NC, gabor@unc.edu, http://www.or.unc.edu/~pataki

1) Improving Cuts in Integer Programming, ***Kent Andersen***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, kha@andrew.cmu.edu, ***Gerard Cornuejols***, ***Yanjun Li***

Several classic cutting planes in integer programming, such as Gomory's mixed integer cuts, can be viewed as disjunctive cuts for the cone defined by the basis. We show how to improve the disjunction in order to generate better cuts. We present computational results.

2) Finding Good Multiple Disjunctions for Cut Generation, ***Gabor Pataki***, University of North Carolina, Dept. of OR, Smith Bldg., CB 3180, Chapel Hill, NC, gabor@unc.edu, http://www.or.unc.edu/~pataki, ***Egon Balas***, ***Michael Perregaard***

A multiple disjunction is one with more than 2 terms, i.e., one that is obtained by considering the 4 possible values that a pair of 0-1 variables can take. We develop algorithms for finding multiple disjunctions that perform better than the standard ones with 2 terms, when used for cut generation.

3) An Efficient Procedure for Identifying Cliques with High Cardinality, ***Laureano F. Escudero***, Universidad Miguel Hernandez, Ctr. de Investigacion-Op., Avda del Ferrocarril, Elche, Alicante, 03202, Spain, escudero@umh.es, ***Susana Munoz***

The performance of an algorithm for identifying dominant cliques with respect to a set of cliques is analyzed. Given a time limit, the computational results while using some MIPLIB instances are compared with those obtained independently by the 2 graph-oriented methods that are included in the studied algorithm.

4) New Short Hot Start Methods & Results for BB (0.1) MIP Programming, ***Kurt Spielberg***, IBM, 2005 Market St., Philadelphia, PA 19103, kurtspie@vnet.ibm.com

We present a new "natural" method for generating "short hot start trees," in addition to earlier "forcing" methods. It is easier to implement and seems to be comparable in results. Also, a new recursive search method for a given hot start may significantly simplify obtaining improved solutions.

TC12 Optimization Techniques III

Contributed Session

Chair: Tonguc Unluyurt, Sabanci University, MDBG, Orhanli, Tuzla, Istanbul, 81474, Turkey, tonguc@sanabciuniv.edu

1) Sequential Testing of Complex Systems Consisting of Identical Components, ***Tonguc Unluyurt***, Sabanci University, MDBG, Orhanli, Tuzla, Istanbul, 81474, Turkey, tonguc@sanabciuniv.edu

We consider the problem of sequentially testing complex systems in a cost minimizing fashion. We will concentrate on the case when the system is composed of identical components. Some heuristics will be presented along with comparisons in terms of quality of solutions. Connections to some other well-known problems will be investigated.

2) withdrawn 10/8: An Optimal Repair Sequence for Clusters, ***Fahad S. Alrakabi***, University of Southern California, 333 San Marcos St., Apt. X, San Gabriel, CA 91776, alrakabi@usc.edu, ***James E. Moore, III***

3) A Constructive Heuristic for the Flowshop Problem with Blocking in Process, ***Debora P. Ronconi***, Universidade de Sao Paulo, A. Prof. Almeida Prado 128, Sao Paulo, SP, 05508-900, Brazil, dronconi@usp.br

We present a new heuristic for the flowshop makespan problem with blocking in process. Scheduling problems with blocking arise in serial manufacturing processes where no intermediate buffer storage is available. This heuristic is based on a property that provides a lower bound for the makespan. Computational tests are reported.

4) Xpress-Mosel: An Extensible Environment for Modeling & Programming Solutions, ***Yves Colombani***, Dash Optimization, Blisworth House, Blisworth, Northants, NN7 3BX, UK, yves.colombani@dashoptimization.com, wwww.dashoptimization.com, ***Susanne Heipcke***

We introduce a new environment for modeling and solving problems. The system comes as a set of libraries or a standalone program and includes a language that is both a modeling and a programming language, combining the strengths of the 2 concepts.

TC13 Interior Point & Kernel Methods

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Theodore B. Trafalis, Oklahoma University, Coll. of Eng. Carson Eng. Ctr., 202 West Boyd, Norman, OK 73019, ttrafalis@ou.edu

1) Efficient SVM Training using Interior-Point Methods with Low-Rank Factorization, ***Katya Scheinberg***, IBM TJ Watson Research Center, Yorktown Heights, NY 10598, katyas@watson.ibm.com, ***Shai Fine***

SVM training is a CQP problem scaling with training set size-n rather than dimension-k. Low-rank factorization reduces per-iteration complexity of IPMs to O(nk*2). Sometimes k ~ n. Often, one can approximate the training set by a low-dimensional training set. We provide an efficient algorithm for finding such set and bound the approximation error.

2) An Analytic Center Machine, ***Theodore B. Trafalis***, Oklahoma University, Coll. of Eng. Carson Eng. Ctr., 202 West Boyd, Norman, OK 73019, ttrafalis@ou.edu, ***Alexander Malyscheff***

The SVM solution corresponds to the center of the largest hypersphere inscribed in the version space. We propose an algorithm that finds the hypothesis that corresponds to the analytic center of the version space. Preliminary experimental results are presented for which ACMs outperform SVMs.

3) An Analytic Center Machine for Pattern Classification, ***Alexander Malyscheff***, University of Oklahoma, Sch. of IE, 202 West Boyd, Rm. 124, Norman, OK 73019, alexm@ou.edu, ***Theodore B. Trafalis***

The optimal SVM solution corresponds to the computation of the Chebyshev center. We propose an algorithm for regression analysis that finds the hypothesis that corresponds to the analytic center of the version space. Preliminary results indicate that a higher level of generalization accuracy can be achieved by this regression estimator.

TC14 Applications of Optimization in Finance

Cluster: Linear & Conic Linear Optimization
Invited Session

Chair: Dimitris Bertsimas, MIT, Sloan Sch. of Mgmt., Rm. E53-363, Cambridge, MA 02139, dbertsim@mit.edu

1) Optimization of Worst-Case Value-at-Risk, ***Laurent El Ghaoui***, University of California, Dept. of EECS, 262M Cory Hall, Berkeley, CA 94720, elghaoui@eecs.berkeley.edu, ***F. Oustry***, ***M. Oks***

We consider the problems of computing and optimiziang the worst-case VaR of a portfolio when the distribution of returns is only partially known, i.e., only bounds on the mean and covariance matrix are available. We show that these problems can be cast as semi-definite programs.

2) Risk Estimation in Optimal Dynamic Hedges, ***Yuji Yamada***, California Institute of Technology, Control & Dynamical Systems, MC 107-81, Pasadena, CA 91125, yuji@cds.caltech.edu

A standard optimal dynamic hedging strategy is to minimize the variance of the hedging error with a 0 mean constraint. However, this criterion does not incorporate additional information such as higher order moments and as a result, unexpected risk may arise. We characterize the wealth balance (hedging error) distribution through its moments. We show that these moments can be obtained efficiently through a backward recursion calculation...

3) Option Pricing without Price Dynamics, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., Rm. E53-363, Cambridge, MA 02139, dbertsim@mit.edu, ***Natasha Busheva***

Using convex optimization techniques, we find best possible bounds for pricing European and American options given prices of other options of different maturities and different strikes under general price dynamics.

TC15 Optimization Techniques VII

Contributed Session

Chair: Shona D. Morgan, North Carolina A&T State University, Sch. of Bus. & Economics, 1601 East Market St., Greensboro, NC 27411, smorgan@ncat.edu, skdavids@eos.ncsu.edu

1) Algorithms for the Model Configuration Problem, ***Shona D. Morgan***, North Carolina A&T State University, Sch. of Bus. & Economics, 1601 East Market St., Greensboro, NC 27411, smorgan@ncat.edu, skdavids@eos.ncsu.edu, ***Yahya Fathi***

We describe the switching cabinet production environment and define the q-model configuration problem in this context. We present an exact procedure for solving the 1-model problem and propose several heuristic procedures for the 2-model problem. Results of a computational experiment are also presented.

2) Fragment DNA Assembly using a Constructive Genetic Algorithm, ***Geraldo Ribeiro Filho***, Universidade de Mogi das Cruzes, Av Francisco Rodrigues Filho, 399, Mogi das Cruzes SP, 08773-380, Brazil, geraldorf@uol.com.br, www.ccet.umc.br/~geraldo, ***Luiz Antonio N. Lorena***

Fragment assembly is the problem of assembly DNA sequence fragments from a parent clone whose sequence is unknown, into a consensus sequence. The related permutation problem is considered using the constructive GA. An initial schemata population evolves to near optimal individuals using a 2-swap heuristic. Computational results are given.

TC16 Flexible Servers in Manufacturing

Sponsored Session

Chair: Hyun-Soo Ahn, University of California, Dept. of IE/OR, 4185 Etchevery Hall, Berkeley, CA 94530, ahn@ieor.berkeley.edu

1) A Fluid Model Approach to Scheduling Systems with Flexible Servers, ***Sigrun Andradottir***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, sa@isye.gatech.edu, ***Hayriye Ayhan***, ***Douglas G. Down***

The problem of maximizing throughput in a general queueing network is examined using associated fluid limit models. The solution involves a related

linear program that not only provides the value of the maximal throughput but gives guidance in constructing policies for the original queueing network. In particular, we show how generalized round robin policies may be constructed using these guidelines.

2) The Optimal Scheduling of a Multi-Class Queueing System with Parallel Servers, ***Hyun-Soo Ahn***, University of California, Dept. of IE/OR, 4185 Etchevery Hall, Berkeley, CA 94530, ahn@ieor.berkeley.edu, ***Izak Duenyas***, ***Rachel Q. Zhang***

We consider the dynamic scheduling of a multi-class queueing system with multiple servers. The objective is to minimize the total holding costs incurred until all jobs in the system are processed. We show that the optimal policy can exhibit one of 3 possible structures and characterize the necessary and sufficient conditions under which each policy will be optimal.

3) Expected Makspan Minimization on Identical Machines in Two Interconnected Queues, ***Tara Javidi***, University of Michigan, taraj@eecs.umich.edu, ***Nah-Oak Song***, ***Demosthenis Teneketzis***

We study the scheduling of jobs in a system of 2 interconnected service stations, Q1 and Q2, on multiple identical machines available in parallel so that every machine can process any jobs in Q1 or Q2. Preemption is allowed. Under certain conditions on the arrival, service and interconnection processes, we determine a scheduling policy that minimizes the expected makespan.

4) The Optimal Control of a Two-Stage Tandem Queue with Dynamic Arrivals, ***Mark E. Lewis***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, melewis@engin.umich.edu, ***Hyun-Soo Ahn***, ***Izak Duenyas***

We consider a 2-stage tandem queueing system with flexible servers. The objective is to minimize the expected average costs. We show that the condition under which the stationary optimal policy exists. We characterize the structure of optimal policies and investigate the value of flexible workforce.

TC17 Advances in Factory Layouts

Chair: Saif Benjaafar, University of Minnesota, Dept. of Mech. Eng., Minneapolis, MN 55455, saif@me.umn.edu

1) Factory Organization & Layout for Stochastic Environments, ***Suzanne Marcotte***, Universite Laval, Centor Research Ctr., Quebec, Quebec, Canada, suzanne.marcotte@centor.ulaval.ca, ***Benoit Montreuil***

Considering the need to address stochastic environments for facilities layout, design methodologies are proposed for holographic factory organizations and distributed layouts. These methodologies organize the plant around multiple copies of flexible cells that are strategically spread around the factory. We empirically compare alternative design methodologies.

2) A New Robustness Measure & its Use in Optimal Block Layout, ***Alice E. Smith***, Auburn University, Dept. of IE, 207 Dunstan Hall, Auburn, AL 36849-5346, aesmith@eng.auburn.edu, ***Bryan A. Norman***

We present a formulation of optimal block layout that considers uncertainty in material handling costs using expected values and standard deviations of product forecasts. Designs are optimized directly for robustness over a range of uncertainty pre-specified by the user. This formulation offers an alternative to previous stochastic layout formulations that are based on discrete scenario probabilities.

3) Design of Dynamic Distributed Layouts, ***Maher Lahmar***, University of Minnesota, Dept. of Mech. Eng., Minneapolis, MN 55455, maher@me.umn.edu, ***Saif Benjaafar***

We present a procedure for design of distributed layouts in a multi-period setting with stochastic demand and relayout. We allow for multiple copies (sub-departments) of the same department type to be placed in non-adjoining locations and let flow allocation among department duplicates to be made as a function of the layout and the demand realization.

TC18 Location Analysis IV

Sponsor: SOLA
Sponsored Session

Chair: H. A. Eiselt, University of New Brunswick, Fac. of Admin., Fredericton, NB, E3B 5A3, Canada, haeiselt@unb.ca

1) A Hybrid Coverage Model for Accessing Public Transportation Service Provision, ***Alan Murray***, Ohio State University, Dept. of Geography, 1036 Derby Hall, Columbus, OH 43210-1361, murray.308@osu.edu

A hybrid coverage model is developed for strategically evaluating public transportation service provision. This model extends the more common notion of service access typically utilized in public transit analysis. We discuss the use and integration of this model in a GIS environment as a strategic planning tool.

2) Locating Distribution Centers for Viking Freight, ***Joy Bhadury***, California State University, Sch. of Business & Economics, Dept. of Mgmt. & Finance, Hayward, CA 94542, jbhadury@csuhayward.edu

We will discus a project that was undertaken to help Viking Freight (a FedEx company) find optimal locations for its distribution centers in the San Francisco bay area. We will discuss the modeling, solution approaches proposed and implementation details.

3) withdrawn 10/9: Interpreting Variations of the Demand Space on the Demand Covering Models, ***Maria Dimopoulou***, Athens University of Economics & Business, dimop@aueb.gr, ***Ioannis Giannikos***

4) Locating Landfills in the Plane, ***H. A. Eiselt***, University of New Brunswick, Fac. of Admin., Fredericton, NB, E3B 5A3, Canada, haeiselt@unb.ca

Siting sanitary landfills is a task that involves multiple stakeholders. The proposed model incorporates transportation costs and the deterioration of property values. Given existing garbage-generating towns of different sizes in the plane, the model optimizes the locations of the landfills under different pricing schemes and money transfer systems.

TC19 Order Promising & Order Fulfillment

Sponsor: Logistics
Sponsored Session

Chair: Chien-Yu Chen, University of Maryland, Smith Sch. of Bus., College Park, MD, cchen@rhsmith.umd.edu

Co-Chair: Michael O. Ball, University of Maryland, Decision & It, Smith Sch. of Business, College Park, MD 20742-1815, mball@rhsmith.umd.edu

1) Optimal Inventory-Backorder Tradeoff in an Assemble-to-Order System with Random Leadtimes, ***Yingdong Lu***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10549, yingdong@us.ibm.com, ***Jing-Sheng Song***, ***David D. Yao***

We study optimal inventory-budget allocation to minimize average customer-backorders in an assemble-to-order system with random lead-times and multiple demand types. We develop both qualitative and algorithmic results and provide extensive numerical examples.

2) Decision Models to Support Delivery-Date Commitment, ***Anant Balakrishnan***, Pennsylvania State University, 303 Beam Bldg., University Park, PA 16802-1913, anantb@psu.edu, ***Hari Natarajan***

As customers demand responsive fulfillment, real-time available-to-promise capabilities have become critical. Motivated by a problem facing a commercial-pipe manufacturer, we present a hierarchy of delivery-date commitment models that integrate the sales and production planning functions of a manufacturing firm, develop an embedded optimization problem to support delivery commitment and discuss our implementation and results.

3) Quantity & Due Data Quoting Available-to-Promise, ***Chien-Yu Chen***, University of Maryland, Smith Sch. of Bus., College Park, MD, cchen@rhsmith.umd.edu, ***Zhenying Zhao***, ***Michael O. Ball***

The pull-based ATP function directly links resources, including material and capacity, with customer orders. We describe a mixed integer programming model for a quantity and due date quoting ATP mechanism. The model takes into account a variety of supply chain constraints, such as material compatibility and substitution preferences.

TC20 Learning, Incentive & Knowledge: The Organization & Incentive System of the Firm

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session

Chair: Juliana Hsuan Mikkola, Copenhagen Business School, Dept. of IE & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, jh.ivs@cbs.dk

1) Organization, Learning & Entrepreneurship, ***Mans J. Molin***, Copenhagen Business School, Dept. of IE & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, mm.ivs@cbs.dk

The relations and tensions between organization and learning and how they are depicted in the tradition of organizational learning will be disentangled. This discussion will then lead to the question of entrepreneurship, both as drawn from this discussion but also applied to the discussion as a way to gain new

insights in organizational learning.

2) Dynamics of Organizational Knowledge Transfer, ***Dana Minbaeva***, Copenhagen Business School, International Econ. & Mgmt., Howitzvej 60, Frederiksberg, DK-2000, Denmark, dm.int.@cbs.dk

We offer a typology of organizational knowledge transfer from MNCs' HQs to their overseas subsidiaries. The findings emphasize the importance of HRM practices in bringing organizational knowledge overseas and assume that there are different HRM practices to be employed at different stages of knowledge transfer.

3) Organizational Learning in R&D Intensive Environments: Contributing Processes & Mechanisms, ***Bo Eriksen***, University of Southern Denmark, Dept. of Mgmt., 55 Campusjev, Odense, DK-5230, Denmark, bo@sam.sdu.dk

We analyze alternative strategies that sourcing R&D knowledge have on organizational learning. We distinguish between internal and external strategies for sourcing knowledge. Balancing internal and external knowledge sourcing and maintaining a sufficient level of diversity in knowledge sourcing strategies is a critical requirement for learning.

4) withdrawn 10/15: The Importance of Sectoral Differences in the Application of Complementary HRM Practices for Innovation Performance, ***Keld Laursen***, Copenhagen Business School, Indust. Economics & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, kl.ivs@cbs.dk

TC21 Remanufacturing Strategy: Managing the Competition

Cluster: Manufacturing Strategy
Invited Session
Chair: Geraldo Ferrer, University of North Carolina, Kenan-Flagler Business Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490, ferrerg@bschool.unc.edu

1) OEM Incentives under Remanufacturing Competition, ***Harry Groenevelt***, University of Rochester, Simon Sch. of Business, Rochester, NY 14627, groenevelt@simon.rochester.edu, ***Pranab Majumder***

We look at OEM incentives when faced with competition from local remanufacturers. Under different market conditions, e.g., imperfect competition, perfect competition, etc., we characterize a Nash equilibrium solution to competitive models and present the incentives of both players. This allows us to prescribe strategies for the players in the game.

2) Competitive Advantages through Interference on the Secondary Market of Used Durable Goods, ***Hans Sebastian Heese***, University of North Carolina, Kenan-Flagler Business Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490, heeseh@bschool.unc.edu, ***Kyle D. Cattani***, ***Geraldo Ferrer***, ***Wendell G. Gilland***, ***Aleda V. Roth***

In the absence of efficient secondary markets, a manufacturer of used durable goods can gain competitive advantages on the primary market of new products by establishing and supporting a closed channel for the return of used products. A model is developed to determine optimal policies for different conditions.

3) Marketability & Competition of Remanufactured Products, ***Geraldo Ferrer***, University of North Carolina, Kenan-Flagler Business Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490, ferrerg@bschool.unc.edu, ***Jayashankar Swaminathan***

We examine a 2-period competition where a new product is offered in the first period. A second player joins the game in the second period offering a remanufactured alternative to compete with products offered by the OEM. We examine practical variations of this problem and discuss managerial insights.

4) Yield Information in Multi-Component Remanufacturing, ***Michael Ketzenberg***, George Mason University, 4400 University Dr., Fairfax, VA 22030-4444, mketzenberg@som.gmu.edu, ***Geraldo Ferrer***

We evaluate the operation of a remanufacturer that produces complex items made of several components. The decision to remanufacture or to purchase each component new is examined. The process is subject to recovery yield and we explore the value of yield information.

TC22 Supply Chain Scheduling

Cluster: Supply Chain Management
Invited Session
Chair: Nicholas G. Hall, Ohio State University, Dept. of MS, 2100 Neil Ave., Columbus, OH 43210-1144, hall.33@osu.edu

1) A Survey of Results on Integrated Scheduling of Job Processing & Job Delivery, ***Zhi-Long Chen***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu

We review results on scheduling models that integrate job processing operations with job delivery operations. Problem solvability and solution algorithms for various models studied in the literature will be reviewed.

2) Designing a Supply Network with Many Practical Constraints, ***Lei Lei***, Rutgers University, Grad. Sch. of Mgmt. & RUTCOR, PO Box 5062, New Brunswick, NJ 08903-5062, llei@andromeda.rutgers.edu, ***Andrzej Ruszczynski***, ***Shuguang Liu***, ***Hua Zhong***

We study the problem of designing a complex supply network after 2 companies merge. An aggregate LP model is proposed to determine the optimal flow through the network and an approximation model is developed for the vehicle routing to minimize the costs under many practical constraints.

3) Supply Chain Scheduling, ***Nicholas G. Hall***, Ohio State University, Dept. of MS, 2100 Neil Ave., Columbus, OH 43210-1144, hall.33@osu.edu

We motivate and review the literature of coordinated decision making in operational planning, which has become known as "supply chain scheduling." The style of the talk is tutorial to assist researchers who wish to initiate work in this area.

TC23 Information & Collaboration in the Supply Chain

Cluster: Supply Chain & E-Market Optimization
Invited Session
Chair: Reha Uzsoy, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907-1287, uzsoy@ecn.purdue.edu

1) Quantifying the Value of Information & Information Sharing in a Supply Cnain: Naive Inventory Policies & Information Delay, ***Heung-Kyu Kim***, Purdue University, Sch. of IE, West Lafayette, IN 47907, kim77@ecn.purdue.edu, ***Jennifer K. Ryan***

We consider the value of information sharing in a simple supply chain under naive assumptions about the demand process and information delay. We quantify the cost to each participant in the supply chain for information sharing with some delay vs. no information sharing and correct vs. incorrect assumptions about demand.

2) Compact Nonlinear Capacity Models for Supply Chains, ***Jakob Asmundsson***, Purdue University, Sch. of IE, Grissom Hall, West Lafayette, IN 47907, asmundss@purdue.edu, ***Reha Uzsoy***, ***Ronald L. Rardin***

An essential component of a high-level dynamic modeling environment for supply chains is a compact description of the individual links. This representation needs to capture the nonlinear relationship between workload, lead-time and capacity in a tractable way. We present a methodology that captures this relationship in a mathematical program.

3) Real-Time Order Promising, ***Scott A. Moses***, University of Oklahoma, 202 West Boyd St., Room 124, Norman, OK 73019, moses@ou.edu

Meeting due dates is an important scheduling objective, but little prior research has considered how to actually assign due dates. We present a highly scalable computational approach for dynamic real-time promising by discrete build-to-order environments. We focus on techniques for rapidly assessing time-phased resource availability.

4) Setting Forecasts & Initial Order Quantities for Newly Identified Service Parts, ***David Simchi-Levi***, MIT, 77 Massachusetts Ave., Rm. 1-171, Cambridge, MA 02139, dslevi@mit.edu, ***Jeffrey Tew***, ***Yao Zhao***

A key challenge faced by General Motor, Service Parts Operations is generating forecasts and initial order quantities for newly identified service parts. Since these parts do not have historical data, standard forecasting methods cannot be applied. We develop a new method based on product classification and compare the effectiveness of our forecast using historical data.

5) An Agency Model of Buyer-Supplier Design/Production Effort, ***Ananth V. Iyer***, Purdue University, Krannert Sch. of Mgmt., 1310 Krannert Bldg., West Lafayette, IN 47907, aiyer@mgmt.purdue.edu, ***Leroy B. Schwarz***, ***Stefanos Zenios***

We consider a principal agent model of buyerÙsupplier effort in the product and

process design and production of product when supplier capability is private information. We focus on the difference between black box designs and glass box designs which differ in which the extent of the buyer

TC24 Supply Chain Management VI

Contributed Session

Chair: Fernando G. Bernstein, Duke University, Fuqua Sch. of Bus., 1 Towerview Dr., Durham, NC 27708, fernando@mail.duke.edu, www.fuqua.duke.edu/faculty/alpha/fernando.htm

1) Decentralized Supply Chains with Competing Retailers under Demand Uncertainty, ***Fernando G. Bernstein***, Duke University, Fuqua Sch. of Bus., 1 Towerview Dr., Durham, NC 27708, fernando@mail.duke.edu, www.fuqua.duke.edu/faculty/alpha/fernando.htm, ***Awi Federgrun***

We analyze the equilibrium behavior of decentralized supply chains with competing retailers under demand uncertainty. We investigate the specification of contracts that allow the decentralized chain achieve aggregate chain-wide maximum profits and analyze the impact various exogenous system parameters have on the equilibrium decisions and expected profits of the firms.

2) Supply Chain Coordination under Random Yield & Uncertain Demand, ***Charles X. Wang***, Syracuse University, Sch. of Mgmt., Syracuse, NY 13210, xwang05@syr.edu

We consider a supply chain composed of a single retailer and a single manufacturer facing random yield and uncertain demand. Under the manufacturer's stochastically proportional random yield, we analyze the supply chain's performance and discuss the enforceable mechanism to coordinate the supply chain.

3) Inventory Management for a Two-Echelon Recoverable Item System, ***Paul L. Ewing***, Colorado School of Mines, 24107 Deer Valley Rd., Golden, CO 80401, ewing41@hotmail.com

We apply optimal inventory policies through the use of simulation and mathematical modeling for a large computer company's service parts logistics system. We use a multi-echelon inventory model for the repairable parts problem based on the Sherbrooke's METRIC model.

4) withdrawn 9/24: The Design of Agile Supply Chains, ***Hulya Yazici***, University of Wisconsin, 418G Wimberly Hall, 1725 State St., La Crosse, WI 54601, yazici.huly@uwlax.edu

5) An Inventory Model with Two Suppliers under Yield Uncertainty, ***Murat Fadiloglu***, Bilkent University, Dept. of IE, Ankara, 06533, Turkey, mmurat@bilkent.edu.tr, www.ie.bilkent.edu.tr/~mmurat/, ***Emre Berk***, ***Cagri Gurbuz***

A single item inventory model with 1 retailer and 2 suppliers is considered. The retailer does not receive all the quantity ordered. It is assumed that a random fraction of the lot size is actually delivered by the suppliers. The model is constructed assuming both binomial yield and stochastically proportional yield. In the model, the demand rate is constant, the replenishment is instantaneous and backordering is allowed...

TC25 Production & Scheduling IV

Contributed Session

Chair: Arisa Kosadat, Texas Technical University, Dept. of IE, Lubbock, TX 79409, akosadat@ttacs.ttu.edu

1) A Joint Economic Lot-Size Model with a Backordering Policy, ***Arisa Kosadat***, Texas Technical University, Dept. of IE, Lubbock, TX 79409, akosadat@ttacs.ttu.edu, ***Surya D. Liman***

The joint economic lot-size (JELS) model has been found to be more economical than the traditional EOQ/EPQ model. The cost can be further reduced when the supply is in sub-batches of uniform size. We present a JELS model that allows backordering and supply in sub-batches of uniform size.

2) Multi-Stage Scheduling with Non-Regular Criteria: Problems, Complexity, Heuristics, ***Frank Werner***, Otto von Guericke University, Faculty of Mathematics, PSF 4120, Magdeburg, 39106, Germany, frank.werner@mathematik.uni-magdeburg.de, ***Volker Lauff***

We discuss several extensions of single-stage scheduling with common due date and non-regular criteria to the multi-stage case. Several heuristics for flow shop problems with arbitrary total earliness-tardiness penalties are presented and compared. For problems with additional intermediate storage costs between the operations, we give complexity results and some basic properties.

3) withdrawn 10/9: Efficient Scheduling of Personnel Review Meetings in a Consulting Firm, ***Robert M. Saltzman***, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132, saltzman@sfsu.edu, ***Jennifer L. Meyer***

4) Network Decomposition-Based Lower & Upper Bounds for the Decrete Time-Cost Tradeoff Problem, ***Can Akkan***, Koc University, Rumelifeneri Yolu, Sariyer, Istanbul, 80910, Turkey, cakkan@ku.edu.tr, ***Andreas Drexl***, ***Alf Kimms***

For the discrete time-cost tradeoff problem where the objective is to minimize total cost given a project deadline, we present an algorithm to calculate lower and upper bounds using column generation. The algorithm is based on partitioning the network. Computational study demonstrates that tight bounds are obtained in short run-time for hard instances.

TC27 Hunters & Killers

Sponsor: MAS

Sponsored Session

Chair: John P. Ballenger, Raytheon Missile Systems, Huntsville, AL

1) Determining a Basis of Comparison between Hunters & Killers, ***John P. Ballenger***, Raytheon Missile Systems, Huntsville, AL

In an information age, hunters are anticipated to play an increasingly important role on the battlefield; however, the field commander has typically opted for a force that is heavily killer weighted in the past. Given constrained budgets, valid questions arise concerning what is the proper mix of hunters and killers, or more specifically, how do we compare the value of a hunter with that of a killer...

2) Attrition Modeling of Hunters & Killers, ***Bruce W. Fowler***, US Army Aviation & Missile Command, Aviation Missile RD & Eng. Ctr, Advanced Systems Directorate, Redstone Arsenal, AL 35898

The classic problem considered in attrition rate theories, e.g., Lanchester theory, uses localized target acquisition and fire assignment. We examine the dynamics of hunter-killer attrition and develop estimates of attrition rate coefficients.

TC28 Tutorial: Decision Making with Dependence & Feedback - The Analytic Network Process

Cluster: Decision Making Theory & Applications: AHP/ANP

Invited Session

Chair: Thomas L. Saaty, University of Pittsburgh, Pittsburgh, PA 15213, saaty@katz.pitt.edu

1) Tutorial: Decision Making with Dependence & Feedback - The Analytic Network Process, ***Thomas L. Saaty***, University of Pittsburgh, Pittsburgh, PA 15213, saaty@katz.pitt.edu

The ANP for decision making with dependence and feedback and its software, Super Decisions, are a new and general way to make complex decisions. The ratio scale measurement used in the ANP and the AHP, also developed by Saaty, will be shown to be well-validated in several examples of estimating the market share of well-known products. How to make more complex decisions in economic, social and political areas will be the central topic...

TC29 The Interface of Simulation & Statistics

Sponsor: QSR/Simulation

Sponsored Session

Chair: Barry L. Nelson, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd. Rm. C250, Evanston, IL 60208-3119, nelsonb@iems.nwu.edu, www.iems.nwu.edu/~nelsonb

1) Exploring Agent-Based Simulations: Simple Models, Complex Analyses, ***Susan M. Sanchez***, Naval Postgraduate School, OR Dept., 723 Glasgow Hall, Monterey, CA 93943-5219, ssanchez@nps.navy.mil, ***Tom Lucas***

In agent-based simulations, multiple entities sense and stochastically respond to local conditions in their environment, mimicking complex large-scale system behavior with high-level interactions. We examine adaptive sequential approaches for identifying robust decision factor settings. Examples are drawn from a suite of test problems and military agent-based models.

2) A Wavelet-Based Procedure for Process Fault Detection, ***Emily K. Lada***, North Carolina State University, Grad. Program in OR, CB 7913, Raleigh, NC 27695-7913, eklada@eos.ncsu.edu, ***J.-C. Lu***, ***James R. Wilson***

To detect faults in a time-dependent semiconductor manufacturing process, we develop a wavelet-based procedure for comparing a set of in-control runs vs. data from a new run using a variant of a 2-sample Hotelling's T-squared statistic with "inverse jackknifing." A Monte Carlo study illustrates the procedure's

general effectiveness.

3) Regurgitated Variance Estimators for Simulations, ***David Goldsman***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu, ***Seong-Hee Kim***, ***Barry L. Nelson***

We report on new estimators for the variance parameter of a steady-state simulation process. The trick is to see what happens when we combine multiple estimators from the same data set, the only difference among the estimators being the batch size. We find that the resulting regurgitated estimators are shown to have smaller bias and variance than their non-regurgitated contemporaries.

TC30 Analysis of Management & Organizational Factors

Sponsor: Decision Analysis
Sponsored Session
Chair: Vicki Bier, University of Wisconsin, 1513 University Ave., Madison, WI 53706, bier@engr.wisc.edu

1) Using Strategic Reference Points in Developing Models of the Enterprise, ***Robert F. Bordley***, General Motors, Renaissance Center, MC 482-D20-B24, PO Box 100, Detroit, MI 48265-1000, robert.bordley@gm.com

No abstract supplied.

2) A Dynamic Approach to Organizational Fit & Performance, ***Richard M. Burton***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, rmb2@duke.edu, ***Borge Obel***, ***Michael Roach***

Quantitative and qualitative public data on US bank holding companies are used as input for an expert system to identify organizational misfits. Longitudinal techniques are applied to explore the dynamic relationship between misfits and performance. We argue that organizations should reduce all misfits to realize improvements in performance.

3) Influences of Management & Organizational Factors on Risk, ***Vicki Bier***, University of Wisconsin, 1513 University Ave., Madison, WI 53706, bier@engr.wisc.edu

Management and organization have significant effects on risk. There is no one "correct" management style or structure. Rather, key aspects of an organization should match the environment and be internally consistent. Understanding this issue is a challenging research agenda at the interface of engineering and social science.

4) withdrawn 10/10: A Framework for Organizational Risk Analysis, ***Gregg Courand***, Synergia LLC, 2400 Broadway, Ste. 203, Reswood City, CA 94063, courand@synergia.com, ***Michael R. Fehling***

TC31 Theory of Hints & Belief Functions

Cluster: Belief Functions: Advances & Applications
Invited Session
Chair: Paul-Andre Monney, University of Fribourg, Dept. of Quantitative Econ., Ave. de Beauregard 11, Fribourg, CH-1700, Switzerland, paul-andre.monney@unifr.ch

1) Belief Functions & Hints, ***Norbert Lehmann***, University of Fribourg, Dept. of Informatics DIUF, Rue Faucigny 2, Fribourg, CH-1700, Switzerland, norbert.lehmann@unifr.ch

It will be shown that the theory of hints is closely related to the Dempster-Shafer theory. The main difference is that the theory of hints incorporates a symbolic part that is missing in the Dempster-Shafer theory. Nevertheless, for every hint, a corresponding mass function can easily be constructed.

2) Probabilistic Argumentation Systems: Viewing the Theory of Hints from a More Practical Perspective, ***Rolf Haenni***, University of California, Comp. Sci. Dept., 4532 Boelter Hall, Los Angeles, CA 90095, rolf.haenni@gmx.net

PASs provide an intuitive and natural approach to non-monotonic reasoning under uncertainty. Their underlying concept is closely related to the theory of hints. The basic idea is to find and evaluate arguments in favor and against certain hypotheses.

TC32 Tutorial: An Introduction to OR/MS & Financial Engineering

Invited Session
Chair: John R. Birge, Northwestern University, jrbirge@northwestern.edu

1) Tutorial: An Introduction to OR/MS & Financial Engineering, ***John R. Birge***, Northwestern University, jrbirge@northwestern.edu

TC33 Health Care Performance Measurement & Reporting using DEA

Cluster: Data Envelopment Analysis
Sponsor: Health Applications
Sponsor/Invited Session
Chair: H. David Sherman, Northeastern University, 404 Hayden Hall, Boston, MA 02115, h.sherman@neu.edu

1) Sensitivity Analysis of Nursing Unit Efficiency, ***Dianne Jewell***, Virginia Commonwealth University, Dept. of Physical Therapy, PO Box 980224, Richmond, VA 23298-0224, djewell@hsc.vcu.edu, ***Marie Gerardo***, ***Yasar A. Ozcan***, ***Barbara Mark***

We utilize DEA to examine data that a hospital could use to determine nursing unit efficiency. Eight models were evaluated. Results demonstrate that routinely collected data can be used to evaluate nursing unit efficiency. We make suggestions on robustness of the models based on alternative outputs and inputs. suggestions on robustness of the models based on alternative outputs and inputs.

2) Hospital Performance Reporting: Seeking More Comprehensive Measures, ***Kimberly L. McGarvey***, Pennsylvania Health Care Cost Containment Council, Managed Care/Financial Report, kmcgarvey@phc4.org, ***Tracy Spangler***

DEA is used to examine hospital performance beyond basic financial and operational ratios. The way DEA was applied its relationship to other data already reported on hospitals and the current and future benefits of this type of analysis will be presented.

3) Benchmarking Physicians to Reduce Health Care Costs: Empirical Evaluation of Multi-Stage DEA to Identify/Adopt High Quality Low Cost, ***H. David Sherman***, Northeastern University, 404 Hayden Hall, Boston, MA 02115, h.sherman@neu.edu

Multi-stage DEA is applied to an HMO (1 million members, 3000 physicians) to locate high quality-low cost physicians. Information on patient severity, case mix, quality of care and resource use are incorporated to seek a comprehensive measure of physician practice patterns and to identify high quality-low cost patterns. DEA findings are compared with methods currently used to evaluate and reward physician performance.

TC34 Transportation III

Contributed Session
Chair: Yuen-fan Tang, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, 99903588r@polyu.edu.hk

1) withdrawn 10/10: Short-Term Prediction of Annual Average Daily Traffic in Hong Kong, ***Yuen-fan Tang***, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, 99903588r@polyu.edu.hk, ***William H. K. Lam***

2) Solving the Regional LTL Linehaul Problem, ***Robert W. Haessler***, University of Michigan, 701 Tappan, Ann Arbor, MI 48109-1234, robertwh@umich.edu, rwhcorp.com

We describe a new heuristic procedure for solving the linehaul problem for a regional less-than-truckload carrier. A sample problem for a midwest LTL firm with 15 terminals is presented along with a solution generated by the new procedure. The results provide a 5% reduction in both the number of drivers needed and the miles traveled.

3) A New Hybrid Heuristic for the Vehicle Routing Problem, ***Prem K. Viswanathan***, Indian Institute of Management Calcutta, c/o Fellow Program Office, Joka, Diamond Harbor Rd., Kolkata, West Bengal, 700-104, India, vpremk@hotmail.com, ***Manabendra N. Pal***

We propose a hybrid scheme that utilizes the geometric properties of the customer locations in a VRP and captures the essence of the 2 classes of heuristics, savings and petal based procedures, to obtain fast and accurate solutions. The algorithm has shown promising results on certain benchmark problems.

4) Heuristics for the Inventory Routing Problem, ***Marta Cabo***, University of Southampton, Fac. of Math Studies, Highfield, Southampton, SO17 1BJ, UK, m.cabo@maths.soton.ac.uk, ***Chris N. Potts***

We study the IRP of scheduling and routing a number of vehicles to deliver sufficient quantities of a product to meet the given demand of a set of spatially dispersed customers over several time periods. This model allows the possibility of selecting, for each customer, frequent deliveries with small quantities or less

frequent deliveries with larger quantities...

TC35 Transportation V

Contributed Session

Chair: Larry J. LeBlanc, Vanderbilt University, Owen Grad. Sch. of Mgmt., 401 21st Ave. South, Nashville, TN 37203-9865, larry.leblanc@owen.vanderbilt.edu

1) An Application of a Micro Genetic Algorithm to Generate Optimum Traffic Progression Routes on Congested Intersection Networks, ***Montty Girianna***, University of Illinois, 106 Newmark Civil Eng. Lab., 205 North Mathews Ave., Urbana, IL 61801, girianna@uiuc.edu

We present an algorithm to identify the set of traffic progression routes and choose the best ones for congested intersection networks. In this algorithm, signal coordination is formulated as a dynamic optimization problem. The problem is solved using a micro GA. This type of GA provides a continuation of solution improvement with only a modest population size and overcomes the drawback encountered by the standard simple GA...

2) Robust Ranking of Customers in Flight-Bookings, ***Staffan Ringbom***, Swedish School of Economics & Business Administration, PO Box 479, Helinski, 00101, Finland, staffan.ringbom@shh.fi

A higher ranking of tickets with more favorable in comparison to less favorable refundability options is guaranteed with a price premium dependent on the relation between the expected marginal revenues and the marginal increases in variance of the showups. The ranking is independent of the demand and the booking strategy.

3) Using VBA in Excel to Graph a Network, ***Larry J. LeBlanc***, Vanderbilt University, Owen Grad. Sch. of Mgmt., 401 21st Ave. South, Nashville, TN 37203-9865, larry.leblanc@owen.vanderbilt.edu

I show how to graph a network's nodes and links using VBA. Using coordinates of each node i, they are graphed as a text box containing the number i. Links are drawn as lines between their 2 corresponding nodes. This can display the chosen network at each iteration of an overall algorithm.

4) Business Operations Centers for Letter Mail Logistics, ***Hans-Jurgen Sebastian***, Aachen Institute of Technology, Weisenweg 36A, Aachen, 52072, Germany, sebasti@or.rwth-aachen.de

In the transportation logistics and telecommunication area, large enterprises started to develop their BOCs. These centers typically perform the following functions: performance measurement and optimization of the networks, real -time monitoring and control of processes, customer care and marketing. We present a case study of the Deutsche Post BOC.

TC36 Robust Airline Schedule Planning

Sponsor: Aviation Applications/TSS

Sponsored Session

Chair: Cynthia Barnhart, MIT, 77 Massachusetts Ave., Rm. 1-229, Cambridge, MA 02139, cbarnhar@mit.edu

1) Robust Fleet Assignment with Short Cycles & Hub Isolation, ***Jay Rosenberger***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 20332, jrosenbe@isye.gatech.edu

Airline decision makers cancel flights in operations because of disruptions. When canceling a flight, they usually cancel a cycle, a sequence of flights that begins and ends at the same airport. Consequently, a fleet assignment and aircraft rotation with many short cycles is frequently less sensitive to a flight cancellation than one with only a few short cycles. We present a robust fleet assignment model that embeds many short cycles within a solution.

2) Robust Crew Scheduling: Move-Up Crews, ***Sergei Chebalov***, University of Illinois, Dept. of Math., chebalov@math.uiuc.edu, ***Diego Klabjan***, ***Ladislav Lettovsky***, ***Ellis L. Johnson***

Due to the flight disruptions in operations, the crew scheduling cost at the end of a month is substantially higher than the projected cost in planning. We present a model and solution methodologies that produce more robust crew schedules in planning. Besides the objective of minimizing the cost, we introduce the objective of maximizing the number of move-up crews...

3) Scheduling Robustness to Minimize the Effects of Service Disruptions, ***Massimo Morin***, MIT, 77 Massachusetts Ave., Rm. 35-220, Cambridge, MA 02139, mmorin@mit.edu, ***John-Paul Clarke***

The airline irregular operation problem has many components, one of the most important being the accommodation of passengers affected by service disruptions. We will review the problem and the approaches used thus far to solve it. We will then define 2 customer centered schedule performance metrics, coverage and robustness, present analysis of the schedule of a major carrier...

4) Robust Fleet Assignment under Demand Uncertainty, ***Shan Lan***, MIT, 77 Massachusetts Ave., Rm. 1-229, Cambridge, MA 02139, slan@mit.edu, ***Cynthia Barnhart***

Without considering variations in demands and passenger loads when fleeting and scheduling flight legs, airlines are unable to manage spill or predict turn times accurately, resulting in decreased profits and schedule reliability. We describe a modeling framework and solution approach to determine robust fleet assignments under varying passenger demands and loads and present results using data from a U.S. airline.

TC37 Auctions & Pricing

Sponsor: E-Business

Sponsored Session

Chair: G. Anandalingam, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Rm. 293, Philadelphia, PA 19104-6315, anand@seas.upenn.edu, anand@rhsmith.umd.edu

1) A Primal-Dual Algorithm for Winner Determination in Combinatorial Auctions, ***Roy Kwon***, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, rkwon@seas.upenn.edu, ***G. Anandalingam***, ***Lyle Ungar***

In combinatorial auctions, bidders value combinations of goods, the auctioneer prices items individually and allocates items to maximize revenue when combinatorial bids are made. Winner determination is an NP-hard problem. We present an approximate primal-dual algorithm that has features that can be used for efficient market design for combinatorial auctions.

2) Joint Optimization of Pricing & Routing in Multi-Service Networks, ***Debasis Mitra***, Bell Laboratories, Lucent Technologies, Murray Hill, NJ 07974, ***K. G. Ramakrishnan***, ***Qiong Wang***

We consider a fixed network that offers multiple services with different price elasticities and quality of service requirements. The revenue maximization model jointly optimizes pricing and route selection. We prove that link shadow costs provide the basis for optimal pricing and routing and study the impact of a number of parameters on the results.

3) Efficiency Gains in Communications Networks with Two-Part Pricing, ***Neil Keon***, SMU, Cox Sch. of Bus., Dallas, TX 75275

In real-time 2-part pricing in telecommunications, the fixed component accelerates investment payback the variable component either adjusts the fee charged for a given volume of traffic or adjusts the traffic served for a given fee. We will examine the efficiency gains of such 2-part pricing and present analytical and numerical results.

TC38 Stochastic Models in Revenue Management

Sponsor: Applied Probability

Sponsored Session

Chair: Constantinos Maglaras, Columbia University, 409 Uris Hall, 3022 Broadway, New York, NY 10027, c.maglaras@columbia.edu

Co-Chair: Assaf J. Zeevi, Stanford University, Info. Systems Lab, Ee Packard Bldg., Rm. 251, Stanford, CA 94305-9510, assaf@isl.stanford.edu

1) Rental Systems with Reservations: The Value of Advance Information, ***Sergei Savin***, Columbia University, 404 Uris Hall, 3022 Broadway, New York, NY 10027, svs30@columbia.edu, ***Ben Wang***

We analyze a problem of allocating fixed rental capacity between 2 different customer classes in the presence of a reservation system. We assume that while class 1 customers use reservations, those belonging to class 2 use rental system on a "walk-in" basis. We formulate capacity allocation model as a problem in admission control to the queueing loss system and study the performance of several heuristic capacity allocation policies.

2) The Two-Leg Airline Revenue Management Problem, ***William L. Cooper***, University of Minnesota, 111 Church St., Minneapolis, MN 55455, billcoop@me.umn.edu

Recently, a number of researchers have studied Markov decision process formulations for single-leg revenue management problems. However, little attention has been given to such methods for problems with multiple flight legs, in part because MDP formulations become computationally intractable. We analyze a two-leg revenue management problem within the MDP modeling framework...

3) Revenue Management as a Diffusion Control Problem, ***Martin I. Reiman***, Bell Labs., 600 Mountain Ave., Rm. 2C-315,

Murray Hill, NJ 07974-0636, marty@research.bell-labs.com

We consider a single flight revenue management problem with Poisson booking requests carrying random fares. The optimal control has a threshold (bid price) form. Under the appropriate scaling, which includes the number of seats growing large, this gives rise to a diffusion process with a controlled drift.

4) Dynamic Pricing of Web-Based Services: Approximate Analysis & Scaling Relations, ***Constantinos Maglaras***, Columbia University, 409 Uris Hall, 3022 Broadway, New York, NY 10027, c. maglaras@columbia.edu, ***Assaf J. Zeevi***

We consider a model in which customers access web-services via the Internet. Exploiting natural scaling relations that are intrinsic to high-capacity systems with many users, we develop approximations that are used to study optimal pricing policies, as well as system externality costs due to service degradation.

TC39 Software Demonstration VII

Chair: To be announced

1) Software Demonstration: Optimizing University & Corporate Training Course Schedules, ***Gary M. Thompson***, SchedulExpert, Inc., 117 Oak Hill Rd., Ithaca, NY 14850, gmt1@schedulexpert.com

SchedulExpert, Inc. sells software for optimizing course schedules in post-secondary and large-scale corporate training environments. Both products generate conflict-free schedules, have user-friendly GUIs, incorporate numerous constraints and preferences and allow users to set the relative priority of 10+ objectives. Details and trial software are available at schedulexpert.com.

2) Software Demonstration: New Interactive Operations Management Modules, ***Dick Hercher***, McGraw-Hill/Irwin, 1333 Burr Ridge Pkwy., Burr Ridge, IL 60521, dick_hercher@mcgraw-hill.com

McGraw-Hill is including Java applet modules on selected operations management and OR text CDs and web sites. Developed by Accelet Corp. and McGraw-Hill, the new interactive operations management modules are of 3 types: interactive graphs, model simulations and interactive algorithms. Samples of applets for transportation, forecasting, linear programming and other topics will be demonstrated.

TC40 DEA

Contributed Session

Chair: Nicole Adler, Northwestern University, Dept. of IEMS, 2145 Sheridan Rd., Evanston, IL 60208, msnic@mscc.huji.ac.il, http://pluto.huji.ac.il/~msnic/adler.htm

1) A GoDEA Approach for Modeling Undesirable Outputs in the Measurement of Efficiency, ***Kalyan Pasupathy***, Virginia Tech., 500 Roosevelt Blvd., #128, Falls Church, VA 22043, kalyan@vt.edu, ***Kostas Triantis***

We present a DEA approach for considering both desirable and undesirable outputs. In the course of addressing these problems, a decision maker encounters conflicting objectives with respect to the output set. This motivates the use of goal programming in conjunction with DEA, a concept known as GoDEA.

2) Performance in Social Services: A Three-Stage DEA Approach, ***Alexandra Medina-Borja***, Virginia Tech/American Red Cross, 500 North Roosevelt Blvd., Apt. 125, Falls Church, VA 22044, nmedina@vt.edu, ***Kostas Triantis***

An adaptation of the DEA formulation to social service organizations is presented. The new formulation incorporates the concepts of capacity building, technical efficiency, service quality and effectiveness or outcome achievement in a 3-stage approach. Its use as a benchmarking tool permits the evaluation of performance on different critical fronts.

3) Including Principal Component Weights to Improve Discrimination in DEA, ***Nicole Adler***, Northwestern University, Dept. of IEMS, 2145 Sheridan Rd., Evanston, IL 60208, msnic@mscc.huji.ac.il, http://pluto.huji.ac.il/~msnic/adler.htm, ***Boaz Golany***

We further develop the combined use of principal component analysis (PCA) and DEA. The aim is to reduce the lack of discriminatory power that occurs in DEA when there are an excessive number of inputs and outputs in relation to the number of decision-making units. Three separate PCA-DEA formulations are developed...

4) An Analysis of Performance Measures for Case Management Operations at the Worker's Compensation Board, ***Kevin B. Tang***, University of British Columbia, Ctr. for Ops. Excellence, 2053 Main Mall, #209, Vancouver, BC, V6T 2G9, Canada, ktang@coe.ubc.ca, http://www.coe.ubc.ca, ***Jason Goto***, ***David W. Glenn***

Compensation Services manages return to work, wage loss, pension and health-care benefits to injured workers and those suffering from occupational diseases. Multivariate and DEA are used to determine the relationships between existing performance measures, quantify factors influencing these performance measures and determine relative efficiencies across case management operations.

TC41 Supply Chain Challenges in IBM

Cluster: Unsolved OR Problems in Industry
Invited Session

Chair: Brian T. Eck, IBM Integrated Supply Chain, Rte. 52, Hopewell Junction, NY 12533, brianeck@us.ibm.com

1) Supply Chain Challenges in IBM, ***Brian T. Eck***, IBM Integrated Supply Chain, Rte. 52, Hopewell Junction, NY 12533, brianeck@us.ibm.com

Consider a global, multi-plant manufacturer that produces some of its tier-two and/or tier-three supply, but for which tier one supply is outsourced. What level of control in demand/supply planning optimizes results in this setting? What approaches to integrating and synchronizing such a supply chain are the most effective?

TC42 Open Source Software II

Cluster: Open Source Software
Invited Session

Chair: Robin Lougee-Heimer, IBM TJ Watson Research Center, Math Sciences Dept., PO Box 218, Yorktown Heights, NY 10598, robinlh@us.ibm.com

1) dylp: A Dynamic Simplex Implementation, ***Lou Hafer***, Simon Fraser University, Sch. of Comp. Science, Burnaby, BC, V5A 1S6, Canada, lou@cs.sfu.ca

dylp implements a dynamic simplex algorithm. Dynamic simplex alternates between primal and dual simplex, with addition and deletion of constraints and variables between simplex phases. We will provide computational results, i.e., Netlib, MIPLIB, etc., and discuss advantages and disadvantages of the algorithm and implementation.

2) A Parallel Pivot-Based Heuristic for General 0-1 Mixed Integer Programming, ***Mikhail Nediak***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, msnediak@rutcor.rutgers.edu, ***Jonathan Eckstein***

Our MIP heuristic combines cutting plane techniques with pivots and "probes" that locally minimize a concave integrality merit function. We discuss extending the OSI interface to make the heuristic independent of the LP solver, while maintaining control over individual pivots. We also discuss computational results and opportunities for parallelism.

3) Implementing Lift & Project Cuts in the COIN-OR Cut Generator Library, ***Matthew J. Saltzman***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, mjs@clemson.edu, ***Robin Lougee-Heimer***

Convexification theories support derivation of a general class of valid inequalities for MIPs. We describe an implementation of the so-called lift-and-project cuts in the open-source COIN-OR Cut Generator Library. The code is available for testing, application, and enhancement by the computational optimization community at http://www.coin-or.org.

TC43 Education II

Contributed Session

Chair: John A. Lawrence, California State University, Dept. of IS & Dec. Sci., Fullerton, CA 92834, jlawrence@fullerton.edu

1) E-Courses in Management Science & Statistics, ***John A. Lawrence***, California State University, Dept. of IS & Dec. Sci., Fullerton, CA 92834, jlawrence@fullerton.edu

Momentum has been building in all sectors of academia to offer more and more courses on the web. But what form should they take? Are they successful? How are they done? A look at what has been tried by the author and others will be discussed.

2) Factors Related to Success in an OR Major, ***Leonard J. Kelly***, RPI, 2 Cranwood Rd., Ledyard, CT 06339, kellyl@rh.edu

We assess the extent and manner in which input variables, including high school rank, high school class size, verbal and math SAT/ACT scores, and performance in the first year calculus course, are related to performance in an undergraduate OR major. Output measures utilized are GPA and attainment of

the OR degree.

3) withdrawn 10/2: Spreadsheets & MS/OR Tools: A Reflective Analysis, 1985-2000, ***Zbigniew H. Przasnyski***, Loyola Marymount University, 7900 Loyola Blvd., Los Angeles, CA 90045, zprzasny@lmu.edu, ***Linda A. Leon***, ***Kala C. Seal***

4) Web-Based Course Enhancement, ***Judith A. Barlow***, Florida Institute of Technology, 150 West University Blvd., Melbourne, FL 32901, jbarlow@fit.edu, http://winnie.fit.edu/~jbarlow, ***David D. Hott***

Web-based courseware designed to support distance learning can enhance traditional classroom-based courses. Web tools can improve communication between professor and students as well as document student participation and contribution to class discussions and group projects. We present some obvious and not-so-obvious benefits web-based tools offer even traditional campus-based courses.

TC44 Combinatorial Auction Designs

Sponsor: Computing Society
Sponsored Session

Chair: Karla Hoffman, George Mason University, Systems Eng. & OR Dept., 4400 University Dr., MS 4A6, Fairfax, VA 22030, khoffman@gmu.edu

1) A Survey of Combinatorial Auction Designs, ***Karla Hoffman***, George Mason University, Systems Eng. & OR Dept., 4400 University Dr., MS 4A6, Fairfax, VA 22030, khoffman@gmu.edu, ***Melissa Dunford***, ***Rudy Sultana***

The Federal Communications Commission (FCC) auctions spectrum for various telecommunication uses. This agency is planning its first combinatorial (package-bidding) auction of spectrum. We provide an overview of auction theory, review literature pertaining to multi-round package-bidding designs and outline various rules that must be specified for a complete auction design.

2) BidBots: A Test Support Environment for Combinatorial Auctions, ***Martin Durbin***, Decisive Analytics Corp., 1235 Jefferson Davis Hwy, Ste. 400, Arlington, VA 22202, ***Dinesh Menon***, ***Tom Wilson***

Software bidding agents have been developed for testing large combinatorial auctions by employing various strategies such as straightforward and parking. We discusses the current design and capabilities of these agents as well as outline the future development and use of agents in testing combinatorial auctions.

3) Crossing the Threshold to Large-Scale Combinatorial Auctions, ***Melissa Dunford***, Decisive Analytics Corp., 1235 Jefferson Davis Hwy, Ste. 400, Arlington, VA 22202, ***Martin Durbin***, ***Dinesh Menon***, ***Rudy Sultana***, ***Tom Wilson***, ***Karla Hoffman***

The development of automated bidding agents allows testing of different combinatorial auction designs to gain insights into scalability issues. We will present a series of test results focusing on the impact of auction rules on run-time and efficiency, as well as computational results of the CPLEX MIP solver.

TC45 Manufacturing III

Contributed Session

Chair: Ali Yalcin, University of South Florida, 4202 East Fowler Ave., ENB 118, Tampa, FL 33620-5350, ayalcin@eng.usf.edu

1) A Heuristic Algorithm for Manufacturing Cell Formation with Fixed Cell Cost, ***Mingyuan M. Chen***, Concordia University, Dept. of MIE, 1455 de Maisonneuve West, Montreal, Quebec, H3G 1M8, Canada, mychen@me.concordia.ca

A MIP model is developed to formulate a cell formation problem considering fixed cell cost. The model determines the number of cells and the formation of the cells. A Lagrangian relaxation-based algorithm is developed to solve the model. Numerical examples are provided.

2) The Distributed Multi-Bay Manufacturing Facility Layout Problem, ***Ignacio Castillo***, University of Alberta, Sch. of Bus., Edmonton, Alberta, T6G 2R6, Canada, ignacio.castillo@ualberta.ca, ***Brett Peters***

We will introduce the distributed multi-bay manufacturing facility layout problem and its mathematical properties. Alternative solution methodologies will be compared on a suite of test problems.

3) Detection of Partial Deadlocks in Flexible Manufacturing Cells, ***Ali Yalcin***, University of South Florida, 4202 East Fowler Ave., ENB 118, Tampa, FL 33620-5350, ayalcin@eng.usf.edu

Polynomial complexity algorithms are used for detection of partial deadlocks in manufacturing cells. These algorithms require the calculation of strongly connected components in the di-graph model of the system considered. We present an algorithm with linear complexity that detects the presence of partial deadlocks in a given state of the system based on a di-graph model.

TC46 Simulation II

Contributed Session

Chair: Andrew J. Siprelle, Simulation Dynamics, 416 High St., Maryville, TN 37804, siprelle@simulationdynamics.com, www.simulationdynamics.com

1) Simulating Supply Chain Networks: A Case Study on Full Truckloads & Performance Assessment, ***Andrew J. Siprelle***, Simulation Dynamics, 416 High St., Maryville, TN 37804, siprelle@simulationdynamics.com, www.simulationdynamics.com, ***David J. Parsons***, ***Richard A. Phelps***

The following case study shows how supply chain modeling can provide a range of performance assessment metrics to respond to the varying needs and perspectives within the customer organization and the specific dictates of a typical and well-known problem.

2) Delta is Improving Airport Design using Simulation, ***Cenk Tunasar***, TransSolutions, 14600 Trinity Blvd., Ste. 200, Ft. Worth, TX 76155, ctunasar@transsolutions.com, ***Suna Hafizogullari***, ***Prathi Chinnusamy***, ***Eric V. Deines***, ***Gloria G. Bender***

We discuss the application of simulation to evaluate passenger and baggage flow through airport terminals. Delta Air Lines is in the process of renovating their terminal facilities at JFK International Airport. We have developed a large-scale simulation model to assist the design team in choosing the best terminal design and operational policies that meet Delta's performance objectives...

3) A Tolerance Synthesis Model in Mechanical Assembly using Taguchi Loss Function, ***Majid Jaraiedi***, West Virginia University, IMSE Dept., PO Box 6070, Morgantown, WV 26506-6070, mjaraied@wvu.edu, ***Wafik H. Iskander***

Taguchi loss function assumes that the cost of deviations from the target is proportional to the amount of deviation. This function can be used to find optimum tolerance for each component to minimize cost. An assembly tolerance synthesis model for equal and unequal tolerance limits is developed.

4) withdrawn 10/12: Simulation Modeling of Concurrent Engineering Processes & Performance, ***Nadia Bhuiyan***, Queen's University, Dunning Hall, 99 University Ave., Kingston, Ontario, K7L 3N6, Canada, nbhuiyan@business.queensu.ca, ***Vince Thomson***, ***Donald Gerwin***

Tuesday 16:00-17:30

TD01 Business & Industry Applications

Contributed Session

Chair: Peter C. Bell, University of Western Ontario, Ivey Sch. of Business, London, Ontario, N6A 3K7, Canada, pbell@ivey.ca

1) Two Ways to Interpret a Pattern Recognition Result, ***Igor D. Mandel***, Acxiom-Sigma Marketing Group, 1850 Winton Rd., Rochester, NY 14618, imande@acxiom.com

Standard error rate estimations and gain chart approaches are considered based on the results of experimental comparison of 10 algorithms of pattern recognition for the solution of the real problem. The serious difference in interpretation of results of those approaches is found and recommendations about business implementation are given.

2) Developing a Global Information Technology Strategy for a Manufacturing Organization: Methodology & Applicatins, ***Indranil R. Bardhan***, University of Texas at Dallas, Sch. of Mgmt., JO43, Richardson, TX 75083, bardhan@utdallas.edu

We present a methodology for developing a global IT strategy for a manufacturing organization. It provides a framework to ensure that IT supports the business strategy and describes an approach to develop IT architecture and investment strategy based on IT guiding principles. A case study from a manufacturing company is presented.

3) Strategic Operations Research & the Edelman Prize Finalist Applications: 1989-1998, ***Peter C. Bell***, University of Western Ontario, Ivey Sch. of Business, London, Ontario, N6A 3K7, Canada, pbell@ivey.ca, ***Chris K. Anderson***

We contacted people who were familiar with all the private sector applications that were Edelman finalists 1989-1998. The post-Edelman history of these applications provides evidence that several applications were more strategic that was originally apparent. We conclude that almost 60% (20 of 34) created a sustainable competitive advantage for their firms and provide examples of strategic OR.

TD02 E-Business & Supply Chain Management

Cluster: OR/MS & the Internet
Invited Session

Chair: Euthemia Stavrulaki, Pennsylvania State University, 311 Beam Bldg., University Park, PA 16802, exs37@psu.edu

1) Retail Banking Distribution Strategy, ***Reynold E. Byers***, University of California, Grad. Sch. of Mgmt., 144 Sea Country Ln., Las Flores, CA 92688, rbyers@uci.edu, ***Phillip J. Lederer***

Technology and competition have given banks more distribution channel choices and unanswered questions. Will branches disappear? Will virtual banks dominate? We model a competitive market for retail banking transactions, allowing banks to choose a mix of distribution channels and customer segments. We show the existence of an equilibrium, despite non-convexities and examine several numerical examples modeled after current distribution strategies.

2) Transparency on Business-to-Business Exchanges, ***Tunay Tunca***, Stanford University, Grad. Sch. of Bus., 518 Memorial Way, Stanford, CA 94305-5015, tunay@stanford.edu

We examine the effect of a B2B exchange on the supply chain purchasing with multiple suppliers. We derive the equilibrium with various modes of bargaining power between partners and different degrees of informational transparency on the exchange and examine the complementarity between different forms of purchasing along the supply chain.

3) Pricing Strategies in E-Business using Multi-Level Security Systems, ***Burak Kazaz***, Loyola University, 25 East Pearson, Ste. 1400, Chicago, IL 60611, bkazaz@luc.edu, ***Nenad Jukic***

Customer segmentation is becoming increasingly important for e-businesses. Companies can use databases with multi-level security systems in order to accomplish such segmentation. We investigate pricing strategies using multi-level security systems for e-businesses.

4) Joint Inventory & Price Optimization for an Electronic Retailer, ***Hemant Bhargava***, Pennsylvania State University, Smeal Coll. of Bus. Admin., 342 Beam Bldg., University Park, PA 16802, hbhargava@computer.org, ***Daewon Sun***, ***Susan H. Xu***

Electronic retailers tend to carry lower inventories, which can reduce carrying costs but also the net demand. We study joint optimization of inventory management and pricing strategies for such retailers, proposing a policy where the retailer offers a lower price for the stock-out period.

TD03 Data Mining & Data Visualization

Cluster: Data Mining
Invited Session

Chair: Ramesh Sharda, Oklahoma State University, Dept. of MS/IS, Coll. of Bus. Admin., Stillwater, OK 74078, sharda@okstate.edu

1) Digging Web for Common Sense: Automated Creation of Organizational Concept Space from the Internet, ***Dmitri Roussinov***, Syracuse University, Sch. of Info. Studies, Syracuse, NY 13244, droussin@syr.edu

Electronic meeting support has been proven to have great impact on productivity of group discussions. Because participants in electronic meetings can generate hundreds of comments in an hour, the task of categorizing and organizing them is very time consuming. Intelligent agents may significantly reduce the cognitive load of meeting participants by automatically organizing documents into clusters, even if manual post-processing still is deemed necessary...

2) Visualizing Trends in Scientific Literature, ***Steven Morris***, Oklahoma State University, Dept. of CEE, Stillwater, OK 74078, samorri@okstate.edu, ***Mark Richardson***

A new software tool allows exploration of document databases of journal abstracts and patents to find time trends indicating research activity and emerging technologies. Documents are mapped as points on a 2-dimensional plane where an interactive visualization system permits exploration of links, document clusters, time trends and other information about the document set.

3) Visualization & the Process of Modeling: A Cognitive-Theoretic View, ***Andrew W. Crapo***, GE Corporate R&D, Niskayuna, NY, crapo@crd.ge.com, ***Laurie B. Waisel***, ***William A. Wallace***, ***Thomas R. Willemain***

We describe the modeling process and, based upon theories of cognition, show how visualization can assist in developing and assessing computational models for large high dimensional datasets. Visualization helps not only to discover the patterns and relationships in data, but also to use newly discovered knowledge to build computational models.

4) Visualization & Test Data Mining, ***Ozgur Turetken***, Temple University, Fox Sch. of Bus./Mgmt MIS Dept, 1810 North 13th, Philadelphia, PA 19122, turetken@temple.edu, ***Ramesh Sharda***

We will discuss the nature of TDM, emphasizing how visualization can support the tasks thereof. The state-of-art in the use of visualization for TDM is elaborated and exemplified by means of a prototype development effort. Consequently, issues that need to be addressed by future research are identified and discussed.

TD04 Auctions & Game Theory

Cluster: Auctions
Invited Session

Chair: Anthony Kwasnica, Pennsylvania State University, 339 Beam Bldg., University Park, PA 16802, kwasnica@psu.edu

1) Simultaneous Ascending Auctions with Privately Known Budget Constraints, ***Giuseppe Lopomo***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708, glopomo@duke.edu, ***Sandro Brusco***

In multiple object simultaneous ascending bid auctions, the possibility that bidders may be budget constrained, no matter how small, shrinks the equilibrium set: equilibria with the highest degrees of competition and equilibria with the highest degrees of collusion disappear. In any equilibrium, some high-budget types mimic the behavior of budget constrained bidders, thus lowering the degree of competition.

2) One Auction or Two? Multi-Unit Sequential Auctions, ***Jane Feng***, Pennsylvania State University, Dept. of MSIS, University Park, PA 16802, jifl@psu.edu

Standard results suggest that the auctioneer will get the same revenue through sequential auctions as through a single auction. We analyze the case where both the auctioneer and the bidders are impatient and find that whether or not to use sequential auctions largely depends on the relationship between the number of items for sale and the number of participating bidders.

3) The Choice of Bid Increments in Ascending Auctions, ***Anthony Kwasnica***, Pennsylvania State University, 339 Beam Bldg., University Park, PA 16802, kwasnica@psu.edu

We examine the strategic choice of bid increments in ascending auctions. Larger increases provide positive externalities to the other bidders. Auctions may be slower than what is optimal, suggesting that the auctioneer may want to impose a minimum bid increment. These results are compared with bid increment choices in experimental auctions.

4) Market Timing in Auctions for Nonhomogeneous Goods, ***Elena Katok***, Pennsylvania State University, Dept. of MSIS, 306 Beam BAB, University Park, PA 16802, ekatok@psu.edu, http://lems.smeal.psu.edu/katok, ***Alvin E. Roth***

Two mechanisms used to sell multiple units are the "Dutch" (descending) and the e-Bay's ascending mechanisms. We compare them in laboratory environments designed to challenge. We find descending mechanism robust, although occasionally the ascending mechanism performs better. We compare the efficiency, seller's revenue and buyer's profit in the two institutions.

TD05 Nonlinear Semi-Definite Programs & Relaxations I

Cluster: Generalized Convexity/Generalized Monotonicity
Invited Session

Chair: Roland W. Freund, Bell Laboratories, 700 Mountain Ave., Rm. 2C-525, Murray Hill, NJ 07974-0636, freund@research.bell-labs.com

1) An Exterior Point Method for Nonlinear Semi-Definite Programs, ***Michael Kocvara***, FA University of Erlangen-Nuremberg, Inst. of Applied Math. II, Martensstrasse 3, Erlangen, D-91058, Germany, kocvara@am.uni-erlangen.de

The penalty barrier multiplier method proved to be a very efficient tool for solving (possibly non-convex) very large-scale NLPs. We will present a generalization of this method to convex and non-convex SDPs and discuss its benefits and drawbacks when compared to interior point methods.

2) Approximating Global Optima of Nonlinear Semi-Definite Programs by Successive Convex Relaxation Method, ***Mituhiro***

Fukuda, Tokyo Institute of Technology, Dept. of Math. & CS, 2-12-1 Oh-Okayama, Meguro-ku, Tokyo, 152-8552, Japan, mituhiro@is.titech.ac.jp, ***Masakazu Kojima***

Recently, Kojima & Tuncel proposed the SCRM for finding the global optima of non-convex quadratic programs. We analyze an extension of this method to nonlinear SDPs. The SCRM can also be embedded in a B&B framework aiming for a better performance.

3) Interior Point-Based Algorithms for Solving Special Nonlinear Semi-Definite Programs, ***Friedemann Leibfritz***, Universitaet Trier, Fachbereich IV Mathematik, Gebaeude E, Trier, 54286, Germany, leibfr@uni-trier.de

We discuss nonlinear SDPs that arise in the design of static output feedback controllers. We then consider interior point-based algorithms for solving such SDPs. The algorithms are designed to take advantage of the special structure of the problems. Finally, we state some convergence results and several numerical examples.

TD06 E-Commerce VI

Contributed Session

Chair: A. D. Amar, Seton Hall University, Sch. of Business, South Orange, NJ 07079, amaramar@shu.edu

1) withdrawn 10/1: Unic: Universal Combinatorial Auction System - Bidding Languages, User Interface for Bid Creation & System Design, ***Elena Katok***, Pennsylvania State University, Dept. of MSIS, 306 Beam BAB, University Park, PA 16802, ekatok@psu.edu, http://lems.smeal.psu.edu/katok

2) Dynamic Pricing with On-the-Fly Demand Forecasting, ***Kyle Lin***, Virginia Tech., Grado Dept. of ISE, Blacksburg, VA 24061, kylin@vt.edu

We consider a dynamic pricing model in which a seller faces a random demand with a known distribution and adopts on-the-fly forecasting of the future demand. With the objective function as the expected revenue, we derive structural properties of the optimal policy and the optimal value function. We also propose heuristic policies, evaluate their performances and discuss the limitations.

3) Product Design Strategies for Cyber Presence, ***A. D. Amar***, Seton Hall University, Sch. of Business, South Orange, NJ 07079, amaramar@shu.edu

The emergence of the Internet has made it essential for all firms to have some presence in the cyber space. Whereas dotcoms specifically design products suitable for e-commerce, other companies mostly struggle. We provide strategies that could be adopted to redesign/reinvent products and services for success in the new medium.

4) Strategies for Effective E-Health: Leverage in the Soft Information Infrastructure, ***Elia V. Chepaitis***, Fairfield University, North Benson Rd., Fairfield, CT 06430, echepaitis@fair1.fairfield.edu, ***Amy E. Chepaitis***

Political, economic and socio-cultural factors within existing brick and mortar health care organizations impede the evolution of robust e-health and of B2B synergies across health care industries. We present 4 revolutionary strategies to create opportunities within soft information infrastructures. These strategies promote quality networked health care, equitable reach and intelligent systems for decision-making.

5) Optimizing Product Location to Streamline Web Site Navigation, ***Suresh K. Nair***, University of Connecticut, Sch. of Bus., Storrs, CT 06269-0241, suresh.nair@uconn.edu, ***Robert I. Chiang***

Many customers routinely find it difficult to locate items they would like to browse or purchase on web sites. Thus, a design mechanism that streamlines site navigation is of interest to researchers and practitioners. There are 2 major issues in web site design. The first is to make aesthetic tradeoffs between having too many items on a page (and resulting clutter) and having many pages to go through (and resulting many clicks)...

TD07 Bilevel Programming II

Cluster: **Bilevel Programming**
Invited Session

Chair: Patrice Marcotte, Universite de Montreal, DIRO, CP 6128, Succ. Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, marcotte@iro.umontreal.ca

1) Strategic Bidding in Wholesale Energy Markets: A Bilevel Programming Approach, ***Marcia Fampa***, Federal University of Rio de Janeiro, COPPE, Av. Eng. Richard 186/302 Graja, Rio de Janeiro, Brazil, fampa@cos.ufrj.br, ***Luiz Augusto Barroso***, ***Carlos Andre dos Santos***

In recent years, the energy industry has shifted from centralized optimization towards market-oriented approaches, which includes bid-based dispatch and spot price payment in a wholesale energy market. In this environment, each generation company must build an optimal bidding strategy, while considering the dynamical behavior of its competitors. The nonlinear problem of determining maximum profit bids in thermal systems can be formulated as a bilevel programming problem...

2) A Trust Region Algorithm for Solving Nonlinear Bilevel Programs, ***Patrice Marcotte***, Universite de Montreal, DIRO, CP 6128, Succ. Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, marcotte@iro.umontreal.ca, ***Benoit Colson***, ***Gilles Savard***

We propose a trust region approach for solving nonlinear bilevel programs where the trust region "model" consists of a linear-quadratic bilevel program. Although nonconvex, the combinatorial structure of the "model" allows to solve it for a global optimum. We discuss the convergence properties of this scheme both for linear and nonlinear lower-level constraints.

3) Sensitivity Analysis for Optimization Problems with Variational Inequality Constraints, ***Jane Ye***, University of Victoria, Dept. of Math. & Stats., PO Box 3045 STN CSC, Victoria, BC, V8W 3P4, Canada, janeye@math.uvic.ca

MPECs constitute a special class of optimization problems in which some or all constraints are defined by a parametric variational inequality. We provide upper estimates for the limiting sub-differential (singular limiting sub-differential) of the value function in terms of the set of normal (abnormal) coderivative multipliers for MPECs...

TD08 Graphs & Geometrical Algorithms for Global Constraints

Cluster: **Constraint Programming**
Invited Session

Chair: Nicolas Beldiceanu, SICS, Lagerhyddsvagen 18, Uppsala, Sweden, nicolas@sics.se

1) withdrawn 10/10: An Overview of Global Constraints in OPL++, ***Pascal Van Hentenryck***, Brown University, Dept. of Comp. Sci., PO Box 1910, Providence, RI 02912, pvh@cs.brown.edu

2) withdrawn 10/10: A Sweep Algorithm for the Cumulative Constraint Family, ***Nicolas Beldiceanu***, SICS, Lagerhyddsvagen 18, Uppsala, Sweden, nicolas@sics.se, ***Mats Carlsson***

3) Matching-Based Tighter Bounds in CP for the Golomb Ruler Problem, ***Philippe Galinier***, Ecole Polytechnique de Montreal, DGI, CP 6079, succ. Center-ville, Montreal, Quebec, H3C 3A7, Canada, philipg@crt.umontreal.ca, ***Brigitte Jaumard***, ***Rodrigo Morales***, ***Gilles Pesant***

A Golomb ruler is a set of integers (called marks) where no two differences between marks are equal. Minimal length GRs have important applications in telecommunication. A redundant constraint on the length of a ruler is proposed, based on the computation of a minimum weight matching in a bipartite graph.

4) withdrawn 10/10: A Non-Overlapping Constraint between Convex Polytopes, ***Nicolas Beldiceanu***, SICS, Lagerhyddsvagen 18, Uppsala, Sweden, nicolas@sics.se, ***Guo Qi***, ***Sven Thiel***

TD09 Tutorial: Fuzzy Dynamic Programming

Invited Session

Chair: Augustine O. Esogbue, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, aesogbue@isye.gatech.edu

1) Tutorial: Fuzzy Dynamic Programming, ***Augustine O. Esogbue***, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, aesogbue@isye.gatech.edu

No abstract supplied.

TD10 New DEA Methods III

Cluster: **Data Envelopment Analysis**
Invited Session

Chair: Zhimin Huang, Adelphi University, Sch. of Bus., Garden City, NY 11554, huang@panther.adelphi.edu

Co-Chair: Susan X. Li, Adelphi University, School of Bus., Garden City, NY 11554, susan@panther.adelphi.edu

1) A DEA Study of Telecommunication Services in OECD Countries, ***Gabriel Tavares***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, gtavares@rutcor.rutgers.edu, ***Carlos H. Antunes***

Several DEA approaches, including reference frequency, cross-efficiency, super-efficiency and level efficiency, are used to evaluate the performance of OECD countries regarding the telecommunication services they provided.

2) Evaluation of the Step Inefficiency Function, ***Hiroshi Morita***, Osaka University, Grad. Sch. of Eng., Suita, Osaka, 565-0871, Japan, morita@ap.eng.osaka-u.ac.jp, ***Ilyes Bellamine***

We discuss the possibility of production process inefficiency estimation and show how a step inefficiency function introduced on an affine system can be reevaluated using the regression analysis and the operational research methods. Finally, we compare briefly our proposed technique to other methods such as DEA, stochastic frontier, etc.

3) withdrawn 10/12: DEA of Closed, Separable Structures, ***David W. Moore***, Colorado School of Mines, Div. of Economics & Bus., 1500 Illinois St., Golden, CO 80401-9952, davidm@ieor.berkeley.edu

4) withdrawn 10/2: Alternative Transformation & Duality of Linear Fractional Programming, ***Greg O'Brien***, La Trobe University, Fac. of Law & Mgmt., Bundoora, 3083, Australia, obrien@latrobe.edu.au, ***Lifen Wu***

TD11 Heuristics for Hard Discrete Optimization Problems

Cluster: **Integer Programming**
Invited Session

Chair: Panos M. Pardalos, University of Florida, ISE Dept., 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, pardalos@ufl.edu

1) Combinatorial Optimization Problems arising in Telecommunications, ***Sergiy Butenko***, University of Florida, Ctr. for Applied Opt., Gainesville, FL, butenko@ufl.edu

New results for the maximum independent set and minimum connected dominating set problems are presented. Their applications in telecommunications are discussed.

2) Reactive GRASP with Path Relinking for Channel Assignments in Mobile Phone Networks, ***Carlos A. S. Oliveira***, University of Florida, Ctr. for Applied Opt., Gainesville, FL, oliveira@ufl.edu

The frequency assignment problem is an NP-hard problem with applications in mobile networks. When the number of available channels is smaller than the number of users, we want to minimize the total system interference. We propose a GRASP with path relinking to solve this problem.

3) withdrawn 9/16: Combinatorial Multi-Level Optimization, ***Olga Perdikaki***, University of Florida, Ctr. for Applied Opt., Gainesville, FL, olgap@ufl.edu

4) A Mixed Integer Approach to Intensity Modulated Radiation Therapy Planning, ***Felisa D. Preciado-Walters***, Purdue University, PO Box 3831, West Lafayette, IN 47996, preciado@ecn.purdue.edu, ***Ronald L. Rardin***, ***Mark Langer***

Cancer treatment through IMRT aims at assigning intensities to beamlets in order to maximize tumor dose, subject to constraints on the radiation affecting surrounding normal tissues. Using an MILP model, a column generation approach is explored to compute solutions within a known tolerance of the optimum.

TD12 Optimization Techniques IV

Contributed Session

Chair: Bob Daniel, Dash Optimization, Blisworth House, Church Lane, Blisworth, Northants, NN7 3BX, UK, bob.daniel@dashoptimization.com, www.dashoptimization.com

1) Applications of Xpress-Mosel, ***Bob Daniel***, Dash Optimization, Blisworth House, Church Ln, Blisworth, Northants, NN7 3BX, UK, bob.daniel@dashoptimization.com, www.dashoptimization.com, ***James Tebboth***

We present various applications of Dash Optimization's new modeling and solving environment Xpress-Mosel, showing its versatility and speed.

2) Randomized Subgradient Methods for the Maximum Feasible Subsystem Problem, ***Edoardo Amaldi***, Politecnico di Milano, DEI, Piazza Leonardo da Vinci 32, Milano, 20133, Italy, amaldi@elet.polimi.it, ***Raphael A. Hauser***

We propose to solve the maximum feasible subsystem problem using randomized and thermal variants of the classic Agmon-Motzkin-Schoenberg relaxation method for solving systems of linear inequalities. We provide an interpretation in terms of randomized subgradient homotopy method and establish sufficient conditions for almost sure converge to an optimal solution within a finite number of iterations...

3) OPTEX: A Rapid Tool for the Development, Management & Use of Large-Scale Mathematical Models, ***Jesus M. Velasquez***, DecisionWare Ltd., Avenida 15 No. 119A-43, Oficina 402, Bogota, Colombia, jvalasquez@decisionware-ltd.com, decisionware-ltd.com

OPTEX is a computer rapid tool oriented to design, manage, use and maintain DSSs that integrates concepts of client/server information systems with large-scale optimization and equilibrium technologies. Conceived under the concepts of object oriented programming, it supports the development of real solutions without the need for large programming labor.

4) withdrawn 10/5: Application of the Neural Network Energy Function in Solving Integer Programs, ***Anulark Techanitisawad***, Asian Institute of Technology, Klong Luang, Patumtani, 12120, Thailand, anulark@ait.ac.th, ***Komgrit Leksakul***

TD13 Applications & Design of New Algorithms

Cluster: **Linear & Conic Linear Optimization**
Invited Session

Chair: Jie Sun, National University of Singapore, Dept. of Dec. Sci., Singapore, 119620, Singapore, jsun@nus.edu.sg

1) The Distribution Network Design Problem: Integrating Transportation & Multi-Echelon Inventory Cost Function, ***Chung Piaw Teo***, National University of Singapore, Dept. of Dec. Sci., Singapore, 119260, Singapore, fbateocp@nus.edu.sg, ***J. Shu***

We study the distribution network design problem with integrated transportation and multi-echelon inventory cost. The problem is where and how many warehouses to locate, which retailer to assign to warehouses and how often reorder while minimizing total costs. A set-partitioning integer-programming model is formulated...

2) Lower & Upper Bounds on Stochastic Earliness & Lateness Penalty, ***B. Chen***, Washington State University, Coll. of Bus., Pullman, WA 99163, chenbi@wsu.edu, ***M. Wang***, ***Jinfeng Yue***

We consider both linear and quadratic penalty functions of a random variable satisfying certain probability distribution function. Upper and lower bounds on the value of the penalty functions as well as the associated minimums are obtained, which are expressed in terms of mean and standard deviation of the distribution function.

3) Interior-Point Algorithms for Inequality Constrained Optimization, ***C.-X. Xu***, Jiaotung University, Sch. of Computing, Singapore, 119260, xucx@comp.nus.edu.sg, ***Phua Kang Hoh***

We propose a feasible trust-region dogleg path algorithm for solving nonlinear inequality constrained optimization. The algorithm is built upon an SQP algorithm, which generates a sequence of feasible points. We show that the proposed algorithm possesses the following properties: globally convergent and 2-step superlinear local convergence under mild conditions.

4) Solving Multistage Stochastic Linear Programs by Scenario Analysis & Infeasible Interior-Point Methods, ***Jie Sun***, National University of Singapore, Dept. of Dec. Sci., Singapore, 119620, Singapore, jsun@nus.edu.sg, ***Xinwei Liu***

Using scenario analysis, a multi-stage stochastic LP is decomposed into a set of scenario decision problems with non-anticipativity constraints. Infeasible IPMs are used to solve the resulting large-scale LP. Complications include rank reduction and computation of search directions that can be generated by solving much smaller dimensional primal-dual equations.

TD15 Optimization Techniques VIII

Contributed Session

Chair: Vladimir I. Tsurkov, Russian Academy of Science, Computing Ctr., 40 Vavilov Str., Moscow, 117967, Russia, tsurkov@ccas.ru

1) An Ant-Bidding Algorithm for the Generalized Flow Shop Scheduling Problem: Optimization & Phase Transitions, ***Alberto V. Donati***, Bios Group, 317 Paseo de Peralta, Santa Fe, NM 87501,

avd@biosgroup.com

The integration of an ant-based algorithm with a bidding-based algorithm is presented and applied to optimize the multi-stage flow-shop scheduling problem of a multi-stage plant. An order parameter is identified and a phase transition is present and is used to both understand the global constraints of the problem and aid in the search for improved (30% better) solutions.

2) Number Partitioning & Rotor Balancing, ***Robert H. Storer***, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18017, rhs2@lehigh.edu

We present new results for algorithms that use embedded number partitioning heuristics to solve sub-problems. We develop algorithms for turbine rotor blade balancing and an aircraft cargo loading problem. We then present algorithm performance results.

3) Problems & Methods in Large-Scale Optimization, ***Vladimir I. Tsurkov***, Russian Academy of Science, Computing Ctr., 40 Vavilov Str., Moscow, 117967, Russia, tsurkov@ccas.ru

This presentation is based on the monograph "Large-Scale Optimization - Problems and Methods," Kluwer Academic publishers, 2001. Exact and approximate aggregations are developed. The method of iterative aggregation is studied. An introduction to block integer programming is considered. Block problems in which the coupling variables do not enter the binding constraints are studied.

4) A New Approach to Pricing American-Style Derivatives, ***Scott B. Laprise***, University of Maryland, 8710 36th Ave., College Park, MD 20740, sbl@math.umd.edu, ***Michael C. Fu***, ***Andrew E. B. Lim***, ***Steven I. Marcus***

By approximating the value function with a piecewise linear interpolation function, the option holder's continuation value can be expressed as a summation of European call option values. Thus, the pricing of an American option written on a single asset can be converted to the pricing of European call options.

TD16 Optimization of Practical Industrial Problems

Sponsor: MSOM
Sponsored Session
Chair: Sanjay Mehrotra, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, mehrotra@iems.nwu.edu

1) The Variable-Sized Bin-Packing Problem from the Steel Industry, ***Milind W. Dawande***, University of Texas at Dallas, Sch. of Mgmt., 2601 North Floyd Rd., Richardson, TX 75083, milind@utdallas.edu, ***Jayant Kalagnanam***, ***Jay Sethuraman***

Motivated by a real problem from the steel industry, we consider the variable sized bin-packing problem from the steel industry. Our results include an asymptotic polynomial time approximation scheme and two 3-approximations.

2) An Optimization Model for Integrated Crew Scheduling & Aircraft Routing, ***Shivaram Subramanian***, United Airlines WHQK, ISD R&D, 1200 East Algonquin Rd., Elk Grove Village, IL 60007, shivaram.subramanian@ual.com, ***Srini Ramaswamy***, ***Rahul Kulkarni***

Reliability and profitability are important goals for an airline. We present a multi-objective optimization model for integrated crew scheduling and aircraft maintenance routing. This model allows the airline to build more cost-effective crew schedules, while also increasing operational reliability and preserving maintenance and aircraft count feasibility

3) Modeling Equipment Selection & Changeover based on Capacity Utilization of Scalable SMT Machines Lines, ***Sanjay Mehrotra***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208, mehrotra@iems.nwu.edu, ***Zhongsheng Hua***, ***Prashant Banerjee***, ***Thomas Tirpak***

We develop a model for a multi-period equipment changeover schedule based on the demand for product families and the capacity utilization of machine lines at Motorola. We describe a solution procedure for this problem, and give computational results for this solution procedure.

TD17 Modeling & analysis of Semiconductor Manufacturing

Sponsor: MSOM
Sponsored Session
Chair: Esma S. Gel, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, esma.gel@asu.edu
Co-Chair: John W. Fowler, Arizona State University, Dept. of Ie, PO Box 5906, Tempe, AZ 85287, john.fowler@asu.edu

1) Planning & Scheduling in Semiconductor Manufacturing Fabs: Stochastic Models & Decision Processes, ***Xiaodong Yao***, University of Maryland, Dept. of DIT, Smith Sch. of Bus., College Park, MD 20742, ***Michael C. Fu***, ***Steven I. Marcus***, ***Emmanuel Fernandez***

In the planning and scheduling of operations in semiconductor manufacturing fabs, there has been relatively little research that takes into account issues like fab life cycle dynamics production planning. We propose finite-horizon transient Markov decision process models to provide decision support on such critical operational issues as capacity planning and allocation and scheduling of preventive maintenance tasks.

2) Scheduling Semiconductor Wafer Fabs with Delayed Precedence Constraints, ***Kasin Oey***, University of Arkansas, Dept. of IE, 4207 Bell Eng. Ctr., Fayetteville, AR 72701, koey@uark.edu, ***Scott J. Mason***

Our primary goal is to develop solution methodologies for scheduling wafer fabrication facilities. We develop a disjunctive graph formulation of a complex job shop problem with extensions such as reentrant flows and batching. We discuss the use of delayed precedence constraints as a means of eliminating infeasible schedules that contain cycles.

3) Heuristic Approaches to Batching Jobs in Printed Circuit Board Assembly, ***Susan K. Norman***, Northern Arizona University, ***Michael Magazine***

The job batching problem partitions a set of jobs into batches in order to minimize total manufacturing time. We have developed 4 heuristic approaches: cluster analysis, best-fit decreasing, sequencing GA and a grouping GA to solve this problem. We compare the performance of these 4 algorithms using an experimental design.

4) Enterprise-Wide Strategic & Logistics Planning for Semiconductor Manufacturing, ***W. Matthew Carlyle***, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, mcarlyle@asu.edu, ***Aditya P. Rastogi***, ***John W. Fowler***

We present a mixed-integer linear programming model for manufacturing, logistics and resource planning decision support in the semiconductor manufacturing industry. We then develop extensions to the model that consider stochastic demands for the various products and present preliminary results indicating the usefulness of these models.

TD18 Location Analysis V

Sponsor: SOLA
Sponsored Session
Chair: Michael P. Johnson, Carnegie Mellon University, Heinz Sch. of PP&M, 2107C Hamburg Hall, Forbes Ave, Pittsburgh, PA 15213-3890, johnson2@andrew.cmu.edu

1) withdrawn 10/12: Location of Multiple-Server Public Facilities for Minimizing Customer Congestion & Travel Costs, ***Vladimir Marianov***, Catholic University of Chile, Dept. of Electrical Eng., Vicuna Mackenna 4860, Santiago, Chile, marianov@ing.puc.cl

2) Facility Location Problems: New Results & Algorithms, ***Yuri Levin***, Rutgers University, RUTCOR, Sch. of Bus., 640 Bartholomew Rd., Piscataway, NJ 08854, ylevin@rutcor.rutgers.edu, ***Adi Ben-Israel***

New results are presented for the Fermat-Weber and location-allocation problems. Solution algorithms are based on the Newton Bracketing method for convex minimization, which uses Newton iterations to improve upper and lower bounds on the minimum value, has a natural stopping rule and is parallelizeable. Applications to other areas are discussed.

3) Location Problems with Uniform Distributed Demands, ***Jiamin Wang***, University of Toronto, Rotman Sch. of Mgt., 105 Saint George St., Toronto, Ontario, M5S 3E6, Canada, wang@rotman.utoronto.ca, ***Oded Berman***

The 1-median and 1-antimedian problems are considered when demand weights at nodes of a network are independent uniform random variables. Connections between the optimal solutions to the problems and their deterministic counterparts are established under specific conditions and 2 different optimization approaches are suggested respectively for networks of distinct scales.

4) Heuristic Solution Methods for Housing Location Models, ***Michael P. Johnson***, Carnegie Mellon University, Heinz Sch. of

PP&M, 2107C Hamburg Hall, Forbes Av, Pittsburgh, PA 15213-3890, johnson2@andrew.cmu.edu

Models have been proposed to enable public housing authorities to choose locations of new project-based subsidized housing, and generate distributions of families using tenant-based housing subsidies. Heuristic methods to solve these multi-objective, integer, nonlinear models are presented, and solutions derived are compared to known solutions generated through IP solvers.

TD19 Logistics of E-Commerce

Sponsor: Logistics
Sponsored Session
Chair: To be announced

1) Supply Chain Management at Amazon.com, ***Raghu Sethuraman***

No abstract supplied.

2) Towards Effective E-Logistics & Fulfillment Strategies: An Exploratory Analysis of On-Line Shoppers, ***Kofi Q. Dadzie***, Georgia State University, Dept. of Mktg., Robinson Coll. of Bus., Atlanta, GA 30303, kdadzie@gus.edu, ***Evelyn Winston***

An exploratory study of e-logistics customer service reveals that some important customer service components have no direct impact on satisfaction levels and repurchase intentions of Internet consumers. Implications for e-logistics and order fulfillment strategies are examined.

3) Current Location Methods & the New Location Criteria: Conflict or Complementarity?, ***Heli Kilpala***, Utah State University, Logan, UT 84322-4110, heli@cc.usu.edu

The demand-pull commerce changes the criteria for locating business entities. Using company interviews and literature examples, the new criteria are discussed. Review on the existing location methods shows that many of the new criteria are difficult to capture with the existing tools.

TD20 Managing R&D Organization: Localization & Internationalization

Sponsor: Mgmt. of Productivity/Technology & Technology Mgmt.
Sponsored Session
Chair: Juliana Hsuan Mikkola, Copenhagen Business School, Dept. of IE & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, jh.ivs@cbs.dk

1) The Overlaying Structures of R&D Organizations, ***Maximilian von Zedtwitz***, IMD International, PO Box 915, Lausanne, CH-1001, Switzerland, zedtwitz@imd.ch

We identify 4 principal overlaying interdependent structures of R&D organization: geographical/legal hierarchical/functional projects/processes and networks. Organizational flexibility and innovative capability are subject to different change drivers in each structure. Managing the design and evolution of structures and its change drivers is important to balance R&D efficiency and effectiveness.

2) Developing Organizational & Technological Capabilities in Cross- Border Strategic Alliances, ***Henrik Sornn-Friese***, Copenhagen Business School, Indust. Economics & Strategy, Howitzvej 60, 5th Fl., Frederiksberg, DK-2000, Denmark, hsf@ivs.cbs.dk

Reporting from a longitudinal case study of a medium-sized logistics company this paper examines the development of organizational and technological capabilities in cross-border alliances and its impact on firm strategy. We identify organizational and technological capabilities as major outcomes of alliances that importantly facilitate strategic change.

3) How Late Mover MNCs Tap into Local R&D Clusters, ***Volker Mahnke***, Copenhagen Business School, Indust. Economics & Strategy, Howitzvej 60, Frederiksberg, DK-2000, Denmark, vm.ivs@cbs.dk, ***Mark Lorenzen***

We analyze how late entrants tap into Denmark's Telecom technology cluster. Expected agglomeration externalities (positive and negative) affect R&D location processes. Ways of dealing with liabilities of foreignness vary with complementary R&D assets, perceived learning intent and technological strength of late entrants.

4) withdrawn 10/10: Entry Mode, Exit Mode & R&D Intensity, ***Lasse B. Lien***, Norwegian School of Economics & Business Administration, Dept. of Strategy & Mgmt., Breiviken 40, Bergen-Sandviken, 5035, Norway, lasse.lien@nhh.no

5) The Evolution of Corporate Technology Diversification: In Search of a Paragigm Change, ***Elena Kosmopoulou***, University of Reading, Dept. of Economics, Whiteknights PO Box 218, Reading, G6 6AA, UK, e.kosmopoulou@reading.ac.uk

We investigate the evolution of corporate technology diversification based on empirical evidence from the world's largest firms from 1969-95. In particular, we explore the rate and direction of change prompted to accommodate for the arrival of the ICT paradigm and the extent to which technologies related to the previously dominant paradigms are supplanted.

TD21 Assessing the Impact of E-Business on Manufacturing Strategy

Cluster: Manufacturing Strategy
Invited Session
Chair: Eve Rosenzweig, University of North Carolina, Kenan-Flagler Bus. Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490, rosenzwe@bschool.unc.edu

1) The Null Effect: The Impact of E-Business on Manufacturing Strategy, ***David M. Dilts***, Vanderbilt University, Owen Grad. Sch. of Mgmt., Nashville, TN 37203, david.dilts@vanderbilt.edu

What has been the impact of e-business on the development, documentation, implementation and performance of manufacturing strategy? Despite all the hyperbolas of the press, the actual impact has been trivial. We will separate fact from media fiction and discuss why so little has changed in strategic manufacturing.

2) The Value of Information in Business-to-Business, ***Anil Khurana***, Teksila Inc., akhurana@tcg-software.com

Contrary to the B2B hype driven by e-bay-type auction models, we assert that B2B relies on 3 key components: information, technology and relationships. We evaluate the business model of a start-up that we call B2B.com. Our analytical framework highlights the role of information content and information process dimensions.

3) Integrating Complementary Supply Chain Resources & Managerial Practices: Theory Development & an Empirical Test, ***Arun Rai***, Georgia State University, E-Commerce Inst., 823 RCB Bldg, Robinson Coll. of Bus., Atlanta, GA 30080, arunrai@gsu.edu, ***Nainika Patnayakuni, Ravi Patnayakuni***

A multi-dimensional construct for SC resource intgration is developed and validated using a sample of manufacturing firms. Performance impacts of SC integration under varying demand conditions and diversification objectives are examined. The reinforcing effects of product design, inter-organizational governance mechanisms and e-coordination capabilities on SC performance are assessed.

4) E-Space Supplier Development: Implications for Manufacturing Strategy, ***Diane H. Parente***, Pennsylvania State University, Sch. of Bus., Erie, PA, dhp3@psu.edu, ***Ray R. Venkataraman, John Fizel, Ido Millet***

Supplier development in a traditionnal B2B environment may be characterized by the knowledge, skills and abilities of the purchasing agents. Web-based reverse auctions are conducted by the purchasing function, bringing both opportunities and risks to the participants. We explore e-space supplier development and the implications for manufacturing strategy.

TD22 Information & Forecasting in Multi-Stage Supply Chains

Cluster: Supply Chain Management
Invited Session
Chair: David W. Glenn, University of British Columbia, Fac. of Commerce & Bus. Admin., 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, david.glenn@commerce.ubc.ca, dglenn@coe.ubc.ca

1) Quantity vs. Price-Based Returns Mechanisms, ***Martin A. Lariviere***, Northwestern University, Kellogg Sch. of Mgmt., Evanston, IL 60208, m-lariviere@kellogg.nwu.edu

It is well known that a partial returns policy based on either quantity or price mechanisms can improve supply chain performance. However, little research has been done on whether one kind of mechanism is preferable to another. We examine this issue when the supply chain must undertake costly forecasting.

2) The Impact of Information Sharing on Forecasting Accuracy in Multi-Stage Supply Chains, ***Yao Zhao***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208, zhaoy@mit.edu, ***David Simchi-Levi***

We consider a multi-stage supply chain facing correlated external demand in which retailers share demand information and inventory policies with their

suppliers. We characterize the impact of information sharing on forecasting accuracy for different chain partners.

3) Asymmetric Demand Information in Supply Chains, ***Beril L. Toktay***, INSEAD, Blvd. de Constance, Fontainebleau Cedex, 77305, France, beril.toktay@insead.fr

We consider a 2-tier supply chain where each party receives a different signal concerning final demand and investigate the impact of this information asymmetry on contract choice.

4) Adaptive Inventory Control in a Two-Tier System, ***David W. Glenn***, University of British Columbia, Fac. of Commerce & Bus. Admin., 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, david.glenn@commerce.ubc.ca, dglenn@coe.ubc.ca, ***Martin L. Puterman***, ***Arnab Bisi***

We model a 2-tier supply chain composed of a single supplier and several retailers, where the underlying probability distribution for demand is unknown. The supplier observes retailer sales and seeks to estimate the joint demand distribution. We analyze optimal ordering policies and examine the effects of various contracting schemes, e.g., buy-back, consignment, etc.

TD23 Optimal Control of Supply Chains

Cluster: Supply Chain & E-Market Optimization
Invited Session
Chair: Jian Yang, NJIT, Dept. of IME, Newark, NJ 07102, yang@adm.njit.edu, http://www-ec.njit.edu/~yang

1) An Optimal Control Policy for Managing Capacity in Service-Oriented Supply Chains, ***Douglas J. Morrice***, University of Texas, Mgmt. Dept., MSIS Dept., CBA 4.202, CBA 5.202, Austin, TX 78712-1175, morrice@mail.utexas.edu, ***Edward G. Anderson***

We study a stochastic production/inventory control problem where the supply of raw material is not reactive to short-term demand patterns and the raw material can be stored for future production. This problem is commonly encountered in firms where production is vertically integrated. We find optimal policies for this problem.

2) Models for Supply Chain Vendor Selection using E-Markets, ***Sanchoy Das***, NJIT, Dept. of IME, Newark, NJ 07102, sanchoy.k.das@njit.edu, ***Hossam Shahin***

E-marketplace supply chains tend to be short-term and with no history. In an e-marketplace, the OEM specifies its requirements and suppliers then submit electronic bids. A large number of combinations are possible from these bids. We present a solution model that considers several bid attributes to prescribe the optimal configuration of vendors.

3) The Dynamics of Market Evolution in the Internet Era, ***Han Zhang***, University of Texas, Dept. of MS/IS, Austin, TX 78712, hanzhang@uts.cc.utexas.edu, ***Sulin Ba***, ***Maxwell Stinchcombe***, ***Andrew B. Whinston***

We use evolutionary game theory to explore the following questions: Under what conditions will people stick to the traditional market and what conditions will electronic transactions as the convention of the future? Of particular interest is the role of "trusted third parties" in reducing asymmetric information in e-commerce.

4) Production/Inventory Control with Exogenous & Storable Supply, ***Jian Yang***, NJIT, Dept. of IME, Newark, NJ 07102, yang@adm.njit.edu, http://www-ec.njit.edu/~yang

We study a stochastic production/inventory control problem where the supply of raw material is not reactive to short-term demand patterns and the raw material can be stored for future production. This problem is commonly encountered in firms where production is vertically integrated. We find optimal policies for this problem.

TD24 Supply Chain Management VII

Contributed Session
Chair: Laoucine Kerbache, HEC School of Management, 1 Boulevard de la Liberation, Jouy-en-Josas Cedex, 78351, France, kerbacke@hec.fr, www.hec.fr

1) Queueing Networks & the Topological Design of Supply Chain Systems, ***Laoucine Kerbache***, HEC School of Management, 1 Boulevard de la Liberation, Jouy-en-Josas Cedex, 78351, France, kerbacke@hec.fr, www.hec.fr, ***J. MacGregor Smith***

Recent trends in globalization have pushed production firms to link their internal processes to external suppliers and customers. The resulting system with its various components and levels (suppliers, manufacturer, warehouses, distributors, retailers and clients) is a very large network of activities and resources. Modeling and optimization of such complex systems is a new area of research where exact analytical results are obviously not possible...

2) Order Coordination in a Decentralized Supply Chain with an Extended (R,T) Policy, ***Joong Y. Son***, University of California, 014 Anderson Hall, AGSM, Riverside, CA 92521, joong.son@ucr.edu, ***Ted D. Klastorin***, ***Kamran Moinzadeh***

We analyze an order coordination scheme in a decentralized 2-echelon supply chain with random demands at retailers. An extended (R, T) policy is proposed to incorporate timing discount mechanism. We demonstrate effectiveness of our scheme and identify settings under which our coordination policy is most beneficial for the stakeholders.

3) GE-NOME: Gaming Environments to Improve Operational Efficiencies, ***Rick Cobello***, GE R&D, 1 Research Circle, Niskayuna, NY 12309, cobello@crd.ge.com

Gaming can provide a rich environment for improving business objectives and engage the user to improve to the next level of business competency. The engagement of the user and design of hybrid interactive gaming environments is critical for improving productivity in business and enhancing interactive business models. We address how gaming can be applied in improving supply chain and business strategies.

TD25 Production & Scheduling V

Contributed Session
Chair: Joao V. Moccellin, University of Sao Paulo, Av. Trabalhador Sao-Carlense, 400, Sao Carlos SP, 13566-590, Brazil, jvmoccel@sc.usp.br

1) Flow-Shop Heuristic Scheduling with Parellel Uniform Processors, ***Joao V. Moccellin***, University of Sao Paulo, Av. Trabalhador Sao-Carlense, 400, Sao Carlos SP, 13566-590, Brazil, jvmoccel@sc.usp.br, ***Marcelo S. Nagano***

We deal with k-stage hybrid flow shop scheduling where, at any stage, there are 2 uniform machines. The performance measure is the make span. We introduce alternative improvement heuristics in order to evaluate the effectiveness of a conditional job-move in the improvement step. Computational results are discussed.

2) Sequencing Mixed-Model Assembly Lines under an Andon System & Variable Work Pacing, ***Timothy J. Flynn***, University of Alabama, PO Box 870223, Tuscaloosa, AL 35487-0223, timjflynn00@aol.com, ***John Mittenthal***

In this job sequencing decision problem, the andon system results in additional constraints linking all workstations. We present the formulation of a mathematical model for this problem. Proofs of dominant sequence characteristics are given. Lower bounds are developed. Heuristic solution methods are discussed.

3) Single Machine Scheduling with a Sum of Linear Job Earliness & Squared Job Tardiness Objective, ***Jeffrey E. Schaller***, Eastern Connecticut State University, 83 Windham St., Willimantic, CT 06226-2295, schallerj@easternct.edu

We consider the problem of scheduling a single machine when the objective uses a linear penalty for jobs that are completed before their due dates and a quadratic penalty for jobs that are tardy. An optimal B&B algorithm is presented as well as an efficient heuristic algorithm.

4) An Efficient Optimal Solution to the Two-Hoist Cyclic Scheduling Problem, ***Yun Jiang***, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, Hong Kong, jiangyun@ust.hk, ***Jiyin Liu***

We address the 2-hoist cyclic scheduling problem with fixed part processing and moving times. A polynomial algorithm is developed to obtain the optimal cycle time. The algorithm searches for the optimal solution by checking the feasibility of some special points and stops when the first feasible solution is found.

TD27 New Analytical Tools for Massive Change in Organizations

Sponsor: MAS
Sponsored Session
Chair: Pauline P. Cason, SAIC, 6725 Odyssey Dr., Huntsville, AL 35806

1) Strategic Mapping: "Let's Determine What's Wrong before We Fix It!", ***Suzanne Stiglets***, SAIC, 6725 Odyssey Dr., Hutsville, AL 35806, ***Johnny Cagle***

In response to a large agency government customer, we developed an approach for rapid evaluation of an organization's strategic health and subsequent rational change management, IT assessment and program management to achieve a 30% or better improvement in cost effectiveness, or in the case of private sector

organizations, improved profit margin. This innovative approach has proven sound and very successful...

2) Cost Review & Evaluation: A Driver for Organizational Change, ***Pauline P. Cason***, SAIC, 6725 Odyssey Dr., Huntsville, AL 35806, ***Lemenuel Vaughan***

In the process of review and evaluation of a large politically sensitive organization's cost estimates, points for organizational improvements began to emerge. What began as an attempt to justify cost numbers for a major project over 20 years became a tool for driving organizational change recommendations.

TD28 Decision Analyses I

Contributed Session

Chair: Ayse Onculer, INSEAD, Boulevard de Constance, Fontainebleau, 77305, France, ayse.onculer@insead.fr

1) withdrawn 10/15: A Rank-Dependent Approach to Risky Intertemporal Choice, ***Ayse Onculer***, INSEAD, Boulevard de Constance, Fontainebleau, 77305, France, ayse.onculer@insead.fr

2) A VBA/EXCEL Scoring Tool for R&D Project Selection, ***Jaclyn D. Tripken***, James Madison University, Coll. of Bus., CIS/OM, MSC 0202, Harrisonburg, VA 22807, ***Anne D. Henriksen***, ***Susan W. Palocsay***

We present a VBA/Excel decision support tool designed to rank R&D projects using a scoring approach that explicitly accounts for tradeoffs between criteria. The decision support tool collects and summarizes data from peer-evaluation questionnaires and then ranks the R&D projects based on algorithms that account for both merit and value.

3) withdrawn 10/9: Multi-Objective Optimization for Improving the Quality of Final Ranking Derived from a Fuzzy Preference Relation, ***Eduardo R. Fernandez***, Autonomous University of Sinaloa, Segunda 2911, Fracc. Isssteesin, Culiacan, Sinaloa, 80020, Mexico, eddyf@uas.uasnet.mx, ***Juan C. Leyva***

4) withdrawn 10/15: Market Designs for Electricity Transmission Networks, ***Maria Martoccia***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, mmartoccia@london.edu

TD29 QSR in Manufacturing Systems

Sponsor: QSR/MSOM

Sponsored Session

Chair: Bruce A. Ankenman, Northwestern University, Dept. of IE, 2145 Sheridan Rd., Evanston, IL 60208, ankenman@iems.northwestern.edu, www.iems.northwestern/~bea

1) Robust Design of a Semi-Conductor Manufacturing Process via Simulation, ***Russell R. Barton***, Pennsylvania State University, Dept. of IME, 207 Hammond Bldg., University Park, PA 16802, rbarton@psu.edu, ***Daniel Finke***, ***Chad Geist***, ***Scott Rosen***, ***Harold Marcus***, ***Inge Marcus***

Burn-in operations in semiconductor manufacturing are the last performance checks before shipping. Manufacturing efficiency depends on the order in which temperatures are cycled and on the availability of ovens and device carriers. Robust process design is examined via sensitivity analysis and metamodeling applied to a discrete-event simulation model.t simulation model.

2) Spare Parts Inventory Management in a Wafer Fabrication Facility, ***Elif Akcali***, Purdue University, Sch. of IE, 1287 Grissom Hall, West Lafayette, IN 47907-1287, akcali@purdue.edu, ***Reha Uzsoy***, ***Tim Teyner***, ***Randall Hamlin***, ***Marty Davis***, ***Tom McCullough***

We examine the problem of managing spare parts inventory for the production equipment in a semiconductor wafer fabrication facility. Demand and cost data are analyzed to determine an appropriate inventory control policy. Computational results are reported.esults are reported.

3) Statistical Process Control in Processes having Automatic Process Control, ***John R. English***, University of Arkansas, Dept. of IE, Fayetteville, AR 72701, jre@uark.edu

We provide a summary of an on-going effort to develop effective statistical process control tools with processes having automatic process control, i.e., the chemical industry. Challenges of correlated data are addressed and discussed in the presentation. Encouraging research results using alternative approaches for statistical process control are collected and described. cribed.

4) New Challenges of Fault Diagnisis in Multi-Stage Manufacturing Processes, ***Yu Ding***, Texas A&M University, Dept. of IE, yuding@engin.umich.edu, ***Darek Ceglarek***, ***Jan Shi***

There are 2 major approaches used in model-based fault diagnosis: pattern recognition and estimation. These have been successfully implemented in many single-station processes. When a multi-stage manufacturing process is studied, can these developed approaches still be applied? What are the challenges brought by the multi-stage process and possible solutions? Using a case of the sheet metal assembly process, we investigate these questions. point the sheet metal assembly process.

TD30 DA Arcade II

Sponsor: Decision Analysis

Sponsored Session

Chair: Dana R. Clyman, University of Virginia, Darden Grad Sch. of Bus. Adm., PO Box 6550, Charlottesville, VA 22906-6550, clymand@darden.virginia.edu

1) withdrawn 10/12: Paradox-Free Decision Modeling, ***Fatma Mili***, Oakland University, mili@oakland.edu

2) A Multi-Objective Decision Analysis Approach to Watershed Management, ***Jason Merrick***, Virginia Commonwealth University, Dept. of Stats Science & OR, 1015 West Main, PO Box 842014, Richmond, VA 23284, jrmerrick@mail1.vcu.edu, ***Gregory S. Parnell***

In an NSF funded project, we integrated the views of diverse watershed stakeholders using multi-objective decision analysis. Each of the stakeholders' beliefs, strategies and goals were brought together under a watershed management framework to meet the overall objective of the project committee: to maximize the quality of the watershed.

3) Using a Bayesian Approach to Quantify Scale Compatibility Bias, ***Richard M. Anderson***, JHU, 3400 North Charles St., 313 Ames Hall, Baltimore, MD 21218, anderson@titan.me.jhu.edu, ***Benjamin F. Hobbs***

We use a Bayesian method to compute probability distributions of attribute weights, assuming that the ratios produced by each respondent's judgments are subject to random error and scale compatibility bias. The bias is found to be significant and in the predicted direction. A heuristic is effective in eliminating the bias.

4) Exploiting Supply & Demand Curves for Decision Analysis, ***Jeffrey Keisler***, University of Massachusetts, 100 Morrissey Blvd., M/5-230, Boston, MA 02125, jeff.keisler@umb.edu

Business strategy decisions can be efficiently modeled using standard microeconomic structures combined with traditional DA. I will briefly discuss motivating examples from practice and specific modeling techniques and challenges.

TD31 Belief Functions & Statistics

Cluster: Belief Functions: Advances & Applications

Invited Session

Chair: Paul-Andre Monney, University of Fribourg, Dept. of Quantitative Econ., Ave. de Beauregard 11, Fribourg, CH-1700, Switzerland, paul-andre.monney@unifr.ch

1) Analyzing Linear Regression Models with the Theory of Hints, ***Paul-Andre Monney***, University of Fribourg, Dept. of Quantitative Econ., Ave. de Beauregard 11, Fribourg, CH-1700, Switzerland, paul-andre.monney@unifr.ch

A functional model assumes the existence of a deterministic relation between the unknown parameter, the observation variable and the random perturbation. Linear regression models are examples of such models. They are analyzed by means of the assumption-based reasoning principle and the results are expressed in terms of hints.

2) Belief Functions in the 21st Century: A Statistical Perspective, ***Arthur P. Dempster***, Harvard University, Dept. of Statistics, Cambridge, MA 02138, dempster@hustat.harvard.edu

Statistics is a "second tier" discipline that links selected mathematical formalisms with almost any science or profession in a unified way. Statistics consists of interlocking technologies: design, data analysis, stochastic modeling, stochastic inference ("p-values"), posterior inference and decision analysis. Belief functions constitute an appropriate methodology for posterior inference, more flexible than its narrower Bayesian special case...

TD32 Facilities Planning & Design

Contributed Session

Chair: Rasaratnam Logendran, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, logendrr@engr.orst.edu

1) Mathematical Modeling Approach for Solving Unequal-Area Facility Layout Problems, ***Rasaratnam Logendran***, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, logendrr@engr.orst.edu, ***Thanat Kriausakul***

We present a mathematical modeling approach for solving unequal-area facility layout problems. The objective function of the model integrates both a distance measure for the transfer of parts between facilities and a similarity measure for the facilities configured in the layout. An example is used to demonstrate the applicability of the proposed approach.

2) withdrawn 10/5: A Layout Technique for the Multiple Floor Layout Problem Considering the Area of an Elevator, ***Takanari Inoue***, Waseda University, Dept. of IMSE, 3-4-1 Ohkubo, Shinjuku, Tokyo, 169-8555, Japan, takanari@yoshi.mgmt.waseda.ac.jp, ***Kazuho K. Yoshimoto***

3) Facility Layout Considering Uncertainty, ***Sadan Kulturel-Konak***, Auburn University, 207 Dunstan Hall, Auburn, AL 36849, sadan@eng.auburn.edu, ***Alice E. Smith***, ***Bryan A. Norman***

A tabu search procedure is developed for optimizing the facility layout problem considering uncertainty. The objective is to design a robust layout that copes with very different scenarios on a continuous scale of uncertainty. The solution procedure is assessed on a variety of test problems from the literature.

4) Further Results on Finite-Size Facility Placement with Barriers to Rectilinear Travel, ***Selcuk Savas***, Koc University, Coll. of Eng., Istanbul, 80910, Turkey, ssavas@ku.edu.tr, http://home.ku.edu.tr/~ssavas/

The placement (location and orientation) of a finite-size facility is considered on the Euclidean plane under the presence of barriers to rectilinear travel. Recent results for arbitrary shaped barriers and facility are exploited to obtain special case results for convex and nonconvex polygonal structures.

5) Optimization Techniques in Wind Power Plant Design, ***Aytun Ozturk***, University of Pittsburgh, 1072 Benedum Hall, Pittsburgh, PA 15261, uoast2@pitt.edu, ***Bryan A. Norman***

Renewable energy technologies such as wind energy are developing rapidly. We consider the problem of optimizing the number and locations of wind generators in a wind power plant for a given wind regime and plant size. We also look at the power distribution cable layout of the plant.

TD33 Logistics IV

Contributed Session

Chair: Ronald G. McGarvey, Pennsylvania State University, 310 Leonhard Bldg., University Park, PA 16802, rgm133@psu.edu

1) The Logistics Network Design Problem: An Application to the Automobile Industry, ***Daeki Kim***, Korea University, 5-1 ga, Anam dong, Sungbuk ku, Seoul, 136-701, Korea, daeki@korea.ac.kr, kuba.korea.ac.kr/~daeki, ***Myungseob Park***, ***Sangbum Seo***, ***Kwangtae Park***

The logistics network design problem considers inventory and transportation costs simultaneously. There are many limitations to apply conventional OR techniques to solve the real-world application, i.e., nonlinear cost functions, huge problem size, stochastic nature of the problem, etc. We suggest a 2-stage algorithm that integrates state-of-the-art optimization and simulation techniques. We present computational results.

2) Aggregation of Demand Points for the Covering Location Model, ***Hulya Emir***, University of Florida, Weil Hall 303, PO Box 116595, Gainesville, FL 32611, hulya@ufl.edu, ***Richard L. Francis***

The covering location problem seeks the minimum number of facilities such that each demand point is within some given radius of its nearest facility. We consider the effect demand point aggregation has on the model error. It is important how one measures infeasibility. We suggest a number of aggregation schemes and compare their performances.

3) Competitive Facility Location on the Line with Elastic Gravity-Based Demand, ***Ronald G. McGarvey***, Pennsylvania State University, 310 Leonhard Bldg., University Park, PA 16802, rgm133@psu.edu, ***Tom M. Cavalier***, ***E. Amine Lehtihet***

A competitive facility location problem occurring on a linear market, with elastic gravity-based demand is studied. A firm with existing facilities wishes to increase its market share. Rather than introducing a fixed number of new facilities, a fixed budget for new facility construction and existing facility improvement is imposed.

4) Inter-Block Crane Deployment in Container Terminals, ***Chung Lun Li***, HKUST, Dept. of IEEM, Clear Water Bay, Kowloon, Hong Kong, lichung@ust.hk, ***Raymond K. Cheung***, ***Wuqin Lin***

We consider the problem of scheduling the movements of cranes in a container storage yard so as to minimize the total unfinished workload at the end of each time period. The problem is formulated as an MILP. A Lagrangian decomposition procedure and a successive piecewise-linear approximation method are developed.

5) Efficient Solution Approaches for a Class of Concave Integer Programs, ***Robert Aboolian***, University of Toronto, Rotman Sch. of Mgmt., 105 Saint George St., Toronto, Ontario, M5S 3E6, Canada, aboolian@rotman.utoronto.ca, ***Oded Berman***, ***Dmitry Krass***

We consider a class of concave integer programming models with a special structure. These models have several applications in discrete location theory. We develop efficient exact and approximate approaches for models of this type. A heuristic with proven worst case bound is also presented.

TD34 Transportation IV

Contributed Session

Chair: Ozlem Ergun, MIT, OR Ctr., 77 Mass Ave., Bldg. E40-130, Cambridge, MA 02139, ozie@mit.edu

1) withdrawn 10/9: Railway Capacity Analysis on the Railtrack ECML Upgrade, ***Nick Marinopoulos***, Railtrack, 5th Floor, Toft Green, York, YO1 6HP, UK, nickmarinopoulos@hotmail.com, ***Craig W. Stewart***

2) The Airport Capacity Allocation Problem: A Dynamic Programming Approach, ***Paolo Dell'Olmo***, University di Roma "La Sapienza", Dip. di Stat. Prob. e SA, Ple. A Moro, Rome, 00185, Italy, paolo.dellolmo@uniroma1.it, ***Guglielmo Lulli***

We describe the airport capacity problem, i.e., the problem of finding the optimal balance between the number of arrivals and departures in order to reduce the total economic loss. We have developed a mathematical model for the strategic version of the airport capacity problem. Furthermore, we have carried out a computational analysis and evaluation of the proposed mathematical model...

3) withdrawn 10/10: Shipment Consolidation under(s, nQ)Inventory Policies, ***Sanne R. Smits***, Technology Management, TM/IDL, Pav E6, Postbus 513, Eindhoven, 5632 MG, The Netherlands, s.r.smits@tm.tue.nl

4) A Very Large-Scale Neighborhood Search Heuristic for the VRP with Capacity & Distance Restrictions, ***Ozlem Ergun***, MIT, OR Ctr., 77 Mass Ave., Bldg. E40-130, Cambridge, MA 02139, ozie@mit.edu, ***James B. Orlin***

VLSN search involves designing large (often exponentially sized) neighborhoods with efficient search techniques. We describe a very large scale neighborhood search heuristic for solving the VRP. We present the results of a computational study where we compare the performance of this technique with other competitive heuristics and B&C algorithms.

TD36 Models to Support Aviation Operations

Sponsor: **Aviation Applications/TSS**

Sponsored Session

Chair: Robert L. Hoffman, Metron Scientific Consulting, 131 Elden St., Herndon, VA, hoff@metsci.com

1) Decision Support Algorithms for the Surface Management System, ***Chris Brinton***, Metron Scientific Consulting, 131 Elden St., Herndon, VA, brinton@metsci.com, ***Stephen Atkins***

Numerous challenges to airport surface management efficiency currently exist, including optimal use of multiple departure runways, and efficient sequencing of departing flights to meet airborne restrictions. We analyze decision support algorithms implemented via discrete network event algorithms and show the potential for significant improvements in both efficiency and flexibility.

2) Integration of Multiple Decision Aids in Air Traffic Management, ***James Kuchar***, MIT, 77 Massachusetts Ave., Rm. 33-305, Cambridge, MA 02139, jkkuchar@mit.edu

As the number and scope of decision-aid systems grow, there is an increasing need to better-integrate these systems to avoid the potential for decision-aid conflicts. I outline the issues behind the potential for conflicting information between multiple decision-aid systems on the ground and in the cockpit, and discuss methods for identifying, modeling and mitigating decision-aid conflicts. discuss methods for identifying, modeling and mitigating decision-aid conflicts.

3) Robust Real-Time Operations Planning, ***John-Paul Clarke***,

MIT, 77 Massachusetts Ave., Rm. 33-314, Cambridge, MA 02139, johnpaul@mit.edu, ***Eric Feron***

We will rely upon previous work in adaptive or parametric optimization and recent advances in robust control system design to present new approaches to real-time operations optimization that minimize the worst case or expected cost of running those operations in the presence of uncertainties.

4) Balancing Airport Arrival & Departure Flows, ***Robert L. Hoffman***, Metron Scientific Consulting, 131 Elden St., Herndon, VA, hoff@metsci.com

Arrival and departure flows at a single are often analyzed and managed separately. In reality, these are related by connecting aircraft. We develop a network flow model and show how this can be used to predict and prevent airport gridlock.

TD37 Models & Methods for Electronic Markets

Sponsor: E-Business
Sponsored Session
Chair: Teodor Gabriel Crainic, University of Montreal, CRT, CP 6128, Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, theo@crt.umontreal.ca

1) Advising Carriers in Electronic Freight Markets, ***Tsung-Sheng Chang***, University of Montreal, CRT, CP 6128, Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, ts@crt.umontreal.ca, ***Teodor Gabriel Crainic***, ***Jawad Abrache***

Electronic bilboards and markets are a major manifestation of e-commerce in the freight industry. Access to these markets may greatly contribute to enhance a carrier's productivity and profitability, if done right. Intelligent advisors may prove the critical factor to achieve these goals.

2) Bundle Trading in Financial Markets, ***Jawad Abrache***, University of Montreal, DIRO & CRT, CP 6128 Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, jawad@iro.umontreal.ca, ***Teodor Gabriel Crainic***, ***Michel Gendreau***

Recent mechanisms in financial markets trade assets in bundles. We propose a new formulation trading that extends previous models by allowing a more detailed portfolio representation and introduces XOR bids for more flexible bidding. We also present a simplex-based discrimination procedure intended to separate "equivalent" orders. Numerical results support the validity of the model and solution method.

3) Design for Optimized Multi-Lateral Multi-Commodity Markets, ***Teodor Gabriel Crainic***, University of Montreal, CRT, CP 6128, Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, theo@crt.umontreal.ca, ***Jacques Robert***, ***Michel Gendreau***

We describe a design for an optimized, centralized, multi-lateral, periodic commodity market. The market allows for several products and grades, combined lots on sale, significant transportation costs, and the need for buyers to combine different grades under technological limitations. We describe the optimization methodology for clearing the market and its implementation in a multi-round atonnement process.

4) Customer Efficiency: The Concept & its Impact on E-Business Management, ***Mei Xue***, University of Pennsylvania, OPIM Dept., Wharton Sch., SH-DH 1347, Philadelphia, PA 19104, xuem@wharton.upenn.edu,http://opim.wharton.upenn.edu/~xuem, ***Patrick T. Harker***

With the development of e-business models, customers now often participate actively in the co-production of service product with the firm, rather than being the passive recipients of the service product. This role transition has many potential impacts on e-business management. We present the concept of customer efficiency and explore its potential impact on e-business management. customer efficiency and explore its potential impact on e-business management.

TD40 Queueing I

Contributed Session
Chair: Patrick P. Wang, University of Alabama, 2714 Lake Crest Dr., Tuscaloosa, AL 35406, pwang@ua.edu

1) M-Failure Group Maintenance Policies for Unreliable Queueing Systems, ***Gia-Shie Liu***, National Defense University, Dept. of Bus. Admin., 8 Alley 135 Ln 296 Ing-Tao, Taipei, Taiwan, 239, ROC, liug@rs590.ndmc.edu.tw, ***Apostolos N. Burnetas***

We consider the maintenance problem for a production system with N independently operating servers and a single Markovian queue. A customer-independent m-failure group maintenance model has been developed. We formulate a matrix geometric model to calculate the steady state distribution and the expected average cost.

2) An Analytical Study of Serial Buffered Systems with Exponential Service Times, ***Gil Zussman***, Technion Israel Institute of Technology, Dept. of Electrical Eng., Haifa, 32000, Israel, gilz@tx.technion.ac.il, ***Abraham Grosfeld-Nir***

Even for exponential servers, systems with finite intermediate buffers and more than two units in series pose major computational problems that are largely unsolved (Neuts, 1981). We propose a methodology for recursive analysis of such systems, using QBD processes. We use numerical results for performance evaluation of pull production systems.

3) Allocation of Service Time in a Multi-Server System, ***Muhammad A. El-Taha***, University of Southern Maine, Dept. of Math. & Stats., Portland, ME 04104-9300, eltaha@usm.maine.edu, www.usm.maine.edu/~eltaha, ***Bacel Maddah***

Consider a multi-server $FCFS$ system where we arrange servers in two stations in series. All arrivals join the first station where they receive a maximum of T units of service. Arrivals with more than T units of service join the second queue where they receive their remaining service. This model exhibits interesting performance characteristics. The model is useful for repair systems.

4) An M/G/Inf Queue in Series, ***Patrick P. Wang***, University of Alabama, 2714 Lake Crest Dr., Tuscaloosa, AL 35406, pwang@ua.edu, ***William J. Gray***, ***Meckinley Scott***

We discuss an M/G/Inf queue. Because of the tandem structure of servers, customers may be blocked when they finish their services. We derive the joint probability of the number of customers in service and in blocking. The blocking time distribution is also obtained for M/M/Inf queues.

5) Pooling in Tandem Lines with Blocking & Cooperation, ***Nilay T. Argon***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, nilay@isye.gatech.edu, ***Sigrun Andradottir***

For a tandem line of finite queues, we consider pooling several stations and the associated servers into a single station with a single team of servers. We show that pooling stations at either end of the line always increases throughput. We discuss under what conditions pooling intermediate stations increases throughput.

TD41 OR at Hewlett-Packard

Cluster: Unsolved OR Problems in Industry
Invited Session
Chair: Shailendra Jain, Hewlett-Packard Labs., Decision Tech. Dept., 1501 Page Mill Rd., Bldg. 1U, Palo Alto, CA 94304-1126, shailendra_jain@hp.com

1) OR at Hewlett-Packard, ***Shailendra Jain***, Hewlett-Packard Labs., Decision Tech. Dept., 1501 Page Mill Rd., Bldg. 1U, Palo Alto, CA 94304-1126, shailendra_jain@hp.com

At HP, the HLP research team has been actively engaged in joint research in select areas with few universities. This limited interaction cannot significantly influence the vast research efforts in academia. I will share specific research areas of interest to HP and hopefully, they should be of interest to many other industrial organizations. It is believed that there is a significant gap between what is needed in industrial settings and the research results produced in universities...

TD42 Nontraditional OR

Cluster: Nontraditional OR
Invited Session
Chair: John J. Bartholdi, III, Georgia Institute of Techology, Sch. of ISyE, Atlanta, GA 30332-0205, john.bartholdi@isye.gatech.edu

1) Estimating the Probability of Winning the Presidency: A Bayesian Approach, ***Edward Kaplan***, Yale School of Management, Box 208200, New Haven, CT 06520-8200, edward.kaplan@yale.edu, ***Arnold Barnett***

We present a new method for estimating the probability that a candidate will win the US presidential election. The method produces the probability distribution of the number of electoral college votes for the candidate. We illustrate, using state-specific polls from the 2000 campaign and examine optimal sample allocation.

2) The Impact of Novel Treatments on A-beta Burden in Alzheimer's Disease: Insights from a Mathematical Model, ***David L. Craft***, MIT, OR Ctr., Cambridge, MA 02142, dcraft@mit.edu, ***Lawrence M. Wein***, ***Dennis J. Selkoe***

Motivated by recent therapeutic initiatives for Alzheimer's disease, we

developed a mathematical model of the accumulation of amyloid-beta-protein in the brain. Our variation of Smoluchowski's equations incorporates the production and clearance of A-beta monomers and the elongation and fragmentation of A-beta polymers. Closed-form stability and steady-state results are discussed.

3) withdrawn 10/9: The Surprising Ubiquity of the Benford Distribution & How it Arises, ***Ted Hill***, Georgia Institute of Technology, Dept. of Math, Atlanta, GA 30332, hill@math.gatech.edu

4) Exploiting the Structure of Musical Space to Represent Musical Information, ***Elaine Chew***, University of Southern California, 3715 McClintock Ave., GER 240, Los Angeles, CA 90089-0193, echew@usc.edu, http://www-rcf.usc.edu/~echew

A 3-D model for representing musical information will be presented in which musical time series data map to meaningful spatial trajectories. Euclidean metrics are used to capture salient perceptual cues in order to quantify tonal properties. Applications include cognitive modeling, audio synchronization and music information visualization, comparison and retrieval.

TD43 Education III

Contributed Session

Chair: David J. Rader, Rose-Hulman Institute of Technology, 5500 Wabash Ave., CM 127, Terre Haute, IN 47803, david.rader@rose-hulman.edu

1) Teaching OR to Math/CS/Engineering Undergraduates, ***David J. Rader***, Rose-Hulman Institute of Technology, 5500 Wabash Ave., CM 127, Terre Haute, IN 47803, david.rader@rose-hulman.edu

An approach for teaching an introductory deterministic OR course to math/CS students is discussed. This approach incorporates algorithm development as its main objective, as opposed to a more mechanical approach given by most textbooks. Time will be allocated for discussion and analysis.

2) Recruiting Technically Skilled Faculty in a Tight Market, ***David D. Hott***, Florida Institute of Technology, 150 West University Blvd., Melbourne, FL 32901, dhott@fit.edu, ***Judith A. Barlow***

Recruiting and retaining qualified faculty in MISs is becoming increasingly difficult. Academic programs continue to grow in number and size while non-academic competitors offer higher and higher salaries. We identify alternatives to address this problem, including faculty development, restructured benefit packages and program alliances using distance learning.

3) A Web-Based Environment for Teaching Queueing Theory, ***Clara M. Novoa***, Lehigh University, 14 Duh Dr., Apt. 221, Bethelehem, PA 18015, cmr5@lehigh.edu, http://www.lehigh.edu/~cmr5/cmr5.html

This is a web-based application for teaching engineering students to optimize real queues. In an industrial setting, feedback is delayed and confounded by other variables. Our proposed environment is fast and addresses data analysis issues. The educational benefit is to provide an environment focusing on the conceptualization of material with encouragement of creativity.

TD44 Strategic Management II

Contributed Session

Chair: J. D. Selby-Lucas, Old Dominion University, 102 Kaufman Hall, Norfolk, VA 23259, jselbylu@odu.edu

1) Oscillations in Organizational Sales & Profits, ***Gene Murkison***, Georgia Southern University, Dept. of Mgmt., Bus. School, Statesboro, GA 30460-8154, murkison@gasou.edu

Through an in-depth study of a large Georgia textile firm, interesting oscilatory organizational results were noted. The phenomenon is analyzed and discussed with implications for strategic management.

2) The Role of the Operations Function in Strategy: Some Insights from the Resource-Based View of the Firm, ***Lieven L. Demeester***, INSEAD, 1 Ayer Rajah Ave., Singapore, 138676, Singapore, lieven.demeester@insead.edu, ***Jovan Grahovac***

Some key articles in the field of operations strategy are regularly referred to in discussions of the RBV of the firm. In this view, the firm is seen as a collection of mutually reinforcing competencies that can be leveraged to create a competitive advantage in suitable product markets. We examine the impact of the resource-based perspective on operations strategy and explore how OS could further benefit from the RBV.

3) Design for Trainability, ***J. D. Selby-Lucas***, Old Dominion University, 102 Kaufman Hall, Norfolk, VA 23259, jselbylu@odu.edu, ***William W. Swart***, ***Charles S. Duncan***

Engineering design has evolved from a linear process to a collaborative and concurrent process. The evolution has built in considerations, i.e. design for manufacturability. We suggest "design for trainability" to address the issue that unless operators can be effectively trained to use products or processes, it will not succeed.

4) Strategic Supply Chain Design for New Products, ***Renee J. Butler***, Georgia Institute of Technology, 765 Ferst Dr., Atlanta, GA 30332-0205, rbutler@isye.gatech.edu, ***Jane C. Ammons***, ***Joel S. Sokol***

We discuss designing a strategic supply chain for a spin-off product with uncertain demand and customer locations. Our goal is a flexible system that is easily scalable to respond to the growth and fluctuation of our market, while minimizing the company's risk.

TD45 Operations Management XI

Contributed Session

Chair: Shaoxiang Chen, Nanyang Technological University, B2A-30 Nanyang Bus. School, Singapore, 639798, Singapore, aschen@ntu.edu.sg

1) withdrawn 10/10: A Maximal Covering Location Model in the Presence of Partial Coverage, ***Esra K. Karasakal***, Middle East Technical University, Dept. of IE, Ankara, 06531, Turkey, esra@ie.metu.edu.tr, ***Orhan Karasakal***

2) Performance Analysis of Multi-Process Products, ***Amit Mitra***, Auburn University, Coll. of Bus., Ste. 516, Auburn, AL 36849-5240, mitra@business.auburn.edu

Traditional indices of process capability represent a measure of proportion nonconformance for a single characteristic of a product. A product may usually incur multiple processes involving several characteristics, where unit costs of nonconformance may vary. A performance measure is developed that incorporates the unit costs of nonconformance.

3) The Optimality of Hedging Point Ploicy for the Stochastic Two-Product Flexible Manufacturing Systems, ***Shaoxiang Chen***, Nanyang Technological University, B2A-30 Nanyang Bus. School, Singapore, 639798, Singapore, aschen@ntu.edu.sg

We study the stochastic 2-item, periodic review, single facility FMSs, where stochasticity comes from random demands and/or an unreliable production process. Based on a notion called m-difference monotone introduced here, we prove that the hedging point policy is optimal to the systems in general for both finite and infinite horizon cases of the problems...

TD46 Operations Management

Contributed Session

Chair: Jochen Kleinknecht, Stanford University, Dept. of MSE, Terman Engineering Ctr. 450, Stanford, CA 94305-4025, jochenk@stanford.edu

1) Product Portfolio Management in Delay Sensitive Markets, ***Kristin Fridgeirsdottir***, Stanford University, 450 Terman Eng., Stanford, CA 94305, krisfrid@stanford.edu, ***Ram Akella***

We consider a design house (or a general service facility) that competes in a delay sensitive market. We construct its optimal product portfolio where products are competing for resources. We specifically explore factors that can drive the diversification of the portfolio such as priority policies, variance and correlation of revenues.

2) Value Creation in Services: Relating Job Designs, Incentives & Operational Performance, ***Evrim D. Gunes***, INSEAD, Blvd. de Constance, Fontainebleau, 77305, France, evrim-didem.gunes@insead.edu, ***Zeynep Aksin***

We study a job design problem in a service setting, where there are 2 customer types with different revenue generation potential. We model the service level decision of the server in a principal-agent framework and discuss the implications for operational performance and design choice.

3) Supply Contracts with Options in E-Business, ***Jochen Kleinknecht***, Stanford University, Dept. of MSE, Terman Engineering Ctr. 450, Stanford, CA 94305-4025, jochenk@stanford.edu, ***Ram Akella***, ***John P. Weyant***

We consider supply contracts with options in the presence of a spot market in a N-period setting with 2 players and determine the options value to the buyer as well as the value of the spot price information for non-stationary demand and spot price distributions that may be correlated.

Wednesday 08:30-10:00

WA01 Artificial Intelligence II

Contributed Session

Chair: Raphael A. Hauser, Oxford University Computing Laboratory, Wolfson Bldg., Parks Rd., Oxford, OX1 3QD, UK, rah48@damtp.cam.ac.uk, www.damtp.cam.ac.uk/user/people/Raphael/index.

1) Generalized Perceptron Boundedness Theorems, *Raphael A. Hauser*, Oxford University Computing Laboratory, Wolfson Bldg., Parks Rd., Oxford, OX1 3QD, UK, rah48@damtp.cam.ac.uk, www.damtp.cam.ac.uk/user/people/Raphael/index., ***Edoardo Amaldi***

Using a novel approach to proving the perceptron boundedness theorem of Minsky & Papert, we are able to solve the long-standing open problem of giving an explicit formula for the bound in terms of the input data. We substantially generalize the validity of the result to various deterministic and probabilistic settings...

2) withdrawn 9/20: Hierarchical Intelligent Control: A Study of Available Grammar Inference Tools, *Codrin Nichitiu*, EURISE University Jean Monnet, 23 rue du Dr. Michelon, St. Etienne, 42023, France, codrin@ens-lyon.fr

3) withdrawn 9/11: A Preliminary Investigation of Collective Learning Personality Traits, *Kristin E. Heckman*, George Washington University, Dept. of Comp. Sci., 801 22nd St. NW, Washington, DC 20052, kheckman@seas.gwu.edu, ***Peter Bock***

4) Modeling Long-Term Product & Pricing Decisions in the Automobile Market: An Agent-Based Approach, *Jie Cheng*, JD Power & Associates, 5435 Corporate Dr., Ste. 300, Troy, MI 48098, jie.cheng@jdpa.com, ***Irina Ionova, Jorge Silva-Risso***

We present an agent-based simulation framework, embedded with a disaggregate consumer response model, to study the dynamics of automotive retail markets. The research produces insights into interactions among manufacturers' product and pricing decisions, dealers' and lenders' selling strategies and consumers' brand selection decisions. Such insights can help manufacturers making better long-term decisions such as product quality improvements and lifecycles.

5) A Continuous Relaxation for the Cumulative Constraint, *John N. Hooker*, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, jh38@andrew.cmu.edu, ba.gsia.cmu.edu/jnh, ***Hong Yan***

The cumulative constraint is one of the key global constraints in constraint programming, due to its role in many scheduling applications. We provide what appears to be the first continuous relaxation for this constraint, which can be useful for solving scheduling problems by decomposition.

WA02 Models of IT Impact on E-Business & Supply Chains

Cluster: OR/MS & the Internet

Invited Session

Chair: Shankar Sundaresan, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu

1) Auctions or Group Buying? A Comparison of Web-Based Dynamic Pricing Mechanisms, *Krishnan S. Anand*, University of Pennsylvania, The Wharton Sch., 1311 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104-6366, anandk@wharton.upenn.edu, ***Ravi Aron***

Group buying mechanisms in the B2C context are recent phenomena enabled by the Internet. We model a web-based group-buy scheme and contrast it with other price discovery mechanisms such as auctions and fixed pricing and provide a welfare ranking of the 3.

2) Diffusion of Internet Infrastructure, *Arun Sundararajan*, NYU, Stern Sch. of Bus., New York, NY 10012, asundara@stern.nyu.edu

I present a model that suggests that most aspects of the Internet structure are likely to become service-like products. Embedded is a model capturing the intrinsic nature of technological innovation which occurs not due to pro-active corporate investment but as a consequence of the progress of related technologies.

3) Information Intermediaries in E-Business & Supply Chain Networks, *Shankar Sundaresan*, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu

The emerging information economy gives rise to several new forms of intermediaries. Using economic models, we extend my prior research on the impact of information infrastructure on the reconfiguration of supplier networks and model the emergence of new information intermediaries driven by differing roles of information.

WA03 Optimization in Kernel Methods Training

Cluster: Data Mining

Invited Session

Chair: Theodore B. Trafalis, Oklahoma University, Coll. of Eng. Carson Eng. Ctr., 202 West Boyd, Norman, OK 73019, ttrafalis@ou.edu

1) Learning with Very Large Datasets, *Theodore B. Trafalis*, Oklahoma University, Coll. of Eng. Carson Eng. Ctr., 202 West Boyd, Norman, OK 73019, ttrafalis@ou.edu, ***Theodoros Evgeniou, Hussein Ince***

We present methods for speeding up learning techniques with very large datasets. We first suggest general approaches to the problem, and we then apply them to a particular learning technique, namely support vector machines. We prove bounds on the distance of the solution found using these methods from the theoretically optimal.

2) Decomposition Techniques in Support Vector Machines Training, *Hussein Ince*, University of Oklahoma, Sch. of IE, 202 West Boyd., Rm. 124, Norman, OK 73019, ince@ou.edu, ***Theodore B. Trafalis***

Training of SVM leads to a QP problem. Since the number of variables in this problem is equal to the number of observations, we have to deal with large scale QP problems. We investigate interior point decomposition methods and provide preliminary computational results.

3) Robust Optimization Methods in Support Vector Machines Training, *Theodore B. Trafalis*, Oklahoma University, Coll. of Eng. Carson Eng. Ctr., 202 West Boyd, Norman, OK 73019, ttrafalis@ou.edu

We consider the SVM where the data set is not accurately specified and the only knowledge about it is that, it belongs to an uncertainty set U. We investigate ellipsoidal uncertainty sets and formulate the SVM problem in this case.

WA04 Auctions: Field & the Laboratory

Cluster: Auctions

Invited Session

Chair: Mark Isaac, Florida State University, Dept. of Economics, 246 Bellamy Bldg., Tallahassee, FL 32306-2180, misaac@mailer.fsu.edu

1) Church "Silent" Auctions: Simultaneous Ascending Prices, Bidding Clocks & a Public Goods Component, *Mark Isaac*, Florida State University, Dept. of Economics, 246 Bellamy Bldg., Tallahassee, FL 32306-2180, misaac@mailer.fsu.edu

Simultaneous ascending auctions have become a popular mechanism in market design. One manifestation of this general class of mechanism, which has existed for years, has been the "silent" auction used by churches and other non-profit organizations for fundraising. While sharing the basic elements of most ascending simultaneous auctions, "church silent auctions" also have two more unusual features...

2) The Simultaneous Ascending Price Auction: Dynamics of Price Adjustment in Experiments & in the Field, *Tim Salmon*, Florida State University, Dept. of Economics, Tallahassee, FL 32306-2180, tsalmon@garnet.acns.fsu.edu, ***Charles Plott***

Theory and experiments are used to develop a model of behavior in simultaneous, ascending price auctions. The model can be used to estimate bidder values from bids during an auction and those estimates can be used to predict the final prices and ending times of the auction. The model is tested on the recent UK 3G spectrum auction.

3) Offer Verifiability & the Relationship between Auctions & Multi-Lateral Negotiations, *Bart Wilson*, George Mason University, Interdis. Ctr. for Econ. Sci., 4400 University Blvd. MSN 1B2, Fairfax, VA 22030, bwilson3@gmu.edu, ***Charles J. Thomas***

Many procurement settings involve multi-lateral negotiations, a process in which a buyer solicits price offers for a homogenous product from sellers with heterogeneous costs and then plays the sellers off one another to obtain additional price concessions. Within the auction literature, it has been hypothesized that this exchange process bears some relation to second-price or English auctions...

WA05 Nonlinear Semi-Definite Programs & Relaxations II

Cluster: Generalized Convexity/Generalized Monotonicity
Invited Session

Chair: Florian Jarre, Heinrich-Heine Universitaet, Mathematisches Institut, Universitaetsstrasse 1, Duesseldorf, D-40225, Germany, jarre@opt.uni-duesseldorf.de

1) On Convexification of Nonlinear Semi-Definite Programming Problems in Control, ***Carsten W. Scherer***, Delft University of Technology, ME Systems & Control Group, Delft, 2628CD, The Netherlands, c.w.scherer@wbmt.tudelft.nl

We review various important problems in control that can be reduced to solving bilinear matrix inequalities. For the design of structured controllers, we present new results on the existence of non-linear variable transformations that allow to convexity and to globally solve these non-convex optimization problems.

2) An Extension of the Positive Real Lemma to Singular Systems, ***Roland W. Freund***, Bell Laboratories, 700 Mountain Ave., Rm. 2C-525, Murray Hill, NJ 07974-0636, freund@research.bell-labs.com, ***Florian Jarre***

The well-known positive real lemma characterizes passivity of regular linear dynamical systems via the solvability of certain SDPs. We present an extension of the positive real lemma to singular systems. Based on this result, we propose an approach for contrusting passive reduced-order models via semi-definite programming.

3) A Numerical Comparison of Two Equivalent Nonconvex Semi-Definite Programs, ***Florian Jarre***, Heinrich-Heine Universitaet, Mathematisches Institut, Universitaetsstrasse 1, Duesseldorf, D-40225, Germany, jarre@opt.uni-duesseldorf.de, ***Roland W. Freund***

No abstract supplied.

4) Nonlinear Semi-Definite Heuristics for the Maxcut Problem, ***Bernd W. Hirschfeld***, Heinrich-Heine Universitaet, Mathematisches Institute, Universitaetsstrasse 1, Duesseldorf, 40225, Germany, hirschfeld@opt.uni-duesseldorf.de

We compare 4 different approaches for finding an approximation to the solution of the max-cut problem. The 4 approaches are based on the technique by Goemans & Williamson, the relaxation of Nesterov and 2 new non-convex potential functions.

WA06 Performance Issues in High Speed Networks

Cluster: Telecommunications
Invited Session

Chair: George Michailidis, University of Michigan, Dept. of Stats., 4062 Frieze Bldg., Ann Arbor, MI 48109-1285, gmichail@umich.edu

1) On Designing Efficient Simulations of Complex Stochastic Networks, ***George Michailidis***, University of Michigan, Dept. of Stats., 4062 Frieze Bldg., Ann Arbor, MI 48109-1285, gmichail@umich.edu

Borrowing ideas from the field of experimental design, we develop a framework to efficiently simulate several performance measures of modern high-speed networks. The main objectives are to minimize the number of required simulation runs and to fit models to the derived simulated data that predict well the performance of the network in all regions of the input space.

2) withdrawn 10/10: Call Admission Control in Packet Networks: The Gamma Approximation, ***Ramon M. Rodryguez-Dagnino***, ITESM Monterrey, Ctr. Electronica y Telecom., Sucursal de correos J CP 64849, Monterrey NL, Mexico, rmrodrig@campus.mty.itesm.mx, ***Catalina Pico***

3) Adaptive Mechanisms for Quality of Service Assurance in Third Generation Wireless Networks, ***Mohammed Moustafa***, CUNY, Electrical Eng. Dept., New York, NY 10031, moustafa@ieee.org, ***Ibrahim Habib***, ***Mahmoud Nagheshinah***

3G wireless systems offer opportunities to support a wide range of multimedia services. A key requirement of these services is insurance of end-to-end QoS attained as a result of proper resource management. We present a novel algorithm for adaptive allocation of resources in a cellular-based network. The algorithm utilizes GAs to control the power and rate of mobiles...

4) Fast Algorithms for Delay-Constrained Unicast QoS Routing, ***Christos Douligeris***, University of Piraeus, Dept. of Informatics, 80 Karaoli & Dimitriou, Piraeus, 18534, Greece, cdoulig@unipi.gr, ***Gang Feng***

A representative QoS routing problem, the delay-constrained least-cost path problem, is studied. Our basic idea is to first combine the delay and cost to form a single mixed-weight, then use Dijkstra's algorithm to find the corresponding shortest path. Theoretical analysis demonstrates the optimality of solutions obtained by the iterative algorithms, good performance and fast speed...

5) Budget-Constrained Capacitated Hub Location to Maximize Expected Demand Coverage in Fixed Wireless Telecommunications Networks, ***Ramesh Bollapragada***, Bell Labs., Lucent Technologies, Holmdel, NJ, rbollapragada@lucent.com, ***Yanjun Li***, ***Uday S. Rao***

We investigate a model for telecom network planning with multiple hub types differing in capacity and cost and uncertain demand for wireless service. First, hubs are located on building tops under limited installation budget. Then, realized demand is assigned to hubs, incorporating crane-rain radius and line-of-sight constraints. We develop a greedy heuristic with provable worst case performance, which we test computationally.

WA07 Equilibria Governed by Hemivariational Inequalities

Cluster: Bilevel Programming
Invited Session

Chair: Jiri Outrata, Czech Academy of Sciences, Inst. of Info Theory & Auto., Pod vodarenskou vezi 4, Prague 8, CZ 18208, Czech Republic, outrata@utia.cas.cz

1) Toward Numerical Solution & Control of Mechanical Problems Modeled by Hemivariational Inequalities, ***Michael Kocvara***, FA University of Erlangen-Nuremberg, Inst. of Applied Math. II, Martensstrasse 3, Erlangen, D-91058, Germany, kocvara@am.uni-erlangen.de

Hemi-variational inequalities present a useful tool for modeling various problems of continuum mechanics. We consider a problem of delamination and discuss its proper modeling and approaches to its numerical solution. We further present a problem of shape optimization of laminated structure, when the hemivariational inequality arises as a constraint.

2) Second-Order Subdifferentials in Variational Analysis, ***Boris Mordukhovich***, Wayne State University, Dept. of Math, Detroit, MI 48202, boris@math.wayne.edu

We study second-order sub-differentials of non-smooth functions that are particularly important for applications to stability and sensitivity issues in optimization and variational analysis. The main attention is paid to developing a workable calculus (sum and chain rules) for 2 kinds of second-order sub-differentials and discussing attractive classes of non-smooth functions for which these subdifferentials can be efficiently computed.

3) On Stability & Optimization in Equilibrium Problems Governed by Hemivariational Inequalities, ***Jiri Outrata***, Czech Academy of Sciences, Inst. of Info Theory & Auto., Pod vodarenskou vezi 4, Prague 8, CZ 18208, Czech Republic, outrata@utia.cas.cz

We consider 2 multi-functions associated with general perturbed equilibrium problems and examine their stability. For a class of such equilibria, including hemi-variational inequalities, workable stability conditions will be provided in terms of second-order sub-differentials. The results can be applied, in mathematical programs, for example, with such equilibria arising as constraints. mathematical programs, for example, with such equilibria arising as constraints.

WA08 Constraint Programming & Mathematical Programming

Cluster: Constraint Programming
Invited Session

Chair: Philippe Refalo, ILOG, Les Taissounieres HB2, 1681 route des Dolines, Sophia Antipolis, 06560, France, prefalo@ilog.fr

1) Integrating Linear Programming & Constraint Programming Techniques for Solving Mixed-Integer Programming Problems, ***Cristian Oliva***, LIA Universite D'Avignon, 339 chemin des Meinajaries, Avignon, 84911, France, cristian.oliva@lia.univ-avignon.fr, ***Philippe Michelon***, ***Christian Artigues***

Reduced cost is commonly used in MIP solvers to reduce the bounds of the variables. We use these costs to identify a set of constraints among which at least one must be satisfied to find a better solution than the current one. These requirements over constraints are used by a constraint programing solver to infer more domain reduction...

2) A Hybrid Approach to the Vehicle Routing Problem with Earliness & Lateness Costs, ***Vincent Furnon***, ILOG, 9 rue de

Verdun, BP 85, Gentilly Cedex, 94253, France, vfurnon@ilog.fr, ***Bruno De Backer***

A 2-step approach is taken to solve the vehicle routing problem with earliness and lateness costs. A local search framework based on constraint programming generates solutions to the routing problem, leaving the scheduling of the arrival times to be optimally set by a linear programming solver.

3) A Hybrid Approach to Scheduling with Earliness & Tardiness Costs, *Chris Beck*, ILOG, 9 rue Verdun, BP 85, Gentilly Cedex, 94253, France, cbeck@ilog.fr, ***Philippe Refalo***

A hybrid approach merging CP and LP is applied to the problem of scheduling with earliness and tardiness costs. The LP model maintains relaxed optimal start times that guide the search heuristic. Advanced CP scheduling techniques are applied in order to reduce the search space. Different relaxations and solvers combinations have been investigated and their efficiency are compared on a set of instances.

WA10 Data Envelopment Analyses III

Contributed Session

Chair: Ranjan Ghosh, Indian Institute of Management Calcutta, Diamond Harbor Rd., Joka, Post Box 16757, Alipore PO, Kolkata, 700 027, India, ranjan@iimcal.ac.in

1) Application of Data Envelopment Analysis to Mining Operations, *Ranjan Ghosh*, Indian Institute of Management Calcutta, Diamond Harbor Rd., Joka, Post Box 16757, Alipore PO, Kolkata, 700 027, India, ranjan@iimcal.ac.in

We describe an application of DEA to iron ore and coal mines for assessing the relative efficiency of mines based on empirical data pertaining to their past performance. The managerial and operating practices of the mines, which were identified as efficient, could be disseminated to less efficient mines.

2) Efficiency of Software Development Projects: A Fuzzy DEA Approach, *Ranjan Pal*, Birla Institute of Technology, Ranchi, Jharkand, 835215, India, ***Jeebak Mitra***, ***Manabendra N. Pal***

In software development projects effort and elapsed time may be considered as input variables and size of the project as output variable. Often these input and output variables are fuzzy. Accordingly, the fuzzy DEA concepts have been used to determine the relative efficiency of software development projects.

3) Incorporation of Quality Dimensions in DEA, *Tor Beltov*, University of Southern Denmark, Dept. of Org. & Mgmt., Campusvej 55, Odense, 5230, Denmark, tor@sam.sdu.dk, ***Ole B. Olesen***, ***Niels C. Petersen***

We are concerned with the incorporation of information on differences in quality of outputs into DEA. Difference in quality is measured by the probability that produced output at any given DMU is of good vs. bad quality. Probabilities are estimated by regression in a logit approach. Approaches for the incorporation of these estimates in DEA are discussed. An application for the Danish hospital sector is presented.

4) Power DEA, *Donna L. Retzlaff-Roberts*, University of Memphis, Fogelman College Bus. & Econ., Memphis, TN 38152, retzlaff@memphis.edu, ***Jose H. Dula***, ***Marie-Laure Bougnol***

PowerDEA is a methodology based on DEA that provides more in-depth and comprehensive results. Our approach involves DEA analyses over elements of the power sets of the input/output attributes. The information that emerges from such a study is richer and more complex than from traditional DEA. Additionally, assessments and classifications about entities' performance are more accurate and robust...

WA11 Integer Programming Models & Applications

Cluster: Integer Programming

Invited Session

Chair: Yves Crama, Universite de Liege, Ecole d'admin. des Affairs, Blvd. du Rectorat 7 (B31), Liege, 4000, Belgium, y.crama@ulg.ac.be

1) Easy & Difficult Objective Functions for Max Cut, *S. Thomas McCormick*, University of British Columbia, Fac. of Commerce & Bus. Admin., Vancouver, BC, V6T 1Z2, Canada, stmv@adk.commerce.ubc.ca, ***M. R. Rao***, ***Giovanni Rinaldi***

We investigate the boundary between polynomially-solvable max cut and NP-hard max cut instances based on the sign pattern of the objective and find that the matching number of the subgraph induced by the positive edges determines the boundary. We give applications of the polynomially solvable cases.

2) Planning the Assignment of Telephone Calls, *Frits C. Spieksma*, Maastricht University, Dept. of Math, PO Box 616, Maastricht, 6200 MD, The Netherlands, spieksma@math.unimaas.nl, ***Joris van de Klundert***, ***Jeroen Kuipers***, ***Maarten Winkels***

We investigate a planning problem that has applications in the telecommunications industry. We formulate the problem as a 0-1 integer programming problem and establish its complexity. Further, we describe a solution method and discuss some of its characteristics.

3) An Exact Algorithm for the Share of Choices Problem, *James J. Cochran*, Louisiana Tech. University, Dept. of Comp. IS & Analysis, College of Admin/Bus Box 10318, Ruston, LA 71272, http://www.cab.latech.edu/jcochran/index.htm, ***Jeffrey D. Camm***, ***David Curry***, ***Sriram Kannan***

We demonstrate an algorithm that combines Lagrangian relaxation with various logic rules to solve difficult maximum coverage problems with special ordered sets. We focus specifically on the share of choices problem (selection of product attributes that result in the optimal projected market share). We demonstrate the effectiveness of our algorithm, both on large problems supplied by marketing research firms and simulated problems.

4) Optimal Procurement Decisions in the Presence of Total Quantity Discounts & Alternative Product Recipes, *Yves Crama*, Universite de Liege, Ecole d'admin. des Affairs, Blvd. du Rectorat 7 (B31), Liege, 4000, Belgium, y.crama@ulg.ac.be, ***Pascual J. Rodrigo***, ***Andrea Torres***

We describe and evaluate mixed 0-1 programming models for the procurement problem faced by multi-plant companies when suppliers offer discounts based simultaneously on plant and on corporate purchases, discount schedules depend on the total quantity (rather than cost) of ingredients purchased and alternative production recipes exist for each final product.

WA12 Optimization Techniques V

Contributed Session

Chair: Marc Peeters, Katholieke Universiteit Leuven, Naamsestraat 69, Leuven, 3000, Belgium, marc.peeters@econ.kuleuven.ac.be

1) A New Packing Problem: The Co-Printing Problem, *Marc Peeters*, Katholieke Universiteit Leuven, Naamsestraat 69, Leuven, 3000, Belgium, marc.peeters@econ.kuleuven.ac.be, ***Zeger Degraeve***

The CPP is a new packing problem, which finds its origin in the beverage industry. Given a set of items with an associated color set, pack the items in as few as possible bins, such that its capacity and a limit on the number of different colors is not exceeded.

2) Solvability of Implicit Complementarity Problems, *Vyacheslav V. Kalashnikov*, Autonomous University of Nuevo Leon, Dept. of Eng., AP 111-CF, Cd. Universitaria, San Nicolas de Garza, 66450, Mexico, kalash@osos.fime.uanl.mx

We consider the multi-valued implicit complementarity problem and reformulate it in terms of support functions. Making use of the Leray-Schauder type alternative, we obtain theorems of existence of solution to the initial implicit complementarity problem.

3) The Nonlinear Rescaling-Augmented Lagrangian Method for Constrained Optimization, *Roman A. Polyak*, George Mason University, 4400 University Dr., Fairfax, VA 22030-4444, rpolyak@gmu.edu, ***Igor Griva***

For a constrained optimization problem with inequality constraints and equations, we introduce the modified Lagrangian (ML), which combines the classic Lagrangian for rescaled inequalities with augmented Lagrangian for equations. The NRAL multipliers method alternates the unconstrained minimization of the ML with Lagrange multipliers update. The primal-dual version of NRAL applied for solving a wide class of NLP including the optimal power flow...

4) A Novel Solution Approach for the Vehicle Routing Problem, *Fatma Gzara*, McGill University/GERAD, Fac. of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, gzara@management.mcgill.ca, www.crt.umontreal.ca/~fatma, ***Jean Louis Goffin***

We present a B&B approach with row and column generation for the asymmetric VRP. We propose a new Lagrangean relaxation to the asymmetric VRP that exploits the underlying arborescence structure. We solve the Lagrangean dual problem using a cut generation algorithm that is based on analytic centers. This is embedded in a B&B scheme.

5) The Ant Colony Optimization Algorithm for the Single-Loop Guide Path Problem, *Kourosh Eshghi*, Sharif University of Technology, IE Dept., Azadi Ave., Tehran, Iran, eshghi@sina.sharif.ac.ir, http://sina.sharif.ac.ir/indinfo/home/eshghi, ***Morteza Kazemi***

We describe an ACO-type algorithm for the single loop guide path problem. The principle of ACO methods is based on the way ants search for food and find their way back to the nest. In the proposed algorithm, artificial ants are able to generate feasible loops by using information accumulated in the form of a pheromone trail...

WA13 Information Systems I

Contributed Session

Chair: Daniel Keefe, La Salle University, 1871 Cleveland Ave., Abington, PA 19001, dkeefe@dscp.dla.mil

1) Measuring Costs & Benefits Enterprise Resource Planning: Issues & Methodologies, ***Prafulla Joglekar***, La Salle University, 202 Lenape Ave., Melrose Park, PA 19027, joglekar@home.com, ***Daniel Keefe***

We discuss the issues and methodologies in the measurement of costs and benefits of an enterprise resource planning (ERP) system. The measurement process not only helps a company decide whether or not to implement an ERP system, it also enhances the value of the chosen system.

2) Employee Training & Education for Enterprise Resource Planning Implementation & Beyond, ***James J. Sullivan***, La Salle University, 201 Trappe Ln, Langhorne, PA 19047, james_sullivan@merck.com, ***Prafulla Joglekar***

In today's e-commerce environment, a successful ERP system has become a necessary condition. Based on an extensive review of the available literature, we outline precisely what qualifies as adequate and appropriate employee training and education for ERP implementation and beyond.

3) A Method for Deriving Append-Only Data Models, ***William E. Leigh***, Dept. of MIS, Orlando, FL 32816-1400, leigh@pegasus.cc.ucf.edu, www.bus.ucf.edu/leigh, ***Mario Paz***, ***Noemi M. Paz***

Title 21 of the Code of Federal Regulation - Food & Drug Administration mandates that all records which are part of the test procedures of a new drug be maintained as part of an integral audit trail. One interpretation of this requirement is that the involved database system must be append-only, that is, that there may be no update or delete transactions, only insertions...

4) Using an Intelligent Agent as an ERP Implementation Alternative, ***Bih-Ru Lea***, University of Louisville, Dept. of CIS, Coll. of Bus. & Public Admin., Louisville, KY 40292, brlea@louisville.edu, http://cislab1.cbpa.louisville.edu/brea, ***Bin Yu***

We propose a framework to use software agents as an alternative way to achieve an ERP type of integration. By defining how and what information to share, software agents are used as representatives to communicate among departments through an existing network while serving as an interpreter of the departmental database/information system.

5) Enterprise Systems Implementation Projects: Return on Investment & Business Value Analysis, ***Sameer Shah***, Deloitte & Touche, 44 Center Grove Rd., C-56, Randolph, NJ 07869, shahs5@yahoo.com, ***Mohammed Arif***, ***Dennis J. Kulonda***

A number of corporations have implemented expensive ERP systems during the last decade. We suggest a methodology to map the business value gained through ERP implementations. This business value will be a combination of the return on investment and qualitative analysis of the business benefits obtained.

WA14 E-Commerce IV

Contributed Session

Chair: Roger H. Bezdek, US Treasury Department, 1500 Pennsylvania Ave. NW, Rm. 2039, Washington, DC 20220, roger.bezdek@do.treas.gov

1) EFT & ETA: Treasury Department Programs to Facilitate Electronic Commerce, ***Roger H. Bezdek***, US Treasury Department, 1500 Pennsylvania Ave. NW, Rm. 2039, Washington, DC 20220, roger.bezdek@do.treas.gov

Aggressive efforts are under way in the public and private sectors to facilitate e-commerce and the transition from paper-based financial transactions to EFT. The US Treasury Department is in the forefront of these efforts. We discuss how the Treasury is working with the private sector to accelerate e-commerce and e-business and describe a new e-account that the Department has developed to facilitate this process.

2) withdrawn 10/11: Strategies of Converting Online Visitors to Purchase Model of the Determinants of E-Tailer Customer Conversion Rate, ***Hao Zhao***, Rutgers University, Dept. of Mktg., 180 University Dr., Newark, NJ 07102, haozhao@andromeda.rutgers.edu, ***Yong Cao***

3) withdrawn 10/10: Optimal Strategies of Converting Offline Customers to Online Customers, ***Baohong Sun***, Carnegie Mellon University, 5000 Forbes Ave., Pittsburgh, PA 15213, bsun@andrew.cmu.edu, ***Yong Cao***

4) withdrawn 10/9: An Empirical Analysis of Online Customer's Price Satisfaction & E-Tailer's Trust, ***Yong Cao***, University of Iowa, Dept. of Mktg., Tippie Coll. of Bus., Iowa City, IA 52242, yong-cao@uiowa.edu

WA16 Productivity & Competitiveness

Contributed Session

Chair: Bernardo Villarreal, Universidad de Monterrey, Ave. I Morones Prieto 4500 Pte, Pedro Garza Garcia, NL 66238, Mexico, bvillarreal@udem.edu.mx, www.udem.edu.mx

1) Breaking Process Bottlenecks through Process Redesign, ***Bernardo Villarreal***, Universidad de Monterrey, Ave. I Morones Prieto 4500 Pte, Pedro Garza Garcia, NL 66238, Mexico, bvillarreal@udem.edu.mx, www.udem.edu.mx, ***Jorge Diaz***

The application of resources and improvement efforts in a company should be done rationally, to obtain the maximum benefits from the production system as a whole. The theory of constraints provides the context under which the above can be achieved. This is used to define and implement an improvement strategy in a Mexican plant at Monterrey to improve quality and productivity...

2) withdrawn 10/11: Productivity Measures for Hospitals, ***David L. Zalkind***, George Washington University, 2115 G St. NW, Monroe 401A, Washington, DC 20052, dlz@gwu.edu, ***Thomas G. Mihara***

3) The Performance of ICT Investment in the Korean Manufacturing Sectors, ***Won-Joon Kim***, Seoul National University, Coll. of Eng., Techno-Econ. &, Policy, San 56-1 Shinlimdong, Seoul, 151-742, Korea, wjkim33@snu.ac.kr, ***Jeong-Dong Lee***, ***Tai-Yoo Kim***

Investment on IT has grown. However, IT investment has shown ambiguous performance. We'll show the efficiency of IT investment is quite different from sector to sector and improves over time in Korean manufacturing sectors. We examine several national agenda to improve the efficacy of IT investment at the sectoral level.

4) Competitive Advantage of Korea's Steel Industry, ***Agha I. Ali***, University of Massachusetts, Isenberg Sch. of Mgmt., Amherst, MA 01003, aiali@som.umass.edu, ***Hyun-Soo Han***

In a short span of 30 years, Korea's steel industry has grown from virtual non-existence to leading presence in the global marketplace. We reveal the sources of competitive advantage in conjunction with strategic and tactical decision making issues. The results are demonstrated using extensive data analysis and mathematical models.

WA18 Business Applications II

Contributed Session

Chair: Steven J. Spear, Harvard Business School, Morgan Hall T13, Boston, MA 02163, sspear@hbs.edu

1) Replicating the DNA of the Toyota Production Systems, ***Steven J. Spear***, Harvard Business School, Morgan Hall T13, Boston, MA 02163, sspear@hbs.edu

In 1999, we claimed that TPS is essentially 4 rules for designing, testing-in-use and improving individual and group work. We will introduce initial results of action research at various sites at Alcoa and at 3 hospitals to discover how best to convert an organization to "rule-in-use" management.

2) Optimal Exit from a Project with Noisy Returns, ***Reade H. Ryan***, Baruch College/CUNY, 17 Lexington Ave., Box B6-230, New York, NY 10010, reade_ryan@baruch.cuny.edu, ***Steve Lippman***

We consider the problem of deciding when to exit an investment project when the project's expected profit rate is constant but unknown. By investing, the decision maker risks money but gains information about the value of the expected profit rate. We look at the value of this information and the optimal exit time.

WA19 Applications in Logistics & Supply Chain Management

Sponsor: Logistics

Sponsored Session

Chair: Erhan Kutanoglu, University of Arkansas, Dept. of IE, Fayetteville, AR 72701, erhank@engr.uark.edu

1) The Impact of Lead-Time on Supply Chain Performance, ***Mary J. Meixell***, George Mason University, Sch. of Mgmt., Enterprise Hall, MSN 5F4, Fairfax, VA 22030-4444, mmeixell@som.gsu.edu

We evaluate the impact of lead-time on supply chain performance in a make-to-order environment. For this purpose, we experimentally determine costs using demand amplification as a surrogate measure for labor, capacity, and transportation costs.

2) Time-Based Inventory Management with Location Interactions in Service Parts Supply Chains, ***Erhan Kutanoglu***, University of Arkansas, Dept. of IE, Fayetteville, AR 72701, erhank@engr.uark.edu

Guaranteed time-based service levels are increasingly becoming an important dimension of contracts for service parts. We present the research challenges in this new problem setting. We investigate the effectiveness of inventory sharing mechanisms on the time-based service levels using a stylized 2-location model. We present our initial findings on interactions between stocking policies, service levels and sharing mechanisms.

3) Online Supply Chain Management: Issues & Effectiveness, ***Michael R. Bartolacci***, Pennsylvania State Berks/LV College, Reading, PA 19610, mrb24@psu.edu, ***Mary J. Meixell***

The Internet has brought a new and exciting arena for SCM. An area that traditionally relied on older information technologies such as electronic data interchange can now be conducted partially or totally online. We identify some key factors related to the measurement of the effectiveness of online SCM. We are also developing a model to measure this effectiveness.

4) Impacts of Contract Manufacturing on Logistics Network Design, ***Michael H. Cole***, University of Arkansas, 4207 Bell Eng. Ctr., Fayetteville, AR 72701, mcole@uark.edu, ***Scott J. Mason***

We develop an integrated cost model and mixed integer program for designing manufacturing logistics networks in which some operations can be outsourced. Numerical results based on AMPL/ CPLEX experiments will be presented.

WA20 Management of Technology I

Contributed Session

Chair: Korhan Gurkan, Stanford University, Grad. Sch. of Bus., Stanford, CA 94305-5015, korhang@stanford.edu

1) Parallel Experimentation & Market Structure, ***Korhan Gurkan***, Stanford University, Grad. Sch. of Bus., Stanford, CA 94305-5015, korhang@stanford.edu, ***Haim Mendelson***

Firms in an industry compete in designing and manufacturing products. Modeling product design as a search for the best alternative among experiments with probabilistic outcomes, we establish a causal relationship between the stochastic nature of innovation and market structure, with the cost of experimentation being a key differentiator.

2) withdrawn 10/11: Product Development, Chaos & Complexity, ***Marcos A. Primo***, Arizona State University, ASU Main Campus, SCM Dept., PO Box 874706, Tempe, AZ 85287-4706, marcos.primo@asu.edu, ***Kevin J. Dooley***

3) Software Pricing & Versioning Strategies over Time, ***Michael Pangburn***, Pennsylvania State University, 315 Beam Bldg., University Park, PA 16802, msp5@psu.edu

Product introductions in the software industry are often updates of existing products. Therefore, prices that can be realized in the marketplace depend upon the timing of introductions and their impact on consumers' upgrade decisions. Modeling the dynamics of the versioning problem over time yields insightful results regarding optimal policy structure.

WA21 Product Development: Supply Chain Interface

Cluster: Manufacturing Strategy
Invited Session

Chair: Soumen Ghosh, Georgia Institute of Technology, Dupree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, soumen.ghosh@mgt.gatech.edu

1) Quantity Commitment Timing with Bayesian Information Updating, ***Mark Ferguson***, Duke University, Fuqua Sch. of Bus., Box 304, Durham, NC 27708, mef2@mail.duke.edu

A manufacturer, supplied by a single component supplier, obtains information about demand over time. The manufacturer is faced with the decision of when to commit to its order quantity. Earlier commitments result in a more reliable supply but by delaying its commitment, the manufacturer makes its decision under better information.

2) withdrawn 10/9: Production Management under Frequent Product Introduction, ***Gilvan C. Souza***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742-1815, gsouza@rhsmith.umd.edu

3) A Framework for Integrating Product Platform Development with Supply Chain Configuration in a Global Environment, ***Joon Park***, University of Wisconsin, Sch. of Bus. Admin., Business Bldg. S491, Milwaukee, WI 53201-0742, joonpark@uwm.edu, ***Soumen Ghosh***, ***Nagesh N. Murthy***

We use the concept of reusable assets in developing product platforms to achieve synergy between the product development strategy and supply chain configuration decisions of organizations. An optimization framework representing decisions related to the product platform development, supplier selection and manufacture of modular products in a global environment will be presented.

4) A Decision Making Framework for Integrated Product Planning, ***Nagesh N. Murthy***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, nagesh.murthy@mgt.gatech.edu, ***Chungsuk Ryu***

We propose an integrated product planning model that considers marketing, engineering design and manufacturing implications of developing a family of products. The notion of ideal points on a quality continuum is adopted to identify a set of product variants that maximize overall profit.

WA22 Applications of Forecasting

Cluster: Forecasting
Invited Session

Chair: Kenneth Lawrence, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu

1) Forecasting Model Selection: A Hybrid Genetic Algorithm Neural Network Approach, ***Asokan·Anandarajan***, NJIT, School of Mgmt., Newark, NJ 07102, rishnia@worldnet.att.net, ***Kenneth Lawrence***, ***Murugan Anandarajan***, ***Baj Arinze***

Surveys of the practice of forecasting have found that managers either use their own estimates or use a single forecasting method for any type of data sets. These practices, however, may not produce the most accurate forecasts as research has shown that no single best method exists of all time series and contexts. We examine the application of a GANN approach to indirect forecasting...

2) Forecasting the Model Place for Hand-Held Internet Devices, ***Kenneth Lawrence***, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu, ***Joseph H. Wen***, ***Ron Klimberg***

The future of the mobile marketplace has just begun to intensify with sharp competition among traditional cellular service vendors and Internet providers. Using diffusion modeling, we will forecast the market place for hand-held Internet devices.

3) A Survey of Today's Forecasting Practices, ***Ron Klimberg***, St. Joseph's University, Haub School of Bus., Philadelphia, PA, klimberg@sju.edu, ***Harold Rahmlow***, ***Kenneth Lawrence***

The results of a survey to examine the current forecasting practices of practitioners, i.e., which methods, software, intention and frequency, will be presented.

4) withdrawn 10/9: Expertise in Judgmental Forecasting of Foreign Exchange Rates, ***Dilek Onkal-Atay***, Bilkent University, Fac. of Bus. Admin., Ankara, 06533, Turkey, onkal@bilkent.edu.tr, ***J. Frank Yates***, ***Can Simga-Mugan***

WA24 Industry Applications I

Contributed Session

Chair: Jo Min, Iowa State University, 2019 Black, Ames, IA 50011, jomin@iastate.edu

1) Real Option-Based Electric Power Planning for Inter-Related Generation Units, ***Jo Min***, Iowa State University, 2019 Black, Ames, IA 50011, jomin@iastate.edu, ***Chung-Hsiao Wang***

We will construct and analyze an electric power generation planning based on a real options approach when generation units are inter-related. For a general n generation unit case, we derive managerial insights on the value of the strategic options and the value of the correlation coefficients.

2) A Simulation Approach to Maintenance Management, ***Massoud Bazargan-Lari***, Embry-Riddle Aeronautical University, ABA, 600 South Clyde Morris Blvd., Daytona Beach, FL 32114, bazargam@cts.db.erau.edu

We present a simulation approach to the daily operations of aircraft maintenance

at the Embry-Riddle Aeronautical University in Daytona Beach Florida. The operations at aircraft maintenance division are seen to be the most crucial in how successful the planning for other activities for training are conducted. Each day aircraft maintenance provides flight-training department with a number of serviced and airworthy aircrafts...

3) withdrawn 9/26: Consumer Lifestyles, Energy Consumption & CO2 Emissions, ***Bin Shui***, Carnegie Mellon University, Dept. of Eng. & Public Policy, BH129, Pittsburgh, PA 15213, bshui@andrew.cmu.edu, ***Hadi Dowlatabadi***

4) Status of the Electronic Health Record Internationally, ***Terry L. Huston***, University of Victoria, PO Box 1700, STN CSC, Victoria, BC, V8W 2Y2, Canada, thuston@uvic.ca, ***Jim Dooner***

Many technical and non-technical issues are paramount in the development of the electronic health record including ensuring confidentiality, privacy and security of the patient record as well as achieving some measure of overall international standardization. A current state of affairs is presented comparing the development in several continents.

WA25 Production & Scheduling VI

Contributed Session

Chair: Leyuan Shi, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706, leyuan@engr.wisc.edu, www.engr.wisc.edu/ie/faculty/shi_leyuan.html

1) The Nested Partitions Method for the Job-Shop Scheduling Problem, ***Leyuan Shi***, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706, leyuan@engr.wisc.edu, www.engr.wisc.edu/ie/faculty/shi_leyuan.html, ***Yunpeng Pan***

The nested partitions method is applied to solve job-shop scheduling problem. Numerical results are compared with a few well-known algorithms such as tabu search and GA.

2) Common Due Date Scheduling with Batch Delivery, ***Viput Ongsakul***, Texas Technical University, 201 Indiana Ave., #321G, Lubbock, TX 79415, vongsaku@ttacs.ttu.edu, ***Surya D. Liman***

The problem of JIT scheduling with batch delivery and customer penalty is considered. The batch delivery and customer penalty costs allow early jobs to be shipped before the due date. Each tardy job can wait to be shipped with other tardy jobs to reduce shipping cost.

3) An Integrated Approach to Solve Cutting & Pattern Sequencing Problems, ***Gisele F. Pileggi***, University of Sao Paulo, Rua Alvarenga Peixoto 371, Apto. 23, Bloco 2, Sao Carlos, SP, 13560-180, Brazil, gpileggi@icmcm.sc.usp.br, ***Reinaldo Morabito***, ***Marcos Arenales***

We present an integrated approach to solve the cutting and pattern sequencing problems. The proposed heuristic searches for a solution satisfying tolerancy criteria of both problems considering the dependency between them.

4) Scheduling Jobs with Due Interval Assignment, ***Adam Janiak***, Wroclaw University of Technology, Janiszewskiego 11/17, Wroclaw, 50-372, Poland, janiak@ict.pwr.wroc.pl, ***Marcin Marek***

We consider a problem of scheduling jobs on identical parallel machines, in which a due interval should be assigned to each job. Due interval is a generalization of due date and describes a time interval, in which job should be finished. We prove some problem properties and establish their complexity.

WA26 Undergraduate Projects in OR I

Cluster: Undergraduate OR Projects
Sponsor: MAS
Invite/Sponsor Session

Chair: Jeff Grobman, USAF Academy, 2354 Fairchild Dr., Ste. 6D2AFA, CO 80840, jeff.grobman@usafa.af.mil

1) Flare Effectiveness against Threat Assets, ***Marshall Haylett***, USAF Academy, Dept. of Math Sciences, 2354 Fairchild Dr., Ste. 6D2A, USAFA, CO 80840, ***Jeff Grobman***, ***Rob Gilchrist***, ***Jeff Havlicek***

Protection and survivability are essential to the HH60 Helicopter. With new enemy threat systems being developed, new counter-measure devices and protection systems are needed. Two new devices, the ALQ144+ threat recognition device and the 206 flare, were tested to determine if they significantly improve the survivability of the HH60.

2) Janus Simulation of Design Alternatives for the US Army's Reconnaissance, Surveillance & Target Acquisition Squadron, ***Jeff Lau***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, ***Joe Rhyne***, ***Brian Layton***

The RSTA Squadron will provide the US Army's Brigade Combat Teams with enhanced battle space situational awareness. We address the use of constructive simulation to determine optimal configurations for the Squadron's force structure that result from changes in numbers and types of employed RSTA systems.

3) Officer Non-Rated Line Accessions & Cross-Flows, ***Chris Uecker***, USAF Academy, Dept. of Math Sciences, 2354 Fairchild Dr., Ste. 6D2A, USAFA, CO 80840, ***Jeff Grobman***, ***Rob Gilchrist***, ***Jeff Havlicek***

Air Force Specialty Codes (AFSC) have a specific number of positions for every grade. The total positions in an AFSC meet overall needs; actual distribution by grade does not meet with the authorized number in each grade. This is addressed by changing hiring and transfer practices into and among AFSCs.

4) Analysis of Combat Search & Rescue Missions using the Joint Conflict & Tactical Simulation Model, ***Fernando Cruz***, USAF Academy, Dept. of Math Sciences, 2354 Fairchild Dr., Ste. 6D2A, USAFA, CO 80840, ***Jeff Grobman***, ***Rob Gilchrist***, ***Jeff Havlicek***

Safety and practicality of the V-22 Osprey tilt rotor aircraft is of primary importance to combat search and rescue missions. We study the effects of outwash and downwash created by aircraft hovering at low altitude and determine the best tactics to use to minimize these effects on pararescue personnel.

WA28 Decision Analyses II

Contributed Session

Chair: Arthur J. Swersey, Yale School of Management, 135 Prospect St., New Haven, CT 06511-3729, arthur.swersey@yale.edu

1) Decision Models for Prostate Cancer Detection & Treatment, ***Arthur J. Swersey***, Yale School of Management, 135 Prospect St., New Haven, CT 06511-3729, arthur.swersey@yale.edu, ***Albert Y. Ha***

The probability of detecting cancer in a biopsy is a function of the size of the prostate, the volume of cancer and the number of needles inserted. We use simulation to find these probabilities and use them to estimate the severity of the cancer as a function of the biopsy results.

2) Accounting for Customer Preferences in Product Design, ***Olena Sinkevich***, University of Michigan, 2250 GG Brown Bldg., 2350 Hayward, Ann Arbor, MI 48109, olenas@umich.edu, ***Richard Gonzalez***, ***Panos Papalambros***

In a traditional design process, a design alternative is evaluated based on the optimization problem that includes only physical and engineering aspects of the problem. We propose a rigorous way of including the customer preferences in the design alternative generation and evaluation.

3) Wealth & Skill Pooling Coalitions under Risk, ***Jayavel Sounderpandian***, University of Wisconsin at Parkside, 900 Wood Rd., Kenosha, WI 53141-2000, sounderp@uwp.edu, www.uwp.edu/academic/business/faculty/jay

The 2-person 0-sum game where the payoff is decided by a not-necessarily-fair coin toss is well known. We extend this game to more than two persons and analyze the benefits of coalition formation where coalition members pool their wealth and/or skills.

4) Flexibility of Technologies as a Hedge against Catastrophes, ***Dan Weiss***, University of California, GSM AOB IV, 1 Shields Ave., Davis, CA 95616, dweiss@ucdavis.edu

We provides insight into the meaning of flexibility in decision-making and formalizes managers' intuitions of flexible technologies. A general flexibility comparison among technologies is suggested. Flexible technologies are shown to have capabilities to hedge against bad situations. Advantages and value of flexible technologies for risk-averse decision-makers are highlighted.

WA29 Quantitiative Methods for Quality Improvement

Sponsor: QSR
Sponsored Session

Chair: Victoria C. P. Chen, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, vchen@isye.gatech.edu

1) Likelihood Inference for Exchangeable Binary Data with Applications, ***Catalina Stefanescu***, Cornell University, Sch. of OR/IE, 288 Rhodes Hall, Ithaca, NY 14853, cs105@cornell.edu, www.

orie.cornell.edu/~cstef, ***Bruce W. Turnbull***

We discuss several models for clustered exchangeable binary data and present estimation procedures. In particular I the EM algorithm is applied to obtain maximum likelihood estimates of the common marginal response probability and the intracluster correlation. We derive the variance of the EM estimates and report the results of a simulation study comparing several alternative estimators. Applications to the proposed PRECISE trial are also discussed.ial are discussed. Applications to the proposed PRECISE trial are also discussed.ial are discussed.

2) Estimating a Third-Order Translog Demand System using Canadian Cross-Sectional Micro-Data, ***Vik Singh***, University of Regina, 303 Centennial St., Regina, SK, S4S 6W3, Canada, micro_economics@hotmail.com, www.eco-analysis.com

We present a flexible functional form called third-order translog that includes higher-order terms, to estimate systems of budget-share equations using Canadian cross-sectional micro-data. We test the statistical significance of the third-order terms and also test regularity conditions such as homogeneity and symmetry restrictions of the budget-share systems. It is important to test these restrictions... these restrictions...

3) Application of a New Stochastic Optimization Approach for NLP Problems to Off-Line Quality Control of a Continuously Stirred Tank, ***Kemal H. Sahin***, Carnegie Mellon University, 5000 Forbes Ave., Pittsburgh, PA 15213, khsahin@andrew.cmu.edu, ***Urmila Diwekar***

Generalized approaches to off-line quality control involve minimizing variance by sampling over variability space. This requires large samples of model and derivative calculations. We introduce an NLP technique based on reweighting. The new approach eliminates model calculations for each iteration, as illustrated through a chemical manufacturing case study.

4) Application of Parallel-MARS to a Decision-Making Framework for Wastewater Treatment, ***Julia C. Tsai***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, cctsai@isye.gatech.edu, ***Victoria C. P. Chen***

A parallelized version of multivariate adaptive regression splines (MARS, Friedman 1991) is presented. This new parallel-MARS is utilized within the OA/MARS stochastic dynamic programming solution method (Chen et al 1999). Computational speed-up is demonstrated on a decision-making framework that evaluates current and emerging technologies for a wastewater treatment system.r treatment system.

WA30 Organization Theory

Contributed Session

Chair: Chartchai Leenawong, Case Western Reserve University, Dept. of Ops., WSOM, 10900 Euclid Ave., Cleveland, OH 44106, cxl48@po.cwru.edu

1) Mathematical Models For Studying the Value of Leadership, ***Chartchai Leenawong***, Case Western Reserve University, Dept. of Ops., WSOM, 10900 Euclid Ave., Cleveland, OH 44106, cxl48@po.cwru.edu, ***Daniel Solow***, ***Apostolos N. Burnetas***, ***Sandy E. Piderit***

Mathematical models are presented for studying the value of leadership in the team-replacement problem when there are interactions among the team members. The leader motivates each member to perform closer to his/her maximum ability. Analysis and simulations provide insights into the effects of the leader on the average performance of the best team.

2) An International Investigation of Creative Performance in the Semiconductor Industry, ***Melissa M. Appleyard***, University of Virginia, Darden Bus. Sch., 100 Darden Blvd., Charlottesville, VA 22903,appleyard@virginia.edu,www.darden.edu/faculty/appleyard.htm, ***Clair Brown***, ***Linda Sattler***

Using survey data from engineers in leading semiconductor companies in the US, Japan and South Korea, we analyze how the firm's employment system (human resource practices that structure work, develop skills and evaluate performance) and knowledge management system (information access, sharing and control) affect creative performance.

3) Differentiated R&D: Emergent Forms fro the Coordination of Research & Development in Research Intensive Organizations, ***Ingrid C. Morris-Ensing***, Duke University, Fuqua Sch. of Bus., 2626 Pembroke, Birmingham, MI 48009, icm@mail.duke.edu, ***Jeffrey T. Glass***, ***Gerardine Desanctis***

We examine emergent organizational forms for coordination of distributed R&D in an exploratory study of 12 Fortune 500 organizations. We find distinctive, hybrid models that differ in coordination mechanisms used to capture strengths of centralized and decentralized R&D. We derive propositions regarding models' use and performance as a future research agenda.

4) Informant Bias in Empirical New Product Development Research & its Impact on the Validity of Research Findings, ***Holger M. Ernst***, WHU, Beishem Grad. Sch. of Mgmt., Burgplatz 2, Vallendar, 56179, Germany, hernst@whu.edu, www.whu.edu

The continuous development and introduction of new products is one of the most significant contributors to sustained company growth and profitability in many industries. For at least 3 decades, many researchers have undertaken empirical studies aimed at the identification of new product success factors (NPD research). A look at past empirical NPD research reveals that the overwhelming majority of studies is based on single informants only...

5) Corporate Management, Industry Competition & Firm Abnormal Profitability, ***Moses Acquaah***, University of North Carolina, Dept. of Bus. Admin., PO Box 26165, Greensboro, NC 27402, acquaah@uncg.edu

We model the sustainability of firm abnormal profitability and examine the impact of corporate management quality on the sustainability of firm abnormal profitability. The role of industry competition as a moderator between corporate management quality and firm abnormal profitability is also examined. Implications for RBV research are presented.

WA31 Belief Functions in Modeling

Cluster: **Belief Functions: Advances & Applications**
Invited Session

Chair: Rajendra P. Srivastava, University of Kansas, Auditing Research & Adv. Tech., Sch. of Bus., Lawrence, KS 66045, rajendra@falcon.cc.ukans.edu, http://lark.cc.ukans.edu/~srivasta/

1) Composed Multidimensional Possibilistic Models, ***Radim Jirousek***, University of Economics, Lab. for Intelligent Systems, Praha 3, 130 67, Czech Republic, radim@vse.cz, ***Jirina Vejnarova***

Modern models applied to problems of practice are inherently complex and multidimensional. To cope with the problem of multi-dimensionality, the majority of models based on probabilistic and possibilistic frameworks use graphs to describe structures of relations among the variables. We introduce a rather different procedural approach, describing the process of composition of multi-dimensional possibility distribution from a sequence of low-dimensional distributions...

2) Model Combination using Gaussian Belief Functions, ***Liping Liu***, University of Akron, Coll. of Bus. Admin., CBA Bldg. 351, Akron, OH 44325-4801, liu@acm.edu

We apply the theory of GBFs (Dempster 1990, 1991, Shafer 1992, Liu 1996, 200) to the integration of independent knowledge bases and statistical models. In details, we treat different sources of data as indepdnednt items of evidence and represent the discovered knowledge, i.e., linear models or Bayesian belief networks, by GBFs. We can then combine the independent models in a fashion, combine the GBFs and make enriched inferences based on the combined model...

WA32 Statistics/Quality Control

Contributed Session

Chair: Eugene D. Hahn, George Washington University, MS Dept., Washington, DC 20008, genehahn@gwu.edu, http://gwis2.circ.gwu.edu/~genehahn

1) Bayesian Multivariate Binary Response Models, ***Eugene D. Hahn***, George Washington University, MS Dept., Washington, DC 20008, genehahn@gwu.edu, http://gwis2.circ.gwu.edu/~genehahn

The choice of link function in multivariate binary response models is examined from a Bayesian perspective. A Monte Carlo study reveals that model fit is found to be affected by several factors.

2) The Effects of Home-Away Sequencing on the Length of Best-of-Seven Game Playoff Series, ***Christopher M. Rump***, University at Buffalo, 342 Bell Hall, Buffalo, NY 14260, crump@eng.buffalo.edu, www.acsu.buffalo.edu/~crump

We analyze, via a Bernoulli model, the number of games played in a 7-game playoff series under various home-away sequences. We establish and characterize 4 classes of stochastically different formats, including the popular 2-3 and 2-2 formats used by the major sports leagues. We validate the model using historical NBA and MLB playoff data.

3) Design of a Double Sampling s Chart for Agile Manufacturing, ***David W. He***, University of Illinois, Dept. of Mech. Eng., 3049 ERF, Chicago, IL 60607, davidhe@uic.edu, ***Arsen Grigorian***

The development of DS s charts for the quick detection of small shifts in process standard deviation for agile manufacturing is presented. The

construction of the DS s charts is based on the same concepts in constructing the DS X-bar charts and is formulated as an optimization problem and solved with a GA...

4) Survival Analysis & Days on Lot, ***Lan Wang***, Ford Motor Company, SRL, Rm. 2125, MD 2122, 2101 Village Rd., Dearborn, MI 48124, lwang17@ford.com, ***Gint V. Puskorius***, ***Irv Salmeen***

In the automotive industry, an important marketing problem is the determination of which vehicle options consumers prefer. We apply methods of survival analysis to the number of days that vehicles remain in inventory and determine how vehicle options, volumes, incentives, etc., affect the number of days that vehicles stay in inventory.

5) VAR Chart: A Quality Control Chart Monitoring Multivariate Autocorrelated Processes, ***Xia Pan***, University of Rhode Island, Coll. of Bus. Admin., 2900 Kingstown Rd. 134, Kingston, RI 02881, xpan0114@postoffice.uri.edu, www.uri.edu, ***Jeffrey E. Jarrett***

This is a proposal of a new quality control chart. The literature on statistical quality control to date discussed multivariate control charts for independent processes and univariate control charts for auto-correlated processes separately. We combined the 2 situations and proposed VAR chart for multivariate autocorrelated processes. The estimation issue was also discussed...

WA33 Project Management I

Contributed Session

Chair: Caroline M. G. Miranca, Federal University of Pernambuco, CP 7462, Recife PE, 50722-970, Brazil

1) withdrawn 10/1: Simulating Project Management using System Dynamics, ***J. Chris White***, 209 East IH 30, Rockwall, 75087, jcwhite@comceptinc.com, www.comceptinc.com

2) A Multi-Criteria Decision Support for Project Management of Building, ***Adiel T. Almeida***, Federal University of Pernambuco, CP 7462, Recife PE, 50722-970, Brazil, aalmeida@npd.ufpe.br, ***Caroline M. G. Miranca***

Cost and time have been the main objectives considered in project management. However, in some cases, deadlines cannot be accomplished with cost minimization. We present a multi-criteria approach in order to support the management and planning of project under conflicting objectives, involving criteria such as cost, deadline, commitment, quality and flexibility.

3) Examining the History of Project Office, ***Young H. Kwak***, George Washington University, Project Mgmt. Program, Dept. of MS, Washington, DC 20052, kwak@gwu.edu, http://gwu.edu/~kwak

We examine and review the history and emerging trends of the project office. The evolution of the project office is aligned with the history of project management tools and methodologies, technological innovations and maturity of management science. The project office evolves along with the technological breakthrough and progressive project management functions and practices.

WA34 Optimization Opportunities in the Cruising Industry

Cluster: Cruise Line Applications

Invited Session

Chair: Venkat Panchanadam, Royal Caribbean Cruises, Ltd., 1050 Caribbean Way, Miami, FL 33028, vpanchan@rccl.com

1) Supply Chain Management: A Royal Caribbean Cruises Perspective, ***Michael Allsup***, Royal Caribbean Cruises, Ltd., 1050 Caribbean Way, Miami, FL 33028, mallsup@rccl.com, ***Venkat Panchanadam***

Managing our supply chain is crucial in delivering a wonder vacation experience to our cruising guests. Extensive literature covers supply chain strategies for land-based operations but these strategies require many adjustments to fit our unique business model. We discuss the cruising business and the supply chain framework.

2) The Basics of Revenue Management: A Cross-Industry Perspective, ***Steve Pinchuk***, Profit Optimiation Strategies, Cooper City, FL, steve@revenuemanagement.org

We discuss how the economic principles behind revenue management and technical revenue marketing principles are applied in different industries, with particular focus on cruising. We identify elements of revenue management in economic terms - how to translate that into a better understanding of other revenue management opportunities and learn clearly how revenue management can and will apply to your industry.

3) The Revenue Opportunity Model, ***Markos S. Katsoulakis***, Royal Caribbean Cruises, Ltd., Revenue Mgmt. Dept., 1050 Caribbean Way, Miami, FL 33028, mkatsoulakis@rccl.com

The model post-evaluates the performance of a sailing by defining the optimal prices to be set at discrete time periods prior to departure, which, given the consumer behavior observed at these periods, will maximize the company's total revenue. It is a non-linear model (consumer behavior is a non-linear function of the price) subject to capacity and price fluctuation constraints.

WA36 Air Traffic Management Models

Sponsor: Aviation Applications/TSS

Sponsored Session

Chair: John-Paul Clarke, MIT, 77 Massachusetts Ave., Rm. 33-314, Cambridge, MA 02139, johnpaul@mit.edu

1) Blind Collision Risk under Free-Flight Conditions, ***Thomas R. Willemain***, RPI, Ctr. for Ind. Innovation, Dept. of DSES, 110 8th St., Troy, NY 12180, willet@rpi.edu

We simulate the risk of blind collision in en-route sectors under free-flight conditions. We relate multiple measures of risk to several factors: number of flights, times of entry, directions, airspeeds and altitudes.

2) Flight Routing for Reduced Noise Impact, ***Terry Thompson***, Metron Scientific Consulting, 131 Elden St., Herndon, VA, thompson@metsci.com

Reduction of noise from aircraft is an integral part of airspace design. We present new technologies and methods for selecting flight routes that reduce the impact of noise at key locations.

3) Airlines' Profit-Maximizing Behavior in a Congested Environment, ***Terrence Fan***, MIT, 77 Massachusetts Ave., Rm. 35-217, Cambridge, MA 02139, tpfan@mit.edu, ***Amedeo Odoni***

With significant traffic growth and limited potential for additional airside capacity at the busiest airports in the US, serious congestion problems will persist in the foreseeable future. We examine how profit-maximizing airlines react to growing airport delays, and discuss the implications for public policy.

4) Economics of Hub-Bypass Flights in Networks with Congested Hubs, ***Terran Melconian***, MIT, 77 Massachusetts Ave., Rm. 35-220, Cambridge, MA 02139, tmelcon@mit.edu, ***John-Paul Clarke***

Congestion, an increasingly important problem, is particularly significant at major hub airports.We illustrate how an analysis of the congestion costs at hubs and the new flight revenues from flights that bypass hubs, may be used to quantify the economic advantages of new nonstop flights that bypass hubs.

WA37 E-Commerce I

Contributed Session

Chair: Markus Biehl, York University, Schulich Sch. of Bus. 328, 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada, mbiehl@shulich.yorku.ca

1) Online or Offline? A Buyer's Perspective on E-Marketplaces, ***Markus Biehl***, York University, Schulich Sch. of Bus. 328, 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada, mbiehl@shulich.yorku.ca

Anecdotal evidence suggests that the use of e-marketplaces results in improved efficiencies and reduced costs in supply chains. Other evidence, however, indicates that most benefits of e-marketplaces can be achieved in-house. Using a dynamic decision model, we determine the best mix of internal capabilities and e-marketplace participation over time.

2) withdrawn 9/13: A Business-to-Business Auction Model under Supply Unreliability, ***Tridip Ray***, HKUST, Dept. of Economics, Clear Water Bay, Kowloon, Hong Kong, Hong Kong, tridip@ust.hk, ***Haresh B. Gurnani***

3) Measures & Models of Operational Efficiencies in the Networked Telecommunications Industry, ***Carol W. Carlson***, colorado School of Mines, Div. od Economics & Bus., Golden, CO 80401, cacarlso@mines.edu, ***Shekhar Jayanthi***, ***Robert E. Woolsey***

Resource allocation and operating budget choices are vital to the success of information-intensive businesses. Using exogenous and endogenous variables, we develop measures and models of operational [in]efficiencies of the company-client interconnection. Our analyses of detailed data from a local telecommunications firm serving 26 clients validate managerial perceptions of clients' performance.

4) E-Commerce & Economic Development, ***Syed Shahabuddin***, Central Michigan University, 1306 East Preston, Mt. Pleasant, MI 48858-3929, shaha1s@cmich.edu

Many developing countries are trying to get on the bandwagon of e-commerce, hoping to increase their economic growth. However, e-commerce requires infrastructure and other economic conditions not available in many developing countries. We look at the problems of these countries and suggest ways to get into information technology without e-commerce.

5) An Optimization Protocol for Two-Party Multi-Issue Arbitration, ***Kannan Balaji***, Indian Institute of Technology, IBM India Research Lab., Block I, Hauz Khas, New Delhi, 110 016, India, kbalaji@in.ibm.com, ***Varun S. Malhotra***

Buyer and supplier agents specify their utilities to an arbiter. To achieve consensus between these conflicting parties, the arbiter maximizes their minimum utility. We use simulated annealing for this optimization problem and validate that this approach behaves well in practice.

WA38 Probability

Contributed Session

Chair: Kemal Gursoy, Long Island University, 1 University Plaza, H-700, Brooklyn, NY 11201, kemal.gursoy@liu.edu

1) Approximating the Diffusion Equation with an Ordinary Differential Equation, ***Kemal Gursoy***, Long Is University, 1 University Plaza, H-700, Brooklyn, NY 11201, kemal.gursoy@liu.edu

An approach to approximate the diffusion equation, Wiener process, with an ordinary differential equation is provided. The objective is to construct regular, non-anticipative trajectories of ordinary differential equations as approximate solutions to the diffusion equation.

2) Uncertainty in the Defense Industry: Forecasting Revenues from Government Contracts, ***John D. Pinder***, Northrop Grumman Corp., PO Box 17319, MS 465, Baltimore, MD 21203, john_d_pinder@mail.northgrum.com

Large defense firms earn most of their income from multi-year civilian and military government contracts. Such contracts are prone to cancellation, reductions, delays and loss due to competition. We will model these 4 sources of uncertainty and simulate their impact on revenue forecasts for several representative portfolios of contracts.

3) A New Approach to Distribution Fitting: Decision on Beliefs, ***Ali Eshragh Jahromi***, Sharif University of Technology, No. 9, 1st Block, 3rd Phase, 6th St., Rajaee Shahr, Karaj, Tehran, Iran, a_eshragh@kimianet.com, ***Mohammad Modarres Yazdi***

We introduce a new approach to distribution fitting, decision on beliefs. We assume the observations come from an unknown distribution and by using the sequential Bayesian belief revision process, the belief on distributions is updated. Using stochastic dynamic programming, an algorithm is derived which maximizes the probability of correct selection...

4) Cramer-Lundberg Tail Asymptotics for Perturbed Random Walk, ***Victor F. Araman***, Stanford University, Dept. of MSE, Terman Engineering Ctr. 450, Stanford, CA 94305-4025, varaman@stanford.edu, ***Peter W. Glynn***

A perturbed random walk is a stochastic process obtained by taking an ordinary random walk and adding an independent stationary sequence to it. Our main result is a Cramer-Lundberg exponential asymptotic for the tail probabilities associated with the maximum of a perturbed random walk in which the underlying ordinary random walk has negative drift...

WA39 Decision Problems for a Rapidly Changing Agriculture

Cluster: **Decision Technologies for Food & Agribusiness**
Invited Session

Chair: Paul V. Preckel, Purdue University, Dept. of Agricultural Econ., 1145 Krannert Bldg., West Lafayette, IN 47907-1145

1) Optimizing Technology Investments in Food Safety, ***Scott A. Malcolm***, University of Delaware, 210 Townsend Hall, Newark, DE 19716, ***Helen H. Jensen***

Investment decisions in food safety technology and processes are based on the multiple objectives of maintaining product quality, meeting regulatory and voluntary food safety standards and minimizing cost. We develop an optimization approach to inform food safety investment decisions given their probabilistic nature of foodborne pathogen propagation and control.

2) The Changing Face of Agriculture: Opportunities for the Application of Operations Research Methods, ***Frank Dooley***, Purdue University, 1145 Krannert Bldg., West Lafayette, IN 47907-1145, ***Paul V. Preckel***

The industrialization of agriculture coupled with a movement towards supply chain management initiatives such as ECR and widespread adoption of ERP systems has changed the face of decision making for agribusiness firms. We report efforts of agribusiness forms as they respond to these changes.

3) Optimum Targeting of Agricultural Land Retirement to Improve Water Quality: The Case of Illinois CREP, ***Hayri Onal***, University of Illinois, 305 Mumford Hall, Urbana, IL 61801, ***Madhu Khanna***, ***Rick Farnsworth***, ***Wanhong Yang***

Recent environmental programs aim at retiring critical agricultural lands to reduce sediment and chemicals loading to water bodies. Optimum targeting of land parcels to retire and sending the right price signals to encourage program participation are critical issues. An LP model and results for the Illinois River watershed are presented.

4) Simulation Analysis to Evaluate the Impact of Corn Producer Investment along the Supply Chain in Ethanol Production, ***Joan Fulton***, Purdue University, 1145 Krannert Bldg., West Lafayette, IN 47907-1145, ***Kevin Anderson***, ***Frank Dooley***

Producer investment in value-added processing of agricultural products has increased in recent years. Stochastic simulation is used to evaluate the risk/return implications of corn producer investments in ethanol production and other investments. Producers will benefit from diversification. Government policy directly influences the impact of investment in ethanol.

WA40 Queueing II

Contributed Session

Chair: John F. Shortle, George Mason University, Dept. of Systems Eng. & OR, 4400 University Dr., MS 4A6, Fairfax, VA 22030-4444, jshortle@gmu.edu, http://mason.gmu.edu/~jshortle/

1) Numerical Methods for Analyzing Queues with Heavy-Tailed Service Distributions, ***John F. Shortle***, George Mason University, Dept. of Systems Eng. & OR, 4400 University Dr., MS 4A6, Fairfax, VA 22030-4444, jshortle@gmu.edu, http://mason.gmu.edu/~jshortle/, ***Martin J. Fischer***, ***Donald Gross***, ***Denise M. Masi***

We have developed the transform approximation method (TAM) to analyze queueing systems with heavy- or power-tailed service distributions. We discuss and compare practical aspects of using TAM in conjunction with other queueing analysis methods.

2) Integration of Process Description in IDEF3 with Queueing Networks, ***Ki-Young Jeong***, United Technologies Research Center, 411 Silver Ln, MS 129-55, East Hartford, CT 06108, jeongk@utrc.utc.com, ***Don T. Phillips***, ***Richard J. Mayer***

IDEF3, a process capture method, plays an important role in the design and analysis of manufacturing systems because it allows for descriptions that are both generic and consistent. We use IDEF3 descriptions as a common knowledge base from which quantitative models may be generated. Specifically, we focused on the procedure for generating a queuing network model from a given IDEF3 description...

3) Fluid Analysis of an Input Control Problem, ***Michael H. Veatch***, Gordon College, Dept. of Math., Wenham, MA 01984, veatch@gordon.edu

Wein's 2-station, 6-class MQNET control problem with input control is used to compare the fluid approximation with the diffusion approximation. State space collapse to a 2-dimensional workload is applied to the fluid and the diffusion. Fluid asymptotic optimality is considered. The MDP is solved to give a benchmark.

4) Monotonicity & Threshold Properties in Workload Models with Controlled Service Times, ***Gido Brouns***, Eindhoven University of Technology, PO Box 513, Eindhoven, 5600 MB, The Netherlands, ace@win.tue.nl, http://www.win.tue.nl/~ace, ***Jan van der Wal***

We consider some basic workload models for on-line decision-making in workflow processes. Under certain regularity conditions, we establish various monotonicity properties and show that there exists an optimal threshold policy for the decision to either continue or abort the service of a job.

WA41 OR at Ford

Cluster: **Unsolved OR Problems in Industry**
Invited Session

Chair: Erica Z. Klampfl, Ford Motor Co., E-Tech. Research Dept. SRL Bld, 2101 Village Rd., MD 2122, Dearborn, MI 48124, eklampfl@ford.com

1) Assessing Business Value for Manufacturing Process

Flexibility in the Automotive Industry, ***Gint V. Puskorius***, Ford Motor Company, SRL, Rm. 2125, MD 2122, 2101 Village Rd., Dearborn, MI 48124

Potentially large fluctuations in demand for vehicles, from the forecasts available when capacity planning decisions are made, can result in process flexibility to build either vehicle A or B being very valuable. For a portfolio of products, we want to evaluate optimal capacities and levels of process flexibility, given different possible levels of vehicle commonality, supplier flexibility and other parameters.

2) High-Volume Transactional Records Characterized by a Set of Standard Codes: Clustering, Analysis & Visualization Needs, ***Philip M. Tuchinsky***, Ford Motor Co., Scientific Res. Lab. MD 2122, 2101 Village Rd., Dearborn, MI 48124, ptuchins@ford.com

A transaction, e.g., a vehicle warranty repair, often includes a set of standard codes, e.g., representing parts or priced labor operations, that are the atomic data. How can we represent and cluster similar but not identical sets of alphanumeric text codes to reveal similar vs. different types of transactions, track clusters over time and see the emergence of new clusters?

WA42 Transportation

Contributed Session

Chair: Shahabeddin Toobaie, University of Maryland, Dept. of Civil Eng., 1173 Glen Martin Hall, College Park, MD 20742, shahabt@wam.umd.edu

1) The Punctuality of Railway Systems, ***Michiel J. Vromans***, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, mvromans@fbk.eur.nl

One of the main features of public transport is punctuality: are the published timetables realized by the operators? Because of the stochastic nature of transport processes, this is not always easy. How can we improve logistic plans, such that the reliability of passenger trains increases?

2) The Time-Varying Constrained Shortest Path in a Two-Level Road Network, ***Chi Fat Wong***, Chinese University of Hong Kong, Dept. of SE/EM, Shatin NT, Hong Kong, China, cfwong@se.cuhk.edu.hk, ***Paul Fung***, ***Janny M. Y. Leung***

We study a shortest path problem at a 2-level network where the transit times of the arcs are functions dependent on time. A mathematical formulation and an exact pseudo-polynomial algorithm will be provided. A heuristic approach making use of the features of our investigated network will also be considered.

3) Emergency Snow Routing with Route Continuity Constraints, ***Shahabeddin Toobaie***, University of Maryland, Dept. of Civil Eng., 1173 Glen Martin Hall, College Park, MD 20742, shahabt@wam.umd.edu, ***Ali E. Haghani***

We deal with the multi-depot snow routing problem where in addition to vehicle routing constraints and capacity constraint, the service route for each truck should be connected and the workload balanced. A 3-phase approach is sought: minimizing the number of trucks using the GAs, balancing workloads and routing the trucks using the conventional vehicle routing approach.

4) Free Flight Phase 1: Performance Metric Results, ***David A. Knorr***, Federal Aviation Administration, Free Flight Performance Metric, 1500 K St. NW, AOZ-40, Washington, DC 20005, dave.knorr@faa.gov

Free Flight Phase I is an initial step implementing air traffic controller automation tools focused on increasing airport and airspace capacity. As part of the implementation, the FAA has agreed to measure the operational changes associated with these tools. We describe the mechanisms for operational improvements, methodologies and results. Challenges associated with these analyses are also discussed.

WA43 Transportation Network Simulation & Analysis I

Sponsor: TSS

Sponsored Session

Chair: Baher Abdulhai, University of Toronto, Dept. of Civil Eng., 35 Saint George St., #105, Toronto, Ontario, M5S 1A4, Canada, baher@ecf.utoronto.ca

1) Performance of a Stable Route Guidance Model for Real-Time Deployment, ***Ta-Hui Yang***, Purdue University, Sch. of Civil Eng., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

Experiments are conducted to analyze the performance of a reactive dynamical system-based stable route guidance model for real-time deployment. The results are compared with those of a rolling horizon-based traffic assignment model and a deterministic DTA model. The proposed model can be implemented in sub-real time while ensuring performance comparable to the rolling horizon-based implementation.

2) A Hybrid Optimization-Mesoscopic Simulation Dynamic Traffic Assignment Model, ***Michael A. Florian***, INRO Solutions, 5160 Decaarie Blvd., Ste. 610, Montreal, Quebec, H3C 3J7, Canada, mike@inro.ca, ***Michael Mahut***, ***Nicolas Tremblay***

We present a new dynamic traffic assignment model based on the mesoscopic space-time queue network loading method developed by Mahut. This hybrid optimization-simulation method was applied to a portion of the Stockholm, Sweden road network which consists of 220 zones, 2080 links and 4965 turns. The results are presented.

3) Calibration of Highway Micro-Simulation Models using ITS Data, ***Kyu-Oh Kim***, Texas A&M University, Texas Tramsportation Inst., College Station, TX 77843, k-kim@ttimail.tamu.edu, ***L. R. Rilett***

Our premise is that ITS data provides a unique opportunity for calibrating and validating traffic simulation models. We will focus on the automatic calibration of micro-simulation models. Three optimization methods, GA, SA and simplex, will be used to calibrate the micro-simulation parameters in CORSIM and TRANSIMS. The test bed will be a freeway corridor in Houston, TX...

4) GENOSIM: A Genetic Algorithm-Based Optimization Tool for Automating the Calibration of Microscropic Traffic Simulation Models, ***Baher Abdulhai***, University of Toronto, Dept. of Civil Eng., 35 Saint George St., #105, Toronto, Ontario, M5S 1A4, Canada, baher@ecf.utoronto.ca, ***Tao Ma***

We introduce GENOSIM, a new optimization tool for automating the calibration of traffic micro-simulation models for faster, systematic and robust model building. GENOSIM is developed as an independent software employing state-of-the-art GAs for combinatorial parametric optimization and is integrated with a dynamic traffic microscopic simulation model using Paramics microsimulation suite...

WA44 Transportation Network Planning & Management

Sponsor: TSS

Sponsored Session

Chair: Anthony Chen, Utah State University, Dept. of Civil & Environ. Eng., Logan, UT 84322-4110, achen@cc.usu.edu

1) An Algorithm for the Paired Combinatorial Logit Route Choice Model, ***Anthony Chen***, Utah State University, Dept. of Civil & Environ. Eng., Logan, UT 84322-4110, achen@cc.usu.edu, ***Panatda Kasikitwiwat***

Recently, there is renewed interest in the logit-based route choice model. One of these extended logit models is the paired combinatorial logit model that can overcome the overlapping problem among routes. Equivalent formulation based on the paired combinatorial logit probability has been developed. However, no efficient solution algorithm is provided. We will present an algorithm for the paired combinatorial logit route choice model.

2) Dynamic Micro-Assignment of Travel Demand with Activity/Trip Chains, ***Ahmed F. Abdelghany***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78751, afsaissal@mail.utexas.edu, ***Hani S. Mahmassani***

We present an assignment framework for travel demand with activity/trip chains which can be used in conjunction with activity-based travel demand forecasting procedures as well as for traffic operational studies. The framework includes temporal-spatial micro-assignment models for activity/trip chaining in which trip chains are assigned over time and space.

3) Approaches for the Implementation of Variable Speed Limits, ***Thanasis Ziliaskopoulos***, Northwestern University, CEE Dept., Evanston, IL 60208, a-z@northwestern.edu, ***S. Travis Waller***, ***Huajing Shi***

We will address implementation issues relating to the development and evaluation of variable speed limits under variable scenarios within the US. These scenarios often require the optimization of different objectives, i.e., safety vs. delay. The functional requirements of such a system will be discussed as well as multiple methodological approaches as they relate to varying conditions and differing objectives.

4) An Internet-Based Geographic Information System that Integrates Data, Models & Users for Transportation Algorithms, ***Thanasis Ziliaskopoulos***, Northwestern University, CEE Dept., Evanston, IL 60208, a-z@northwestern.edu, ***S. Travis Waller***

We will discuss the development of an Internet-based GIS that brings together spatio-temporal data, models and users in a single efficient framework to be used for a wide range of transportation applications - planning, engineering and operational. The functional requirements of the system are outlined, considering

various enabling technologies, i.e., Internet tools, large-scale databases and distributed computing systems...

WA45 Management of Technology III

Contributed Session

Chair: Gezinus J. Hidding, Loyola University, 23 East Pearson St., Rm. 1423, Chicago, IL 60611, ghiddin@luc.edu, http://orion.it.luc.edu/~ghiddin

1) The Internet, Lead Users & Product Development, ***Jeff Thieme***, Syracuse University, Sch. of Mgmt., Syracuse, NY 13244, ***David Wilemon***

We discuss the use of Internet-based communication tools in implementing the lead user methodology in the product innovation process. We posit that using these tools can make the process more efficient and effective. A case study illustrating how Internet-based tools improve product quality, reduce development time and lower costs is presented.

2) Unbundling Modularity: Assessing Cost Implications of Product Architecture Differences, ***Sebastian K. Fixson***, MIT, Tech. Mgmt. & Policy Program, 77 Massachusetts Ave., E40-201, Cambridge,MA02139,fixson@mit.edu,www.mit.edu/people/fixson, ***Frank R. Field***

To assess its cost implications, "modularity" is often approximated with the use of "common" or "standardized" components. In contrast, we present a framework to unbundle the multiple features of modularity and to link them to individual cost effects. The employed cost models consider production and logistics processes and inventory.

3) The Value of Knowledge Management: A Simulation Approach, ***Gezinus J. Hidding***, Loyola University, 23 East Pearson St., Rm. 1423, Chicago, IL 60611, ghiddin@luc.edu, http://orion.it.luc.edu/~ghiddin

The value of knowledge management is generally quantified using static accounting- or finance-inspired approaches. Our research revolves around simulation modeling (of a firm) to determine the value of KM as dependent on dynamic aspects: (changing) rates of use or contribution, network externalities and decay of knowledge over time.

4) Understanding the Impact of Enterprise Systems of Firm Performance: A Dynamic Capabilities Perspective, ***Andrea Masini***, INSEAD, Blvd. de Constance, Fontainebleau, 77305, France, andrea.masini@insead.edu

We present a theoretical framework that explains why, through which mechanisms and under what environmental conditions, the adoption of an ERP system may augment or hamper the operational effectiveness of a business organization. The framework is built on the key intuition that the process reengineering required by the ERP adoption interferes with the knowledge evolution cycle...

WA46 Marketing VI

Contributed Session

Chair: Mario Simon, McKinsey & Company/Yale University, 303 West 21st St. #3E, New York, NY 10011, mario_simon@mckinsey.com

1) Capturing Value through Customized Coupons, ***Joseph Johnson***, University of Miami, 521 Jenkins Bldg., Coral Gables, FL 33124, jjohnson@miami.edu, ***Eddie Ip, Gerard J. Tellis***

We show how coupons can be creatively used to capture consumer surplus in the pricing of goods and services. We use customized coupons to set up a differential pricing scheme and then formulate the distribution of these coupons as a multiple knapsack problem to optimize retailer profits.

2) Choice under Complexity: The Effect of Focus on Consumer Decisions, ***Mario Simon***, McKinsey & Company/Yale University, 303 West 21st St. #3E, New York, NY 10011, mario_simon@mckinsey.com

The hypothesis that attentional focus may be more powerful when the choice environment is more complex is examined. A theoretical model/framework and preliminary experimental work are presented and new experiments are proposed. Implications for competitive strategy, advertising, marketing and political campaigning are discussed.

Wednesday 10:15-11:45

WB01 Computer Science/Applications

Contributed Session

Chair: Neal Lesh, MERL, 201 Broadway, 8th Fl., Cambridge, MA 02139, lesh@merl.com

1) Advantages & Applications of Human-Guided Search, ***Neal Lesh***, MERL, 201 Broadway, 8th Fl., Cambridge, MA 02139, lesh@merl.com, ***Joe Marks***

We will discuss our framework for interactive optimization and applications we developed for vehicle routing, jobshop scheduling and graph partitioning. We will show that interactive optimization leverages people's knowledge of real-word constraints and their skills in areas in which humans (currently) outperform computers, such as visual perception and strategic assessment.

2) Computer-Aided Process Planning Technology & Possible Role Expert Systems in the Process, ***Dragan M. Eric***, Sloboda, Ratka Mitrovic B. B., Cacak, 32000, Yugoslavia, leki@ptt.yu, ***Danijela G. Milosevic***

There has been given a presentation of the concept of the expert system role in designing of CAPP systems for the electric discharge machining technology. The role of this expert system would be, first of all, to define all necessary elements of the technological process.

3) Design of Multi-Agent Systems using Problem Decomposition & Task Allocation Approaches, ***Naga K. Krothapalli***, University of Massachusetts, Engineering Lab. Bldg., Dept. of MIE, Amherst, MA 01003, naga@farm.ecs.umass.edu, ***Abhijit Deshmukh***

We present a design approach for multi-agent systems that uses problem decomposition and task allocation methods in a specific problem context. Various problem decomposition techniques will be analyzed based on problem structure and convergence requirements. A task allocation technique with explicit communication cost considerations will also be presented.

4) Layered Architecture for Deployment of Business Components, ***Hemant K. Jain***, University of Wisconsin, School of Bus. Admin., Milwaukee, WI 53201, jain@uwm.edu, www.sba.uwm.edu/h_jain, ***Thavanati B. Reddy***

We present an overview of a research effort targeted at developing and deploying reusable business components. A distributed architecture based on Enterprise Java Beans, JSP and XML has been proposed. The prototype implementation of the architecture and application in an auto insurance claim domain is briefly described.

WB02 Queueing Models for Internet Traffic

Cluster: OR/MS & the Internet

Invited Session

Chair: Susan H. Xu, Pennsylvania State University, Dept. of MS/IS, Coll. of Bus. Admin., University Park, PA 16802, shx@psu.edu

1) Adaptive Congestion Control in the Internet, ***Christopher M. Rump***, University at Buffalo, 342 Bell Hall, Buffalo, NY 14260, crump@eng.buffalo.edu,www.acsu.buffalo.edu/~crump,***Seungwan Ryu***

We propose a new congestion control scheme at a router that utilizes an efficient congestion indicator that combines the (average) queue size and the input traffic load. We also propose an adaptive user response mechanism to the congestion indication from the network. Finally, we analyze and compare our schemes with others such as random early detection.

2) Performance of Caching Strategies in Web Servers, ***Emmanuelle Wallach***, Pennsylvania State University, Dept. of IE, 310 Leonhard Bldg., University Park, PA 16802, ejwl69@psu.edu, ***Natarajan Gautam***

We model the web server cache using a Markov chain and obtain the distribution of the cache contents. From that, we determine the probability of cache-hit under both LRU and LFU caching strategies. We compare the results with approximations for cache-hit probability in the literature.

3) A Class of Priority Queues in Discrete Time for Internet Applications, ***Attahiru S. Alfa***, University of Windsor, Dept. of IMSE, Windsor, Ontario, N9B 3P4, Canada, alfa@uwindsor.ca, ***Kandiyan P. Sapna***

We consider a discrete time single-server queue with 2 classes of customers. Service of a typp-2 customer can only start if there is no type-1 waiting. However, type-2 customers have a waiting time threshold. Under both the preemptive and non-preemptive strategies, we obtain the key performance measures.

WB04 Auctions in Finance

Cluster: Auctions

Invited Session

Chair: Aleksandar S. Pekec, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, pekec@duke.edu

1) Financing Auction Bids, ***Matthew Rhodes-Kropf***, Columbia University, Grad Sch. of Bus., Uris Hall, New York, NY 10027, mr554@columbia.edu, ***S. Viswanathan***

Bidders often finance their cash bids. Examining numerous financial markets shows that any deviation from perfect or complete information, precise levels of competition and the need for all bidders to obtain financing will result in inefficiencies. Overall, adverse selection in financial markets makes efficiency difficult to attain.

2) Designing Auctions of Financial Assets with an Unknown Number of Bidders, ***Aleksandar S. Pekec***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, pekec@duke.edu, ***Ilia Tsetlin***, ***Ronald M. Harstad***

The uncertainty about the number of participating bidders ought to influence the bid-taker's choice of the auction mechanism. In particular, we demonstrate that the policy to sell a fixed number of items regardless of the interest in the auction is not optimal. This observation points out many interesting auction design questions.

3) An Optimal Selling Policy in Multi-Item Auctions of Financial Assets with an Unknown Number of Bidders, ***Ilia Tsetlin***, Duke University, Fuqua Sch. of Bus., Durham, NC 27706, imt@mail.duke.edu, ***Aleksandar S. Pekec***, ***Ronald M. Harstad***

In order to derive optimal auction design, we define the auction cost in the common-value context, derive a symmetric equilibrium bidding function when the number of bidders is unknown and analyze its properties. Surprisingly, conclusions differ for uniform and discriminatory pricing rules. The information aggregation issue and its practical implications are discussed.

WB05 Geometric Programming

Cluster: Geometric Programming
Invited Session

Chair: Gary A. Kochenberger, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, gkockenberger@bus.olemiss.edu

1) Operations Management Applications of Geometric Programming, ***Carlton H. Scott***, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697, ***Thomas R. Jefferson***

It is well-known that the EOQ model and its variants can be modeled and solved as a geometric program. We show that a number of new models associated with OM and related to production control may also be profitably viewed in this way. Previously, these models were analyzed via calculus.

2) Some Important Probability Distributions Studied via Unconstrained Posynomial Minimization, ***Elmor L. Peterson***, North Carolina State University, Dept. of Math & OR, Raleigh, NC

Both the "equilibrium distribution" for a regular finite Markov chain and the "Shannon information-theoretic distribution" that should be inferred from statistically obtained moment conditions can be computed via the minimization of an appropriately defined posynomial. The prototype geometric dual comes directly from the modeling process. The corresponding primal program provides additional insights...

3) Solving Nonlinear Models with Geometric Programming & Staring at Them (Intelligently), ***Robert E. Woolsey***, Colorado School of Mines, Div. of Economics & Bus., Golden, CO 80401, rwoolsey@mines.edu, www.mines.edu/Academic/econbus/woolsey.html

I will present some intimidating non-linear optimization problems and demonstrate how they may be solved, virtually by inspection, using principles of geometric programming.

WB06 Security Issues in a Networked Business Environment

Cluster: Telecommunications
Invited Session

Chair: Mike Burmester, Florida State University, Dept. of CS, Tallahassee, FL 32306-4530, burmeste@cs.fsu.edu

Co-Chair: Vassilios Chrysikopoulos, Ionian University, Corfu, Greece, vchris@ionio.gr

1) Securing Large Open Networks from Denial of Service Attacks & Other Byzantine Threats, ***Mike Burmester***, Florida State University, Dept. of CS, Tallahassee, FL 32306-4530, burmeste@cs.fsu.edu, ***Vassilios Chrysikopoulos***

The survivability of a network in the face of malicious (Byzantine) attacks is often more important than tracing the attackers (hackers). For example, in the case of an electronic Pearl Harbor, it is important that the computer networks that support our critical infrastructures survive malicious attacks. We focus on large heterogeneous networks, such as the Internet, whose topology is dynamic and may not be known.

2) Biometrics & Public Key Infrastructures Securing E-Commerce, ***Christos Dimitriadis***, EXPERTNET SA, Aetideon St. 18, Athens, 15561, Greece, cricodc@expnet.gr, ***Despina Polemi***

Trust is the most critical factor that spreading e-commerce applications depends upon. Trust is translated to the need for identification, authentication, authorization, integrity, confidentiality and non-repudiation. PKIs are an effective approach for ensuring trust in e-commerce applications. We concentrate on the authentication need. Biometrics is the answer to the search for a system that provides a high level security...

3) Agent-Based Security in Intelligent Multimedia Retrieval in Intelligent Networks, ***Christos Douligeris***, University of Piraeus, Dept. of Informatics, 80 Karaoli & Dimitriou, Piraeus, 18534, Greece, cdoulig@unipi.gr, ***Rosa Mavropodi***, ***Panagiotis Kontzanikolaou***

We present a model of security and its performance effects on intelligent multimedia retrieval in an intelligent networks environment. Security issues arise in several nodes of the networks and there are different methods to cope with them. Alternative solutions are investigated.

4) Application of XML Digital Signatures in E-Commerce, ***Panagiotis Sklavos***, EXPERTNET SA, Aetideon St. 18, Athens, 15561, Greece, psklavos@expnet.gr, ***Alexandros Kaliontzoglou***, ***Christian Geuer-Pollmann***, ***Despina Polemi***

XML is a markup meta language that can revolutionize the way electronic data is formulated, organized and displayed. User communities with specific interests and needs can communicate using a custom language that best addresses their objectives. The flexibility that XML provides by means of a user-defined language can be combined with authentication and non-repudiation mechanisms implemented with digital signatures.

WB07 Bilevel Programming III

Cluster: Bilevel Programming
Invited Session

Chair: Gilles Savard, Ecole Polytechnique, Dept. of Math. & IE, CP 6079, Succ. Centre-Ville, Montreal, Quebec, H3C 3A7, Canada

1) A New Global Algorithm for Bilevel Programs on Networks, ***Laura Wynter***, PRISM Universite de Versailles/INRIA, Domaine de Voluceau, BP 105 Rocquencourt, Le Chesnay, 78053, France, laura.wynter@inria.fr, www.prism.uvsq.fr/~wynter

We present an analysis of the non-convex nature of the upper-level objective of a bilevel program over networks and develop a new algorithm for obtaining the global optimum. Numerical experience is provided.

2) Revisiting SQP for Nonlinear Programs with Complementarity Constraints, ***Danny Ralph***, University of Cambridge, Judge Inst. of Mgmt., Trumpington St., Cambridge, CB2 1AG, UK, danny.ralph@iims.cam.ac.uk, ***Roger Fletcher***, ***Sven Leyffer***, ***Stefan Scholtes***

NLPs with complementarity constraints, which typically are in the form of parametric nonlinear complementarity problems, are associated with theoretical and practical difficulties; namely, the lack of constraint qualifications leads to poor numerical conditioning. However, recent computational experiments initiated by Fletcher & Leyffer have shown surprisingly good behavior of certain SQP-based methods, including superlinear convergence rates. We investigate this interesting phenomenon.

3) Implementation of a Trust Region Algorithm for Solving Nonlinear Bilevel Programs, ***Benoit Colson***, FUNDP, University of Namur, Dept. of Mathematics, Rempart de la Vierge 8, Namur, B-5000, Belgium, benoit.colson@fundp.ac.be, ***Patrice Marcotte***, ***Gilles Savard***

We discuss the implementation of a trust region approach for solving non-linear bi-level programs where the trust region "model" consists of a linear-quadratic bilevel program. Through numerical examples, we show that a global solution of the original problem is frequently obtained, due to the strength of the approximation.

WB08 Stochastic Processes
Contributed Session

Chair: Peter M. Vanden Bosch, US Air Force, 4459 Kingslynn Rd., Niceville, FL 32578, pete.vandenbosch@eglin.af.mil

1) Speeding up Simulations of Stochastic Linear Programs with Quasi-Control Variates, ***Markus Emsermann***, Jeppesen Sanderson, 55 Inverness Dr. East, Englewood, CO 80112, markus.emsermann@jeppesen.com, ***Burton Simon***

We estimate the expected value of the objective function of stochastic LPs with random right hand sides. We employ a dual approximation to the primal problem to improve simulation efficiency using QCVs. Applications to power system reliability evaluation and petroleum refining will be presented.

2) Bayesian Analysis of Non-Homogeneous Markov Chains using Dirichlet Prior, ***Minje Sung***, George Washington University, Dept. of MS, Sch. of Bus. & Public Mgmt., Washington, DC 20052, sungmj@gwu.edu, http://gwis2.circ.gwu.edu/~sungmj

We use hierarchical Bayesian approach to describe the transition probabilities of non-homogeneous Markov chains. The Markov chain is used for describing transition behavior of emotionally disturbed children in a treatment program. We present Bayesian models with covariates using Dirichlet as conjugate prior for multinomial. The developed methodology is applied to some real data.

3) Moment Matching using a Family of Phase-Type Distributions, ***Peter M. Vanden Bosch***, US Air Force, 4459 Kingslynn Rd., Niceville, FL 32578, pete.vandenbosch@eglin.af.mil

I'll present an approach to matching the first 3 moments of distributions with positive support. This approach was useful in a queueing application and variants may be useful for other problems.

4) Dynamic Load Plan Selection for Package Delivery, ***David E. Benson***, University of Michigan, 4757 Tatersall Ct., Gahanna, OH 43230, debenson@umich.edu, ***Chelsea C. White, III***

A package loader may select a new load plan during the loading process in order to balance work between vehicles. The problem is modeled as a MDP. We present structured results, conditions for action elimination and a heuristic based upon the action elimination conditions.

5) Optimal Stopping of One-Dimensional Diffusion Processes, ***Savas Dayanik***, Columbia University, Dept. of IEOR, 331 SW Mudd, 500 West 120th St., New York, NY 10027, savas@ieor.columbia.edu, http://www.ieor.columbia.edu/~savas, ***Ioannis Karatzas***

Decision making in stochastic environments often involves optimal stopping problems. Pricing American options and entrance and exit times for investment projects are a few examples. We present a new methodology for solving optimal stopping problems for 1-dimensional diffusion processes, using concave functions and their extensions. Our work extends the results of Dynkin & Yushkevich.

WB10 Data Envelopment Analyses IV
Contributed Session

Chair: Peter J. Weigel, St. Louis University/Ameren Corporation, 3674 Lindell Blvd., St. Louis, MO 63108, pweigel@ameren.com

1) Evaluation of Distribution Efficiency of Medical Care System with Data Envelpment Analysis, ***Mami Furukubo***, Hokkaido University, Grad. School of Eng., Kita-Ku, N13 W8, Sapporo, Hokkaido, 060-8628, Japan, mami@complex.eng.hokudai.ac.jp, ***Azuma Ohuchi***

We evaluate the distribution efficiency of medical care system using DEA and AHP. We determine inputs rate with an AHP-based questionnaire to take into account the opinions of patients. We analyze the Hokkaido where per capita medical expenses are the highest in Japan and show the guidelines of improvements.

2) withdrawn 10/2: Estimating Shareholder Value Maximization using Data Envelopment Analysis, ***Peter J. Weigel***, St. Louis University/Ameren Corporation, 3674 Lindell Blvd., St. Louis, MO 63108, pweigel@ameren.com, ***N. K. Kwak***

3) Environmental Factors in the Assessment of Efficiency in Electricity Distribution, ***Mikko J. Syrjanen***, Helsinki School of Economics, Runeberginkatu 22-24, PO Box 1210, Helsinki, FIN-00101, Finland, mikko.syrjanen@hkkk.fi, ***Pekka J. Korhonen***

Different approaches to include environmental factors in DEA are compared. Potential environmental factors, their selection process and the approaches to include them are discussed in the context of Finnish electricity distribution companies. The results are based on the DEA model developed for regulating electricity distribution in Finland.

WB11 Networks & Graphs III
Contributed Session

Chair: Wayne J. Pullan, Griffith University, Sch. of IT, Gold Coast, QLD, 9726, Australia, w.pullan@gu.edu.au

1) withdrawn 10/12: Optimizing Multiple Aspects of Network Survivability, ***Wayne J. Pullan***, Griffith University, Sch. of IT, Gold Coast, QLD, 9726, Australia, w.pullan@gu.edu.au

2) Extensions of Matching Problems on Plane Bipartite Graphs, ***Hua Ni***, George Washington University, Dept. of EM/SE, 707 22nd St. NW, Washington, DC 20052, nihua@gwu.edu, ***Herman Abeledo***

We study generalizations of the Clar and Fries indices, 2 optimization problems from chemical graph theory. Each problem has a natural formulation that is unimodular, but not totally unimodular. We derive totally unimodular formulations for both problems and use a network flow model to obtain a combinatorial dual for the Fries index.

3) withdrawn 10/2: Integer Programming Heuristics for the Weighted Maximal Planar Graph Problem, ***Merza H. Hasan***, Kuwait University, PO Box 5486, Safat, 13055, Kuwait, merza@kuc01.kuniv.edu.kw, ***Ali H. Abdullah***, ***Ibrahim H. Osman***

4) A Graph Theoretic Heuristic based on Circuit Decomposition, ***Margaret K. Patterson***, University of Maine at Augusta, 65 Main St., Bowdoinham, ME 04008, margaret@maine.edu, ***J. MacGregor Smith***

The facility layout problem is modeled as a circuit decomposition process where the maximum clique and travelling salesman problems are utilized to extract circuits from the graph adjacency matrix, then developed into block plan layouts. Computational experiments with graphs up to N=50 activities are presented.

WB12 Heuristics Programming II
Contributed Session

Chair: Bahram Alidaee, University of Mississippi, Hearin Ctr. for Enterprise Sci, School of Bus., University, MS 38677, balidaee@bus.olemiss.edu, www.bus.olemiss.edu/balidaee

1) Fast Heuristics for Very-Large-Scale Maximum Independent Set & Related Problems using Neural Networks Approach, ***Bahram Alidaee***, University of Mississippi, Hearin Ctr. for Enterprise Sci, School of Bus., University, MS 38677, balidaee@bus.olemiss.edu, www.bus.olemiss.edu/balidaee, ***Gary A. Kochenberger***, ***Parviz Ghandforoush***

We give heuristics that can give relatively good solutions within a reasonable time for very-large-scale maximum independent sets and related problems. We use Hopfield & Tank neural networks optimization models to deal with the problem. Based on several theoretical results, we give heuristics that can be implemented in a very short time. We use heuristics procedures from sequencing literature...

2) A Refinement of Dowsland's Tabu Search Algorithm for the Manufacturer's Pallet Loading Problem, ***Vitoria Pureza***, Federal University of Sao Carlos, Via Washington Luiz km. 235, Sao Carlos SP, 13565-905, Brazil, vpureza@power@ufscar.br, ***Cintia Yamassaki***

We present a Dowsland's tabu search-based implementation for the manufacturer's pallet loading problem. A simple routine designed to improve packing in areas with greater infeasibility was incorporated. The resulting implementation was applied to instances from the literature and practical contexts, providing optimal solutions and reduced CPU times.

3) A Tabu Search Approach to the Orienteering Problem, ***Orhan Dengiz***, Auburn University, 207 Dunstan Hall, Auburn, AL 36849, dengior@eng.auburn.edu, ***Sadan Kulturel-Konak***, ***Alice E. Smith***

We present a tabu search approach to the orienteering problem, an NP-hard combinatorial problem to choose a route through a subset of specified nodes, with predefined starting and ending nodes. The objective is to maximize the total collected score within a given time or distance constraint.

4) A Problem Space Genetic Algorithm to Solve Bicriteria Scheduling & Tool Management Problems, ***Ayten Turkan***, Bilkent University, Dept. of IE, Ankara, 06533, Turkey, ayten@bilkent.edu.tr, ***Selim Akturk***, ***Robert H. Storer***

A PSGA is proposed to solve bi-criteria scheduling and tool management

problems simultaneiously in FMSs. We have 2 objectives: minimizing manufacturing and total weighted tardiness. The PSGA finds approximately efficient solutions minimizing both objectives.

5) Minimizing Products Rates Variation in Just-in-Time Production Systems, ***Ghorbanali Mohammadi***, Brunel University, Systems Eng. Dept., Uxbridge, Middlesex, UB8 3PH, UK, ghorbanali.mohammadi@brunel.ac.uk

Mixed-model assembly lines are often used in manufacturing based on JIT techniques. The effective utilization of these lines requires that a schedule for assembling the different models be determined. The objective is to minimize the total deviation of actual production rates from the desired production rates. We present a practical procedure to minimize total product variation rates that is easy to use by the practitioner.

WB13 Information Systems II

Contributed Session

Chair: Solomon Antony, Texas Tech University, MS 2101, Lubbock, TX 79409, santony@ttacs.ttu.edu, www.ba.ttu.edu/isqs/antony

1) The Effects of the Interface on Implicit Learning: An Empirical Investigation using Database Design Aids, ***Solomon Antony***, Texas Tech University, MS 2101, Lubbock, TX 79409, santony@ttacs.ttu.edu, www.ba.ttu.edu/isqs/antony, ***Radhika Santhanam***

Generally, knowledge-based tools are designed to assist users in problem solving activities. However, the human-computer interaction would result in improvement of user-knowledge on problem solving and the task domain. Using a KBS for database design we measured the effects of interface characteristics (restrictive- or guidance-oriented) on learning outcomes.

2) Preserving Confidentiality: Swapping & Perturbation, ***Krish Muralidhar***, University of Kentucky, Gatton Coll. of Bus. & Econ., Lexington, KY 40506-0034, kmura0@pop.uky.edu, gatton.uky.edu/faculty/muralidhar/index.html, ***Rathindra Sarathy***

Masking techniques are commonly used to preserve the confidentiality of sensitive numerical data residing in databases. Two most commonly used techniques are perturbation and swapping. Knowledge of their relative effectiveness is limited and there is no consensus on the appropriate technique. We present a theoretical basis for their comparison.

3) withdrawn 9/27: Implementing Dedicated Application Software, ***Sung J. Shim***, Seton Hall University, 400 South Orange Ave., South Orange, NJ 07079, shimsung@shu.edu, ***Byung K. Min***

4) Meeting Challenges in Information Systems, ***Pedro R. Kanof***, George Washington University, 1669 32nd St. NW, Washington, DC 20007, pkanof@aol.com

We present a solution to the organiztion need to adapt their ISs to meet new challenges in a timely manner by integrating 2 tools: development and implementation planning and standards of development and documentation, thus guaranteeing meeting deadline, cost and quality criteria.

5) Decreasing Information Costs & Tiering of the Supply Chain, ***Larry R. Arnold***, Tulane University, 7 McAlister Dr., New Orleans, LA 70118, larnold@tulane.edu, ***Grahovac Jovan***, ***Geoffrey G. Parker***

We develop a competitive model of search for supply chain partners where product architecture and IT investment affect costs. Search costs are lower in IT investment but integral product design mutes the effect. We use this framework to characterize equilibrium tiering strategies for the overall design of the supply chain.

WB14 E-Commerce V

Contributed Session

Chair: Kevin Zhu, University of California, 340 Grad. Sch. of Mgmt., Irvine, CA 92697-3125, kzhu@gsm.uci.edu, http://web.gsm.uci.edu/kzhu/

1) The Informational Role of Business-to-Business Exchanges, ***Kevin Zhu***, University of California, 340 Grad. Sch. of Mgmt., Irvine, CA 92697-3125, kzhu@gsm.uci.edu, http://web.gsm.uci.edu/kzhu/

We develop an economic model and examine the incentives for suppliers and manufacturers to participate in the B2B exchange. Our model demonstrates the significance of the informational effects of online B2B exchanges and shows why information transparency of the online collaboration environment is a double-edged sword.

2) E-Supply Chain Systems & Implementation Challenges: A Framework, ***Somendra Pant***, Clarkson University, Box 5790, Potsdam, NY 13699-5790, pants@clarkson.edu, www.clarkson.edu/~pants, ***Rajesh Sethi***, ***Madan Bhandari***

We focus on web-based systems used for integrating e-supply chains. Based on real-life case studies, we develop a 2X3 scheme for classifying approaches to automating, coordinating and integrating e-supply chains. We also focus on how technical, organizational and inter-organizational challenges in the implementation of e-supply chains vary across 6 classes of e-supply chains.

3) Moduleco: A Multi-Agent Software for Virtual Markets Simulations, ***Benoit Leloup***, Ecole Nationale Superieure des Telecommunications, BP 832, Brest, 29280, France, benoit.leloup@enst-bretagne.fr, ***Denis Phan***, ***Antoine Beugnard***, ***Sebastien Chivoret***

Moduleco is a multi-agent software designed to study market phenomenon, especially the interaction between human and artificial components, i.e., pricebots, in e-business and e-finance. Informational, institutional and cognitive assumptions are explicitly drawn. We provide comparative results upon the role of communication structure in the market dynamics when preference interdependency exists.

4) Employing the SERVQUAL Model in Outcome Assessment of Distance Learning vs. Traditional Course Delivery: A Preliminary Analysis, ***Clare L. Comm***, University of Massachusetts, 310 Pasteur Hall, Lowell, MA 01854, clare_comm@uml.edu, ***Duncan G. LaBay***

Student faculty course evaluations were analyzed using the SERVQUAL model (Parasuraman et al 1988). A longitudinal study was done. Data were collected from students at the beginning of the semester in the required principles course of management in the distance learning (cyber) courses and traditional courses. At the end of the semester, data were collected from these same students...

WB16 Strategic Management

Contributed Session

Chair: Debasish N. Mallick, University of Minnesota, Carlson Sch. of Mgmt., Minneapolis, MN 55455, dmallick@csom.umn.edu

1) Strategic Management & Respective Support Tools for a Forest Industry Company, ***Hannu Kivijarvi***, Helsinki School of Economics & Business Administration, Box 1210, Helsinki, 00101, Finland, hannu.kivijarvi@hkkk.fi, http://www.hkk.fi/~iss~staff~hkivijarv.htm, ***Markku Tuominen***

We establish a general framework for building a distributed strategic DSS that integrates advances in a corporate-wide simulation, group support system and hierarchical evaluation procedure. The ideas of the management team about organizational goals, objectives or strategies can be captured by the group support system. The corporate-wide simulation model encourages the participants to establish long-term views of policy and strategic issues...

2) Product Development Performance & its Relationship to Business Success, ***Debasish N. Mallick***, University of Minnesota, Carlson Sch. of Mgmt., Minneapolis, MN 55455, dmallick@csom.umn.edu, ***Roger Schroeder***, ***Sriram Thirumalai***

We explore the strategic role of product development in gaining competitive advantage. Using a database of 38 product development projects, we study the drivers of product development performance and its relationship to business performance.

3) withdrawn 9/20: The Role of the Project Management Office in Achieving Project Success, ***Christine X. Dai***, George Washington University, 1603 Kirby Rd., McLean, VA 22101, cdai@gwu.edu, ***Scott T. Serich***

4) Valuation of an Information Technology Venture using a Real Option Model, ***Jong Wook Jeong***, Seoul National University, Techno-Econ. & Policy Program, San 56-1 Shilimdong Kwamak-Gu, Seoul, 151-744, Korea, mirue@snu.ac.kr, ***Hyun-Jung Lee***, ***Jeong-Dong Lee***, ***Tae Kyui Ryu***

We apply a real option valuation model to one of the ventures in Korea using stochastic process. Real options are built into a growth opportunity by an in-depth analysis of the future investment plan. We provide the economic value of the venture and the additional cost caused by the market uncertainty.

WB17 Operations Management

Contributed Session

Chair: Canan R. Savaskan, Northwestern University, Kellogg Sch. of Mgmt., 2001 Sheridan Rd., Evanston, IL 60208, r-savaskan@kellogg.nwu.edu

1) Strategic Decentralization of Reverse Channels & Price Discrimination through Buy-Back Payments, ***Luk N. van Wassenhove***, INSEAD, Blvd. de Constance, Fontainebleau, 77305, France, luk.van.wassenhove@insead.fr, ***Canan R. Savaskan***

In a remanufacturing environment, we examine how buyback payments for used products can be a means to coordinate pricing decisions in the forward channel when retailing is competitive. We also investigate the implications of product take-back and remanufacturing on the retailers' strategic behavior.

2) Choice of Warranty Cost Charge-Back Contracts to Minimize Total Supply Chain Costs, ***Canan R. Savaskan***, Northwestern University, Kellogg Sch. of Mgmt., 2001 Sheridan Rd., Evanston, IL 60208, r-savaskan@kellogg.nwu.edu

We examine the use of warranty charge-backs to suppliers to minimize total cost (product cost plus warranty cost) across the supply chain chain. Using the principal-agent framework, we compare different warranty cost sharing contracts, i.e. fixed share rate, incentive (target) system and supplier responsible rate, taking into consideration the uncertainty in the responsibility determination process.

WB18 Service Industry

Contributed Session

Chair: Anita L. Tucker, Harvard University, Morgan Hall T-80, Boston, MA 02163, atucker@hbs.edu

1) Service Preparation Failures: An Empirical Investigation of Front Line Problem Solving, ***Anita L. Tucker***, Harvard University, Morgan Hall T-80, Boston, MA 02163, atucker@hbs.edu

We present results from a multi-hospital study in which we explore the influence of organizational factors on front-line worker response to supply and information problems. Our findings suggest that it is not only individual responses, but also patterns of response that impact productivity and both patient and nurse satisfaction.

2) Configuring Online Customer Service based on Context & User Characteristics, ***Craig M. Froehle***, University of Cincinnati, Coll. of Bus. Admin., 521 Lindner Hall PO Box 210130, Cincinnati, OH 45221-0130, craig.froehle@uc.edu, ***Aleda V. Roth***

We examine how user and context characteristics may be used to configure online customer service systems that result in improved service outcomes. Specifically, we show how user tenure and issue criticality are empirically linked to increased customer loyalty and improved technology utilization, dependent upon the user's choice of communication medium.

3) Technician Recruitment Planning in Knowledge-Intensive Call Centers, ***Sanjeev K. Bordoloi***, College of William & Mary, Sch. of Bus., PO Box 8795, Williamsburg, VA 23187, skbord@business.wm.edu, http://business.wm.edu/skb

With the rapid evolution in process technology in recent years, many service companies require workers to acquire and maintain more extensive "knowledge stock" than before. We address the human resource planning situation in a knowledge-intensive call center operation. We offer a control rule that minimizes the overall labor costs.

4) An Empirical Analysis of the Magnitude & Drivers of Misplaced SKUs in Retail Stores, ***Zeynep Ton***, Harvard Business School, Morgan Hall T61A, Boston, MA 02163, zton@hbs.edu, ***Ananth Raman***

Products in stores are often misplaced in areas where customers cannot find or purchase them. Consequently, customers may experience stockouts even when the SKUs they want to purchase are present. Using empirical data obtained from physical audits of 242 stores conducted at a large retailer, we quantify the magnitude of this problem and study its drivers.

5) withdrawn 9/13: Teaching Quantitative Service Operations, ***Richard D. Metters***, Emory University, 1300 Clifton Rd. NE, Atlanta, GA 30322-2710, richard_metters@bus.emory.edu

WB19 Inventory & Routing

Sponsor: Logistics

Sponsored Session

Chair: Stephan Brady, AFIT, Dept. of Operational Sci., WPAFB, OH 45433-7765, stephan.brady@afit.edu

Co-Chair: Stephen M. Swartz, AFIT, Dept. of Operational Sci., Wpafb, OH 45433-7765, stephen.swartz@afit.mil

1) The Scheduling of Truck Loads in a Stochastic Environment, *S. Dekker*, Erasmus University Rotterdam, Sch. of Economics, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, ***R. Dekker***, ***P. van Scheepstal***

We consider the scheduling of 2 types of transportation jobs. One that can be planned freely (a plan job) and one that should be directly executed upon request (a call job). Both types have a known duration and execution window. The problem is to schedule the plan jobs and reserve capacity for the call jobs such that as many jobs as possible are carried out...

WB20 Management of Technology II

Contributed Session

Chair: Kwok L. Shum, Stanford University, Dept. of MS & Eng., PO BOx 11445, Stanford, CA 94309, kwokshum@stanfordalumni.org

1) withdrawn 10/11: A Simple Firm Level Innovation Coordination, ***Kwok L. Shum***, Stanford University, Dept. of MS & Eng., PO BOx 11445, Stanford, CA 94309, kwokshum@stanfordalumni.org

2) Learning Before & During Knowledge Transfer: An Exploratory Case Study, ***Abdelkader Daghfous***, American University of Sharjah, PO Box 26666, Sharjah, UAE, adaghfous@aus.ac.ae

We explore the contributions of learning activities and prior technical and organizational knowledge, of the recipient firm, to the benefits to that firm from a technology transfer project with a Pennsylvania State University engineering lab. The roles of uncertainty and the firm's absorptive capacity are also discussed.

3) Technology Portfolios: A Novel Approach, ***Ozgur E. Gurtuna***, Concordia University, Molson Sch. of Bus., 1455 de Maisonneuve Blvd. West, Montreal, Quebec, H3G 1M8, Canada, gurtuna@yahoo.com, www.tcentral.org

We present a novel approach for the valuation and strategic planning of technology portfolios. Merging real options methodology with portfolio optimization enables us to capture the value of flexibility as well as the interactions between individual projects. The impact of technical and market risks on valuation is also considered.

4) Product Introductions & Obsolescence: A Study of Capacity & Time-Driven Price Erosions, ***Shankar Sundaresan***, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu, ***Michael Pangburn***

Product obsolescence encourages using capacity to satisfy demands early. But, as evidenced recently by memory chip prices, too much output may cause a costly traversal down the demand curve. We develop and apply analytical and empirical models to investigate pricing, capacity and obsolescence interrelationships in high-tech products.

WB21 Strategic Implications of Operational Integration

Cluster: Manufacturing Strategy

Invited Session

Chair: Jeff K. Stratman, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0205, jeff.stratman@mgt.gatech.edu

1) Product & Process Complementarities in E-Business: An Empirical Analysis of Electronic Food Retailers, ***Gregory R. Heim***, Boston College, OP. & Strategic Mgmt., Carroll Sch. of Mgmt., Chestnut Hill, MA 02467, heimgr@bc.edu, ***Kingshuk K. Sinha***

We propose a product-process matrix for e-business. Using the matrix as our conceptual framework, we will empirically examine the complementarities between e-products and e-processes and their impact on online customer satisfaction. We will discuss the implications of the results for product-process integration in e-business.

2) Navigating Business-to-Business Marketplaces: A Model, Propositions & Pre-Test, Design-Stage Scale Development, ***Eve Rosenzweig***, University of North Carolina, Kenan-Flagler Bus. Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490, rosenzwe@bschool.unc.edu, ***Aleda V. Roth***

We propose a coalignment model of seller competence that assumes sellers require a portfolio of integrating mechanisms, skills and practices to compete effectively within various B2B marketplaces. Drawing from extant literature, we develop scales for our proposed dimensions of seller competence and supply chain performance. Through the Q-sort method, we found our scales exhibited sufficient reliability and validity.

3) Integrating Operational Information Systems: Strategic

Implications for Organizational Development, ***Jeff K. Stratman***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0205, jeff.stratman@mgt.gatech.edu, ***Aleda V. Roth***

Management information systems have trended toward increasing integration across business functions, which has had a profound impact on the strategic organizational aptitudes required of adopting firms. We evaluate a series of path models linking organizational aptitudes with business performance, using survey data from North American manufacturing firms using ERP systems.

WB22 Transportation Applications of Forecasting

Cluster: Forecasting
Invited Session
Chair: Kenneth Lawrence, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu

1) Joining Data Envelopment Analysis with Forecasting, ***Timothy Elkins***, Rutgers University, Grad. Sch. of Mgmt., Newark, NJ 07102, ttelkins@pegasus.rutgers.edu, ***Kenneth Lawrence***

DEA has been used as a static technique, typically to rank DMUs or time periods of an individual DMU with an efficiency score based on multiple inputs and outputs. DEA is joined with traditional forecasting techniques to form the basis of a DSS. The approach employs 2 stages, the first being the forecast of the key variable(s)...

2) The EM Algorithm for Unconstraining Censored Demand Data, ***Richard H. Zeni***, US Airways, 2345 Crystal Dr., Arlington, VA 22227, rick_zeni@usairways.com

The EM algorithm is a general-purpose method for maximum-likelihood estimation in incomplete-data problems. We discuss the application of the EM algorithm to estimate unconstrained demand from censored data in a revenue management system. An extension to the algorithm, developed as part of this research, will be discussed. The resulting improvements of forecasting accuracy will be presented.

3) Forecasting the Flow of Freight by Railroad in the United States, ***Kenneth Lawrence***, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu, ***Gary Kleinman***

This forecasting model will predict the flow of freight between major cities in the continental US using railroads. The model structure will be that of an extended gravity model which includes the standard variables of a gravity model as well as other economic variables.

WB24 Industry Applications II

Contributed Session
Chair: Elliot H. Levy, US Department of Commerce, H2220 Herbert C. Hoover Bldg., Washington, DC 20230, elliot_levy@ita.doc.gov

1) Application of Zero-Sum Game Theory in US Trade, ***Elliot H. Levy***, US Department of Commerce, H2220 Herbert C. Hoover Bldg., Washington, DC 20230, elliot_levy@ita.doc.gov

The technique was applied in US trade with Brazil for derivation of optimum trade balance under different strategies, e.g. saddle points. The payoff matrices are in terms of the US as Player 1. Outcome scenarios were developed around an actual 1997 trade balance from increased/decreased low-, middle- and high-total industrial wage classes.

2) Optimizing the Cutting of Stock Plates in a Furniture Company, ***Reinaldo Morabito***, Federal University of Sao Carlos, Dept. de Eng. de Producao, Sao Carlos SP, 13565-905, Brazil, morabito@power.ufscar.br, ***Marcos Arenales***

We analyze practical aspects of the application of a cutting stock model to a Brazilian company that manufactures furniture on a large scale with a high degree of standardization. Examples derived from the company are used to illustrate some of the trade-offs involved.

3) Information Technology & Health Care, ***Adi Armoni***, CIS Dept., Coll. of Mgmt., 19 Yehuda Hanasy St., Tel-Aviv, 69206, Israel, armonia@post.tau.ac.il

The application of information technology to health care, triggered from the development of medical instruments and of requirements on the registration and processing of medical services and electronic patient records, imposed by government, insurance companies or research purposes. Those reasons have led to extensive research, development and the use of health care information systems.

4) Integration of Continuous Caster & Hot Strip Mill Planning for Steel Production, ***Sang Hyuck Park***, RIST, Production Mgmt. Team, 32 Hyoja-Dong, Nam-Ku, Pohang, Kyungbuk, 790-330, Korea, parksh@rist.re.kr

At POSCO Steel Works, the scheduling problem of continuous caster and hot strip mill is managed by human experts, but it is a heavy burden due to the intrinsic complexity of the problem. Thus, we developed a constraint-based scheduling system for the multi-stage production line.

WB25 Business Applications

Contributed Session
Chair: Charles Polk, Net Exchange, 12625 High Bluff Dr., Ste. 316, San Diego, CA 92130, polk@nex.com

1) Combinatorial Matching in Logistics E-Markets, ***Charles Polk***, Net Exchange, 12625 High Bluff Dr., Ste. 316, San Diego, CA 92130, polk@nex.com

In 1993, Net Exchange architected a trucking route auction for Sears Logistics Services. The market was the first commercial business application of combinatoric matching in e-commerce. Net Exchange's unique perspective on market design and engineering (optimization) allowed the firm to architect a market that saved Sears $80 million in 3 years.

2) On-Line Empty Car Distribution Planning at Green Cargo, ***Martin Joborn***, Carmen Consulting, Maria Bangata 6, Stockholm, SE-11863, Sweden, martin@mai.liu.se, http://www.carmen.se

We present a new system for empty freight car distribution planning at Green Cargo, Sweden. The kernel of the system is an optimization model that calculates the availability of empty freight cars in an on-line fashion and constructs detailed distribution plans, taking the transportation capacities of the trains into account.

3) withdrawn 9/18: A Technique for Aggregating Multiple Evaluations, ***Donald N. Stengel***, California State University, 5245 North Backer Ave., MS PB07, Fresno, CA 93740-8001, dons@csufresno.edu

WB26 Undergraduate Projects in OR II

Cluster: Undergraduate OR Projects
Sponsor: MAS
Invite/Sponsor Session
Chair: Jeff Havlicek, US Air Force Academy, 2354 Fairchild Dr., Ste. 6D2AFA, CO 80840, jeff.havlicek@usafa.af.mil

1) A Base Camp Design Methodology for Operations other than War, ***Luke Wittmer***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, ***Frank Snyder***

Supporting military OOTW is a complex endeavor. Through a simulated OOTW, a methodology is developed and tested to decide where to establish a base camp, how to organize that base camp, how to manage operational and logistical needs and how to deploy and manage materiel.

2) Modeling C2ISR with Extended Air Defense Simulation, ***Rob Sickorez***, USAF Academy, Dept. of Math Sciences, 2354 Fairchild Dr., Ste. 6D2A, USAFA, CO 80840, ***Jeff Grobman***, ***Rob Gilchrist***, ***Jeff Havlicek***

Military scenarios are simulated to measure the command, control, information, surveillance and reconnaissance capabilities of US forces. Scenarios include ground troop, mechanized infantry, surface-to-air missile and AWACS interaction with friendly forces. Results provide insight into detection and reaction capabilities of US forces under current and potential threat scenarios.

3) The Effect of Information Availability at the Tactical Level, ***Ira Crofford***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, ***David Sanders***

We address the appropriate level of information availability in a tactical setting at the small unit level. We examine this issue through agent-based modeling in the setting of complex adaptive systems. We will explore this information boundary in terms of differences in combat outcomes due to information availability.

4) Systems Dynamics for Objective Force Analysis, ***Cody Beck***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, x22782@usma.edu, ***Kevin Johnson***, ***Robert Newbill***, ***Michael J. Kwinn, Jr.***

Heretofore widely accepted analysis techniques and MOEs have failed to fully capture the effectiveness of objective force soldier and future combat system due to the non-linearity afforded by information. We have begun work on a new approach using systems dynamics to address this non-linearity in information-based combat systems.

WB28 Decision Analyses III

Contributed Session

Chair: Ali Abbas, Stanford University, 37 Angell Ct., #210, Stanford, CA 94305, aliabbas@stanford.edu, www.stanford.edu/~aliabbas

1) Ordinal & Cardinal Utility: Experimental Arguments based on Prospect Theory, ***Carolina Barrios***, GRID, Bulgaria 200 y Diego de, Almagro, Pent House, Quito, Ecuador, cabala71@yahoo.com, ***Mohammed Abdellaoui***, ***Peter P. Wakker***

The link between utilities derived from observed choices under risk and utilities derived from direct strength of preference judgement is investigated experimentally. An empirical relationship between risky and riskless utility is established. The results obtained reveal the importance for economics as well as for utility function elicitation in decision analysis.

2) Entropy Methods in Decision Analysis Practice, ***Ali Abbas***, Stanford University, 37 Angell Ct., #210, Stanford, CA 94305, aliabbas@stanford.edu, www.stanford.edu/~aliabbas

A decision-maker is interested in a quantity, theta. He consults an expert who provides 5 fractiles. Using the maxiumum entropy method, we show how to reconstruct a full distribution, how to filter off erroneous points acquired during the probability assessment, aggregate opinions from several experts and compare to previous work.

3) A T-Ordered Algorithm for Multi-Criteria Problem Solving, ***Igor Chernorutskiy***, Saint Petersburg State Technical University, 29 Politekhnitcheskaya Str., Saint Petersburg, 195251, Russia, http://www.unilib.neva.ru/stu/faculty.html#8, ***Boris V. Peltsverger***, ***Svetlana B. Peltsverger***

We will discuss different approaches to multi-criteria problems solving which are based upon the idea of criteria ordering. We will show that a t-ordered algorithm allows to solve problems which cannot be solved by some others algorithms.

4) Repeated Play of a Single Gamble, ***John A. Aloysius***, University of Arkansas, IS Dept., WCOB 204, Fayetteville, AR 72701, aloysius@comp.uark.edu, http://comp.uark.edu/~aloysius/

Behavioral research shows that experimental subjects who reject the single play of a gamble, may however, accept repeated plays of that same gamble. The rationality or otherwise of such a pattern of behavior has frequently been the subject of theoretical research beginning with Paul Samuelson's colleague (SC), who gained notoriety in a well-known paper...

5) The International Organization for Standardization: Is it a Discrimination or an Improvement?, ***Mohammad A. Quasem***, Howard University, Dept. of IS & Analysis, Washington, DC 20069, mquasem@howard.edu

The ISO develops worldwide agreements that create a universal standard of quality, forming a simplistic trading environment. ISO certification provides familiarity by indicating that a supplier maintains internationally recognized quality standard. A study will be conducted to examine how ISO has made a vital effect on the country applied for ISO certificate.

WB29 Quality Assurance & Control

Sponsor: QSR

Sponsored Session

Chair: Young Jin Kim, Mississippi State University, Dept. of IE, PO Box 9542, MS 39762-9542, ykim@ie.msstate.edu

1) A Process-Oriented Quality Management System, ***Arzu Akcal***, IDEA AS, Ankara Astalti Arcelik AS Ustu, Tuzla-Istanbul, 81719, Turkey, arzua@idea.com.tr

ISO 9000:2000 QMS provides a systematic approach to improve business processes to satisfy customers. As such, processes are the key elements of this approach. In time, processes may be changed or altered as needed, but these changes must be integrated within the framework of the QMS.

2) A Quality Assurance System for Software Application Development Projects, ***Emma Garza***, Universidad de Monterrey, Ave. I Morones Prieto 4500 Pte, Pedro Garza Garcia, NL 66238, Mexico, ***Bernardo Villarreal***, ***Teresa Villarreal***, ***Martin B. Tellez***

The development of software application projects is a special process because it is not standardizeddardized; each product is each product is unique and the client usually defines his requirements vaguely or subjectively. Under this scenario, it becomes necessary to have a quality system to provide assurance that the products are delivered with quality and timely, the client is satisfied and the process is executed efficiently and efficiently effectively...

3) An Integrated Approach to Off-Line Quality Control, ***Young Jin Kim***, Mississippi State University, Dept. of IE, PO Box 9542, MS 39762-9542, ykim@ie.msstate.edu, ***Byung-Rae Cho***

In Taguchi's off-line quality control, 3 design modules, system design, parameter design and tolerance design, are conducted in a sequential manner which has been argued neither efficient nor economical. We propose an integrated analysis framework in an effort to overcome this short coming and facilitate the applicability of off-line quality control. of off-line quality control.

4) A Fully Adaptive NP Control Chart, ***Hua Luo***, Nanyang Technological University, CETM MPE, Nanyang Ave., Singapore, 639798, Singapore, p146324027@nto.edu.sg, ***Zhang Wu***

Conventional control charts are static in the sense that of the chart parameters, i.e., the sample size, the sampling interval and the control limit, etc., are fixed for the duration of the operation. However, in practice, it may be more suitable to vary these design parameters on occasion. We propose a fully adaptive np control chart (VSSIL) for monitoring process fraction nonconforming...nonconforming...

5) Effects of Estimation Errors on Cause-Selecting Charts, ***Lianjie Shu***, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, shulj@ust.hk, ***Fugee Tsung***, ***Kwok L. Tsui***

The CSC is a useful SPC tool for analyzing multi-stage processes by establishing a relationship between input and output measurements. In practice, the model relating input and output needs to be estimated before the CSC is implemented however, far less is known about the performance of CSC when estimation error is taken into account...

WB30 Strategic Planning

Contributed Session

Chair: Woonghee Huh, Cornell University, Dept. of OR, Rhodes Hall, Ithaca, NY 14853, huh@orie.cornell.edu

1) A Strategic Capacity Planning Model, ***Woonghee Huh***, Cornell University, Dept. of OR, Rhodes Hall, Ithaca, NY 14853, huh@orie.cornell.edu, ***Robin Roundy***

We present a continuous-time rolling horizon model that determines the timings of discrete-size capacity expansions for multiple resources used to produce multiple products facing stochastic demand. This research is motivated by the tool acquisition in the semiconductor fabrication facilities.

2) The Effects of E-Commerce Strategy on Financial Firm Performance, ***Patricia D. Corner***, University of Waikato, Dept. of Strategic Mgmt., Hamilton, New Zealand, pcorner@waikato.ac.nz, ***Delwyn Clark***, ***Stephen Bowden***

We report an empirical study of 1200 New Zealand companies across all industry categories. E-commerce is seen as critical for the survival of New Zealand business given the country's geographic isolation and small scale of business. Relationships among business level strategies, specific e-commerce strategies and financial firm performance are examined.

3) A Dynamic Approach to Optimizing a Firm's Market Scope, ***Moren Levesque***, Case Western Reserve University, Weatherhead Sch. of Mgmt., 10900 Euclid Ave., Cleveland, OH 44106-7235, moren.levesque@weatherhead.cwru.edu, http://weatherhead.cwru.edu, ***Dean A. Shepherd***

We model the strategic decision of market scope as a dynamic deterministic optimization problem. This model captures a trade-off between profit and mortality risk and accommodates the contingent nature of the scope decision by looking at the direct and indirect (due to competition and demand volatility faced by the firm) effect that the choice of scope has on performance.

4) Compromise Management, ***Michel J. Leseure***, Al Akhawayn University, Sch. of Bus. Admin., Ifrane, 53000, Morocco, m.leseure@alakhawayn.ma

A simulation-based policy iteration algorithm for solving Markov and semi-Markov decision problems will be presented. The convergence analysis and some numerical results will be discussed.

WB31 Belief Functions in E-Commerce

Cluster: Belief Functions: Advances & Applications

Invited Session

Chair: Atsushi Inoue, Southern Illinois University, Comp. Sci. Dept., Carbondale, IL 69201-4511, atsushi@cs.siu.edu, www.cs.siu.edu/~ainoue

1) Toward Human-Friendly E-Commerce, ***Atsushi Inoue***, Southern Illinois University, Comp. Sci. Dept., Carbondale, IL 69201-4511, atsushi@cs.siu.edu, www.cs.siu.edu/~ainoue

We introduce research activities to develop human-friendly e-commerce sites currently operated under my direction. Key issues are handling perceptual information and promoting human-centered collaborations. Soft computing

approaches are currently being studied to achieve this goal. In particular, we focus on a method of handling consistencies between fuzzy sets and probabilities through mass assignment...

2) Recommendation of Apparel Coordination based on Color Scheme, *Atsushi Inoue*, Southern Illinois University, Comp. Sci. Dept., Carbondale, IL 69201-4511, atsushi@cs.siu.edu, www.cs.siu.edu/~ainoue, ***Min-Hyung Kim***

The decision to purchase clothing is mainly determined by apparel coordination. Currently possessing clothing and occasions near future are important pieces of information that customers consider upon the purchase. We are developing a prototypic e-commerce site that offers expert services of apparel coordination. A logic programming language with uncertainty management, fuzzy relational inferential language is used to implement the handling of perceptual information...

3) Investigation of Pretty Good Privacy for Customer Service Tasks, *Atsushi Inoue*, Southern Illinois University, Comp. Sci. Dept., Carbondale, IL 69201-4511, atsushi@cs.siu.edu, www.cs.siu.edu/~ainoue, ***Vasuki Manicka***

PGP is well-known as a public-key encryption scheme to be used with e-mail. We can manage the accessibility of e-mail messages among groups of senders and receivers. When e-mail is used as a medium of e-commerce, it is necessary to include anonymous users (customers) within the security scheme for a limited period of time while business transactions are placed. On the other hand, those who completed those transactions should be excluded immediately...

WB32 Finance: Theory & Empirics IV

Contributed Session

Chair: Andrew E. B. Lim, Columbia University, Dept. of IEOR, 331 SW Mudd Bldg., New York, NY 10027, lim@ieor.columbia.edu

1) withdrawn 10/11: Investment Decision Analysis with Computational Agents, *Fernando S. Oliveira*, London Business School, Sussex Place, Regent's Park, London, Nw1 4SA, UK, foliveira@london.edu, ***Derek W. Bunn***

2) Estimating the Term Structures of Treasury & Corporate Bonds with Bayesian Penalized Splines, *Min Li*, University of Cincinnati, QA Dept., PO Box 210130, Cincinnati, OH 45221-0130, min.li@uc.edu, ***Yan Yu***

We develop a Bayesian approach to estimate Treasury and corporate term structures with penalized splines. We first estimate Treasury term structures. We then estimate corporate term structures by adding a spread. We incorporate the knowledge of positive credit spread as informative priors in our Bayesian analysis.

3) Continuous Time Mean-Variance Portfolio Selection with Stochastic Parameter Models, *Andrew E. B. Lim*, Columbia University, Dept. of IEOR, 331 SW Mudd Bldg., New York, NY 10027, lim@ieor.columbia.edu

We discuss the problem of continuous time mean-variance portfolio selection in an incomplete market. Asset prices are geometric Brownian motion and parameters describing the market model may be random. We derive closed form expressions for the optimal portfolios and efficient frontier. A generalization of the mutual fund theorem is also obtained.

WB33 Supply Chain Management VIII

Contributed Session

Chair: Tayur Sridhar, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, stayur@andrew.cmu.edu, www.gsia.cmu.edu/andrew/stayur

1) Analysis of a Natural Gas Supply Chain, *Yang Wei*, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, weiy@andrew.cmu.edu, www.cs.cmu.edu/~weiy, ***Tayur Sridhar***

We present a quantitative model as a first cut towards understanding a natural gas supply chain, where there is a perfect market (market1), a market with a small number of firms (market2) and a pipeline connecting them. We develop a stationary rational expectations equilibrium (SREE) model for market2. An exact SREE model and an approximation are developed and compared for the entire supply chain.

2) Direct Marketing, Indirect Profits: A Strategic Analysis of Dual-Channel Supply Chain Design, *Wei-yu Chiang*, University of Illinois, 350 Wohlers Hall, 1206 South 6th St., Champaign, IL 61820, wchiang@uiuc.edu, http://www.wchiang.net, ***Dilip Chhajed***, ***James D. Hess***

The advent of e-commerce has prompted many manufacturers to redesign their traditional channel structures by engaging in direct sales. Our model conceptualizes the impact of customer attitudes about direct vs. traditional shopping on supply chain design.

3) Manufacturer-Retailer Competition in Dual Distribution Systems, *Tamer Boyaci*, McGill University, 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, boyaci@management.mcgill.ca

We consider a dual distribution consisting of a monopolist manufacturer selling its product through 2 competing channels, one of which is owned by the manufacturer. We analyze the impact of vertical and horizontal competition on supply chain decisions and profits and discuss possible coordination mechanisms.

4) Stochastic Optimization Models for Fair Allocation of Automotive Parts to Service Facilities, *Dae-Sik Choi*, Korea University, 1 5 Ka Anamdong Seongbukku, Seoul, 136, Korea, ichoi@korea.ac.kr, ***In-Chan Choi***, ***Hyung Mo Chung***

Two pressing issues faced by a major automotive parts company in Korea are to allocate parts supplies to meet demand requirements from sub-depots and to set appropriate stock levels for service centers. We present stochastic optimization models for these problems and address some practical issues involved.

WB34 Strategic Research & Management Issues Facing the Cruising Industry

Cluster: Cruise Line Applications
Invited Session

Chair: John J. Sumanth, Norwegian Cruise Line, 7665 Corporate Center Dr., Miami, FL 33126, jsumanth@ncl.com

1) Some Strategic Research Issues Facing the Cruise Line Industry, *John J. Sumanth*, Norwegian Cruise Line, 7665 Corporate Center Dr., Miami, FL 33126, jsumanth@ncl.com, ***Alex Sanguinetti***, ***Ana Ramos***

As cruising evolves into the 21st century, several issues and challenges are confronting this growing, yet still "infant" industry. We raise 7 key issues and challenges, including itinerary development for pre-salability and profit maximization, travel agent/internet distribution chains and process/operational streamlining. Strategists, senior management and researchers must confront and develop solutions for these if positive market growth and financial profitability is to continue.

2) A Queueing Approach to Improving the Pier Operations of a Major Cruise Line, *David J. Sumanth*, University of Miami, Dept. of IE, 283 McArthur Bldg., Coral Gables, FL 33124, dsumanth@miami.edu, ***Jin Takayama***, ***Chris Reynolds***

We present a queueing and simulation model to analyze and improve the effectiveness of pier operations for a major cruise line. An intensive 4-month study of 3 piers was conducted and revealed some very interesting phenomena. These observations provided the foundation for the development of a computer simulation model to predict some key queueing characteristics and to recommend improvements to the existing system...

3) An Industrial Engineering Approach to Improving the Productivity of Customer Relations Department of a Major Cruise Line, *David J. Sumanth*, University of Miami, Dept. of IE, 283 McArthur Bldg., Coral Gables, FL 33124, dsumanth@miami.edu, ***Matthew Garcia***, ***Elisa Rodriguez***, ***Jason Trimble***

This 4-month study applied some well-established IE tools to measure and improve the human performance and productivity of a customer relations department for one of the world's largest cruise lines. The uniqueness of this study lies in the integration of IE and behavioral science approaches to improve the effectiveness and efficiency of a system.

WB36 Airline Revenue Management

Sponsor: Aviation Applications
Sponsored Session

Chair: Judy Pastor, Continental Airlines, 1600 Smith St., Houston, TX 77002, jpasto@coair.com

1) Demand Driven Dispatch: A Successful Combination of Network Optimization & Risk Analysis, *Judy Pastor*, Continental Airlines, 1600 Smith St., Houston, TX 77002, jpasto@coair.com, ***Steve Coy***

DDD seeks to maximize revenue by exchanging aircraft in markets that have excess capacity with markets that have excess demand. We will examine how the combination of network optimization and a simulation-based risk analysis has contributed to the success of Continental Airlines' DDD program.

2) Passenger Recapture Estimation in Airline Revenue

Management, ***Shau-Shiang Ja***, American Airlines, 1 East Kirkwood Blvd., MD 7200, Southlake, TX 76092, shiang.ja@aa.com, ***Beju Rao, Scott Chandler***

Typical unconstraining methods do not account for passenger recapture. This can lead to double-counting of passenger demand and overly aggressive RM controls. Not accounting for recapture can also undermine flight analysts' belief in the untruncation methodology and possibly result in counter-productive overrides of the system. We present a linear regression approach for estimating passenger recapture rates...

3) An Overbooking Model for Network Revenue Management, ***Wen Zhao***, University of Illinois, MIE Dept., 1206 West Green, 227 MEB, Urbana, IL 61801, wenzhao@uiuc.edu

We propose a nonlinear programming model for overbooking in network revenue management systems. The NLP model is easy to solve, and its Lagrangean multipliers are used to approximate the opportunity costs of accepting bookings. We compare this approach with dynamic programming models.

4) Product Technology as a Driver of Product-Development Structure & Frequency in the Jet-Aircraft Industry, ***Alan O'Sullivan***, University of Ottawa, Faculty of Admin., PO Box 450, Station A, Ottawa, Ontario, K1N 6N5, Canada, osullivan@admin.uottawa.ca

The technological complexity, architectural maturity and a high need for reliability of jet aircraft account for the high competency, resource and coordination demands of aircraft development. We discuss why an appropriate response to these challenges is specialization by the airframer in the administration of development and by suppliers in the design and manufacture of subsystems...

WB37 E-Commerce II

Contributed Session

Chair: Suleiman K. Kassicieh, University of New Mexico, 1924 Las Lomas NE, Albuquerque, NM 87131, kasicieh@unm.edu

1) Internet Models in Latin America, ***Suleiman K. Kassicieh***, University of New Mexico, 1924 Las Lomas NE, Albuquerque, NM 87131, kasicieh@unm.edu, ***Raul DeGouvea***

We propose a model for Internet penetration in new economies describing the variables affecting the penetration. The model is run using data from Latin American countries and from the rest of the world. The model also is tested for its ability to project future parameters of Internet use in these economies.

2) withdrawn 9/19: An Analysis of E-Business Strategy & Implementation in Financial Institutions: US & Asian Experiences, ***Dolphy M. Abraham***, Loyola Marymount University, 7900 Loyola Blvd., Los Angeles, CA 90045-8385, dabraham@lmu.edu, ***Todd Eilers, Jier Su, Sheila Brodjogonero, Mark Kilgore, Martin Tanisaki, Derek Tam Sing, Andree Tjoegiarto***

3) Applications of Data Mining in the Finance Industry, ***Zhongxian Wang***, Montclair State University, 234 McCosh Rd., Upper Montclair, NJ 07043-2108, wangj@mail.montclair.edu, ***Qiyang Chen***

We will consider commercial banking, with specifics centering on customer relationship management and fraud in the credit industry as well as further applications in the investment banking arena usage of data mining to detect fraudulent trading.

WB38 Risk Analysis

Contributed Session

Chair: Curtis E. Farrell, 2134 North Lee Highway, Arlington, VA 22201, farrellce@aol.com

1) Enabling Consistent Risk Analysis across Multi-Team & Multi-Contractor Programs, ***Curtis E. Farrell***, 2134 North Lee Hwy, Arlington, VA 22201, farrellce@aol.com

A lesson learned from 20 years experience is that the most important factor that will determine the efficacy of risk analysis across large team-oriented programs is using a consistent risk analysis framework. A framework that has been developed to promote coherent risk analysis in such programs is the subject of this presentation.

2) Probability Models for the Estimation of Number & Cost of Landslides, ***Robert A. Crovelli***, US Geological Survey, Denver Federal Ctr., PO Box 25046, MS 939, Denver, CO 80225, crovelli@usgs.gov

The Probabilistic Landslide Assessment Cost Estimation System (PLACES) was developed from analytic probabilistic methodology to calculate estimates of number and cost of landslides during a specified time. The spreadsheet was applied to estimate the damage, as economic loss, from future landslides caused by rainstorms in the San Francisco Bay region, California.

3) Predictive Modeling for E-Business Project Risk Management, ***Abderrahim Labbi***, IBM Research Division, Saeumerstrasse 4, Rueschlikon, CH, 8803, Switzerland, abl@zurich.ibm.com, www.zurich.ibm.com

We present an adaptive system for project risk management using predictive data mining models. The process consists in several steps for risk identification, assessment, and pricing. The process combines clustering for project portfolio segmentation, boosted decision trees for project risk group prediction and stochastic optimization for portfolio optimization and pricing.

4) Portfolio Optimization under a Minimax Rule with Downside Risk, ***Xiaofeng Nie***, Chinese University of Hong Kong, Dept. of SE/EM, Shatin NT, Hong Kong, PR China, xfnie@se.cuhk.edu.hk

We discuss a portfolio optimization model under a minimax rule where only the downside risk is considered. The problem is formulated as a linear program. Moreover, by using tools from nonsmooth analysis, a capital asset pricing model between the market portfolio and individual securities is derived.

WB39 Modeling Decision Problems in Agribusiness

Cluster: Decision Technologies for Food & Agribusiness
Invited Session

Chair: Timothy J. Lowe, University of Iowa, MS Dept., Tippie Coll. of Bus., S210 Pappajohn Bldg., Iowa City, IA 52242-1000, timothy-lowe@uiowa.edu

1) Small Farmers & E-Commerce, ***Cerry M. Klein***, University of Missouri, IE Dept., E3437 Engineering Bldg. East, Columbia, MO 65211

Small farms are failing generally due to their inability to effectively participate in global markets optimized for industrialized agriculture due to their size of operation. E-commerce is a possible approach but presents new obstacles. A framework for this problem is presented and the difficulty of doing strategic planning is discussed.

2) Applications of Linear Programming in the Turkey Business, ***Bob Johnson***, Jennie-O Foods, Inc., Willmar, MN, bjjohnson@jennie-o.com

Many agribusiness firms face the problem of determining what to start in the pipeline, knowing that the result will come to market up to 2 years later. We will show how a major supplier of turkey products deals with these issues through the use of optimization tools.

3) Bayesian Prediction, Entropy & Option Pricing in the US Soybean Market, 1993 - 1997, ***F. Douglas Foster***, Australian Graduate School of Management, ***Charles H. Whiteman***

We study the performance of the Foster-Whiteman (1999) options pricing procedure, which modifies a Bayesian predictive distribution by a KLIC-minimizing risk-neutralization procedure. Soybean futures options are priced weekly from 1993-97; the prices so produced mimic market prices more closely than those of the Black model or related procedures.

4) Improving the Hybrid Seed Supply Chain: Research Opportunities, ***Timothy J. Lowe***, University of Iowa, MS Dept., Tippie Coll. of Bus., S210 Pappajohn Bldg., Iowa City, IA 52242-1000, timothy-lowe@uiowa.edu

There are several major challenges associated with designing and managing the supply chain for the hybrid seed business. Examples include long lead times and significant production yield uncertainty. We will outline several operational problems this industry faces and discuss how some of these issues have been addressed.

WB40 Queueing III

Contributed Session

Chair: Amy R. Ward, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, amy.ward@isye.gatech.edu

1) On the Stability of Queueing Networks with Deadlines, ***Amy R. Ward***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, amy.ward@isye.gatech.edu, ***Nicholas Bambos***

Consider a single-server, first-come-first-served queue with stationary and ergodic input where each job arrives to the queue with a deadline. We establish the conditions under which the actual workload process - the work in the system that will eventually be served - converges in total variation to a unique stationary process.

2) withdrawn 10/12: Time-Dependent Queue Lengths at Bulk Service Queueing Systems, ***Jeff D. Griffiths***, Cardiff University, Mathematics Inst., Senghennydd Rd., Cardiff, CF24 4YH, UK, griffiths@cardiff.ac.uk, ***Janet E. Williams***, ***Rachel Salmon***

3) Optimal Pricing for the Express Service in a Finite-Capacity Service System, ***Kuo-Hwa Chang***, Chung Yuan Christian University, Dept. of IE, Chung-Li, 320, Taiwan, ROC, kuohwa@cycu.edu.tw

We consider the problem of internal pricing with refund for the express service in a finite-capacity service system. Customers decide whether to pay for such service based on the price, refund and the guaranteed minimum loss rates. A model describing the relation between the price and the service value is developed.

4) Exact Asymptotics for Multi-Class Exponential Polling Models, ***Woojin Chang***, Georgia Institute of Technology, 301 10th St. NW, Apt. 307A, Atlanta, GA 30318, woojin@isye.gatech.edu, www.isye.gatech.edu/~woojin, ***Douglas G. Down***

We find exact asymptotic expressions for the event that total queue length is large for a k_i-limited exponential polling model with equal service rates and N classes of customer. This behavior divides into N very different regimes, depending on the system parameters. Using these exact asymptotic expressions, we provide heuristics for choosing the service policy to provide a given level of quality of service to some classes while giving best effort to the remaining classes.

WB41 OR & Logistics & Supply Chain Problems: New Frontiers of Opportunities

Cluster: Unsolved OR Problems in Industry
Invited Session

Chair: Rajiv Saxena, Menlo Logistics, Inc., 1 Lagoon Dr., Ste. 300, Redwood City, CA 94065, saxena.rajiv@menlolog.com

1) OR & Logistics & Supply Chain Problems: New Frontiers of Opportunities, ***Rajiv Saxena***, Menlo Logistics, Inc., 1 Lagoon Dr., Ste. 300, Redwood City, CA 94065, saxena.rajiv@menlolog.com

We will discuss our experience in using OR tools and techniques in solving logistics and supply chain problems. We will talk about problems that we found difficult to solve using existing techniques and methodologies and we will discuss new areas of focus that may provide interesting topics for additional research.

WB42 Supply Chain Management

Contributed Session

Chair: Lawrence V. Snyder, Northwestern University, 2145 Sheridan Rd., MEAS, Rm. C210, Evanston, IL 60208, l-snyder3@northwestern.edu

1) The Newsvendor Problem with Demand-Estimating Information Technology Systems, ***Lawrence V. Snyder***, Northwestern University, 2145 Sheridan Rd., MEAS, Rm. C210, Evanston, IL 60208, l-snyder3@northwestern.edu, ***Mark S. Daskin***

We present a newsvendor model that explicitly includes the presence of IT systems that estimate demand. Our model uses probabilistic analysis to compute the expected savings in cost from a given IT system. We will discuss theoretical results and extensions to more sophisticated inventory and production planning models.

2) A Mixed-Integer Goal Programming Model for Procurement with Quantity Discount Opportunities, ***Ronald E. Davis***, San Jose State University, 1 Washington Sq., BT 750, San Jose, CA 95192, ron@mathproservices.com, http://www.mathproservices.com

We show results from a mixed-integer goal programming model for developing optimal trade-off curves for manufacturing procurement decisions. Multiple objectives include time of delivery, cost of product and reliability of delivery. Binary variables are used to model quantity discount opportunities in a multiple-site, multiple-supplier context.

WB43 Transportation Network Simulation & Analysis II

Sponsor: TSS
Sponsored Session

Chair: R. Jayakrishnan, University of California, Dept. of Civil Eng., Inst. of Transport. Studies, Irvine, CA 92697, rjayakri@uci.edu

1) Analysis of a Point-to-Point High-Coverage Transit System, ***Christian Cortes***, University of California, Dept. of Civil Eng., Inst. of Transport. Studies, Irvine, CA 92697, ccortes@translab.its.uci.edu, ***R. Jayakrishnan***, ***Jun-Seok Oh***

We propose a new design of a transit system that ensures point-to-point travel using a large number of deployed vehicles such as buses and minivans. The design is based on no more than one transfer during a trip and includes computerized dispatch and routing using probabilistic rules in a real-time management framework. The focus of the presentation is on the routing rules.

2) Estimation of Freight Origin-Destination Matrices with ITS Data, ***Jose Holguin-Veras***, City College of New York, Inst. for Transport Studies, 135th & Convent Ave., New York, NY 10031, jhv@ti-mail.engr.ccny.cuny.edu

We will describe a game theoretical formulation that depicts the flow of goods in urban areas as a market in Cournot-Nash equilibrium. The formulation, integrative freight market simulation, decomposes the urban good movement problem in 2 main components: the estimation of the amount of transportation service contributed to the market (in Cournot-Nash equilibrium)...

3) A Simulation Assignment Model to Evaluate Infrastructure Improvements for Freight Operations in the Chicago Area, ***Thanasis Ziliaskopoulos***, Northwestern University, CEE Dept., Evanston, IL 60208, a-z@northwestern.edu, ***Bhuwan B. Agrawal***, ***Irene Yue Li***, ***S. Travis Waller***

We analyze the truck operation in the Chicago area, its effects on both passenger and truck traffic and discuss a means for evaluating potential improvements. Numerous scenarios of infrastructure improvements on the Chicago network are evaluated. A simulation-based traffic model is developed that accounts for the simultaneous routing of passenger and truck traffic in order to develop performance measures...

4) The Life Expectancy of a Min-Path Tree: A Fast Algorithm for the Dynamic Quickest Path Problem, ***Robert B. Dial***, 55 Broadway, Cambridge, MA, robertdial@email.msn.com

The algorithm finds a quickest path tree in a network whose arc traversal-times are continuous piecewise linear functions of arrival time. Using a parametric approach, the algorithm transforms a min-path tree for one epoch of departure time into the next earlier epoch at which the tree's topology changes. The local updating technique affects only a small fraction of the tree...

WB44 Traffic Control & Flow Analysis

Sponsor: TSS
Sponsored Session

Chair: Srinivas Peeta, Purdue University, Sch. of Civil Eng., West Lafayette, IN 47907-1284, peeta@purdue.edu

1) A Robust Arterial Signal Progression System, ***Meenakshy Vasudevan***, MITREtek Systems, 600 Maryland Ave. SW, Ste. 755, Washington, DC 20024, meenakshy.vasudevan@mitretek.org, ***Gang-Len Chang***

We present a robust discrete optimization technique for arterial signal progression. For real-time applications, commonly observed traffic flow variations will result in the through band not being fully realized. Hence in response to data uncertainties, this study uses robust optimization to obtain a robust solution for the progression problem.

2) Continuous Space-Time Markov Chain Formulation for Day-to-Day Flow Variation, ***Srinivas Peeta***, Purdue University, Sch. of Civil Eng., West Lafayette, IN 47907-1284, peeta@purdue.edu

We propose a continuous space-time Markov chain formulation to study day-to-day flow dynamics to circumvent implementation issues associated with traditional discrete formulations in this context. The discrete formulations can entail a large number of states, thereby making unwieldy simulation and control. entail a large number of states, thereby making unwieldy simulation and control.

3) Imputation of Missing Data for Origin-Destination Estimation, ***L. R. Rilett***, Texas A&M University, Dept. of Civil Eng., Texas Transportation Inst., College Station, TX 77843, rilett@tamu.edu, ***Yongtao Guan***

ITS data provides a unique opportunity for improving many transportation estimation techniques. However, even in a well-maintained system, there can be serious errors in the data. We will focus on data imputation techniques for ITS that used inductance loop technology. A mean substitution imputation approach and a principal component imputation approach will be compared and contrasted...

4) Issues for the Customization of Online Traffic Control on Beowulf Clusters, ***Pengcheng Zhang***, Purdue University, Sch. of Civil Eng., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

We explore issues for the customization of on-line traffic control models on Beowulf supercomputing environments. Aspects addressed include parallelization logic, cache, memory, file administration systems and storage

space. The performance of the Beowulf cluster is compared with that of an IBM SP-2 supercomputer using a dynamic traffic simulator, dynamic traffic assignment algorithms and a time-dependent shortest path model.

WB45 Production & Scheduling VII

Contributed Session

Chair: Meltem Denizel, Sabanci University, Orhanli/Tuzla, Istanbul, 81474, Turkey, denizel@sabanciuniv.edu

1) A Comparison of Lower Bounds for the Multi-Item Capacitated Lot-Sizing Problem with Setup Times, ***Meltem Denizel***, Sabanci University, Orhanli/Tuzla, Istanbul, 81474, Turkey, denizel@sabanciuniv.edu, ***Haldun Sural***

We consider a multi-item, multi-period, dynamic lot-sizing problem. In every period, there is a single capacity constraint with setup times. The objective is to minimize the inventory carrying costs. We present a comparison of lower bounds obtained from different relaxations of the problem.

2) A Tabu Search Algorithm for the Multi-Stage Parallel Machine Problem, ***Yahya Fathi***, North Carolina State University, Dept. of IE, PO Box 7906, Raleigh, NC 27695, fathi@eos.ncsu.edu, www.ie.ncsu.edu/people/new_page_people.htm, ***Bagas Wardono***

We study the problem of scheduling N jobs on parallel machines in L successive stages with the obective of minimizing the makespan. We consider the problem with limited and unlimited buffer capacities and propose a tabu search algorithm for solving each. Results of a computational experiment are also presented.

3) Optimal Manufacturing Batch Size with the Rework Process in a Single-Stage Production System, ***Adul M. Jamal***, Southeastern Louisiana University, 1104 Rue Cannes, Hammond, LA 70402, ajamal@selu.edu, ***Bhaba R. Sarker***, ***Sanjay Mondal***

We develop models to determine the optimal batch quantity in a single stage production system with rework under 2 different policies. Policy 1 deals with instantaneous rework with no shortage. Policy 2 deals with the rework done after N cycles incurring shortages in each cycle. The models are illustrated with numerical examples and sensitivity analysis.

4) Establishing Short-Term Production Targets in Complex Process Networks, ***Payman Jula***, University of California, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, payman@ieor.berkeley.edu, ***Robert C. Leachman***

Given target output schedule, target cycle time for each step, process network structure and initial WIP status, an approach is proposed to set short-term production targets for each step in complex manufacturing networks. These targets can be used to evaluate the system performance and help schedulers control the system to achieve desirable outputs.

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Stavrulaki, Euthemia TA24, TD02
Stecke, Kathryn E. SC21, SD21
Stefanescu, Anton TC05
Stefanescu, Catalina WA29
Stein, Oliver TC07
Stengel, Donald N. WB25
Sterna, Malgorzata SA25
Stewart, Craig W. TD34
Stewart, William R. TB04
Stiglets, Suzanne TD27
Stinchcombe, Maxwell TD23
Stine, P. TA40
Stoenescu, Tudor M. MA06
Stokes, Brian MB30
Stolpe, Mathis MC13
Storer, Robert H. SA45, TD15, WB12
Stratman, Jeff K. SA18, WB21
Street, Nick MA03, MB03, SC33
Stremersch, Stefan MC46
Strickland, Dawn SC11
Stuart, Julie Ann SD40
Stuckey, P. J. MB12
Sturm, Jos F. SD14
Sturmfels, B. SC09
Su, Hang TA38
Su, Jier WB37
Subramanian, Shivaram TD16
Suel, Torsten SD03
Suhl, Leena MA07
Sullivan, James J. WA13
Sultana, Rudy TA42, TC44
Sumanth, David J. WB34
Sumanth, John J. WB34
Sun, Baohong WA14
Sun, Daewon TD02
Sun, Defeng F. MB10
Sun, Jie MB10, TD13
Sun, Lili TB31
Sun, Minghe MD14
Sun, Peng MC14
Sundararajan, Arun WA02
Sundaresan, Shankar WA02, WB20
Sunderling, Matthew MB03
Sung, Chang Sup SA03
Sung, Minje WB08
Supatgiat, Chonawee SC40
Supithak, Wisut TB12, TB34
Supsomboon, Srisawat MD24
Sural, Haldun WB45
Surdu, George G. MK48
Suri, Rajan SC21
Swaminathan, Jayashankar MD16, SA17, TC21
Swan, Bill MD36
Swann, Julie L. MB23, MD08
Swart, William W. TD44
Swersey, Arthur J. WA28
Syau, Yu-Ru MB31
Syrjanen, Mikko J. MC10, WB10
Syrjanenn, Tommi TB08
Szczerba, Robert J. SB24
Szmerekovsky, Joseph G. SA26
Takada, Hiroyku TB35
Takayama, Jin WB34
Takeda, Akiko MA10, TC07
Takita, Keisuke SA20
Talluri, Kalyan SA37
Tamir, Arie MB18
Tan, Baris SC17
Tan, Lili MA07
Tan, Sitong MC05
Tang, Hao MB35
Tang, Kevin B. TC40
Tang, Kwei SC24
Tang, Yuen-fan TC34
Tanisaki, Martin WB37
Tappeta, Ravindra V. MC28
Tarantino, William TB27
Tardif, Valerie TA11
Tardos, Eva SB10
Tasgetiren, Fatih M. SA05, SA45
Tavana, Hossein MB34
Tavares, Gabriel TB03, TD10
Tawarmalani, Mohit MD15, SD05, TA05
Taylor, James G. MA26, MB26, MC26
Taylor, K. L. TB02
Tayur, Sridhar SD16
Tebboth, James TD12
Techanitisawad, Anulark TD12
Teghem, Jacques TB12
Teich, Jeffrey E. MC23
Tekin, Eylem SC16
Tellez, Martin B. TA29, WB29
Tellis, Gerard J. MC46, WA46
Telyakovskiy, Aleksey S. SB32
Tempelmeier, Horst MA07
Teneketzis, Demosthenis MA06, TC16
Teng, Jinn-Tsair MD45
Teo, Chung Piaw TB22, TD13
Terlaky, Tamas MA14, MD13, SC13, TB13
Terwiesch, Christian SA24, SB17
Tew, Jeffrey MB24, TC23
Teyarachakul, Sunantha TB25
Teyner, Tim TD29
Tezcan, Tolga SD27
Thengvall, Benjamin G. MB11
Thiel, Sven TD08
Thiele, Aurelie TA38
Thieme, Jeff WA45
Thirumalai, Sriram WB16
Thomas, Barrett MB35, SB44
Thomas, Charles J. WA04
Thomas, Doug MB22
Thomas, L. C. TB38
Thomas, Rekha R. SB09, SC09
Thomke, Stefan MC21
Thompson, Gary M. TC39
Thompson, Gerald L. SA28
Thompson, Terry WA36
Thomson, Vince TC46
Thonemann, Ulrich W. SA16
Timucin, Sitki TB21
Tind, Jorgen MD10
Tiourine, Sergey SC36
Tirpak, Thomas TD16
Tjoegiarto, Andree WB37
Toktay, Beril L. SA17, TD22
Tomak, Kerem MB06, TC02
Tombak, Mihkel M. SC24
Tomlin, Brian T. MD16
Tompaidis, Stathis MA32
Ton, Zeynep WB18
Toobaie, Shahabeddin WA42
Topaloglu, Huseyin SC35, SD19
Torres, Andrea WA11
Torres, Fidel J. MC25
Toth, Paolo MD35
Tourillon, Dominique MA12
Trafalis, Theodore B. TC13, WA03
Trapp, Rollie MC12
Travis, Laurel E. TA40
Treharne, James MD27
Tremblay, Nicolas WA43
Tretkoff, Carol L. TB07
Triantis, Kostas TC40
Trimble, Jason WB34
Tripken, Jaclyn D. TD28
Trosset, Michael W. SD29
Troutt, Marvin TA01
Troxell, Denise SA43
Truszkowski, Walter MD05
Trystram, Denis SA25
Tsai, Julia C. WA29
Tsao, De-bi MD25
Tschantz, Steven TC04
Tseng, Chung-Li SB40
Tseng, Paul Y. MA10, SD10
Tsetlin, Ilia WB04
Tsikriktsis, Nikos SB17
Tsitsiklis, John N. SB20
Tsui, Kwok L. MD29, SA29, WB29
Tsung, Fugee WB29
Tsurkov, Vladimir I. TD15
Tuchinsky, Philip M. WA41
Tucker, Anita L. WB18
Tufekci, Suleyman SB15
Tumer, Irem MB29
Tumer, Sinan SD18
Tunasar, Cenk TC46
Tunca, Tunay TD02
Tuncel, Levent TA14
Tuominen, Markku WB16
Turetken, Ozgur TD03
Turgeon, Andre TB38
Turkan, Ayten WB12
Turkay, Metin SB19
Turnbull, Bruce W. WA29
Turnquist, Mark A. MA24
Tuunainen, Virpi TB04
Tyagi, Rajesh TB40
Tzur, Michal SA16
Uecker, Chris WA26
Ugray, Zsolt MA02
Ulbrich, Michael SD10
Ulku, Sezer MA15
Ulusoy, Gunduz SA26
Ungar, Lyle TC37
Unluyurt, Tonguc TC12
Upton, Stephen MB27
Urban, Timothy L. SA45, SD45
Uryasev, Stanislav MD32, TA32
Usowicz, Thad SB33
Utkin, O. B. TA10
Uzsoy, Reha MA25, MB24, MC01, MD24, SD25, TC23, TD29
Vaaben, Bo SC36
Vairaktarakis, George L. SA26
Vakrat, Yaniv SD37
Valente, Patrick TA02
Valenzuela, Jorge SB21
Valle, Alejandro G. del TB34
van de Klundert, Joris WA11
Van Der Heyden, Ludo SA25
van der Wal, Jan WA40
Van Fenema, Paul SA18
van Heck, Eric MA04, MD04, TB04
Van Hentenryck, Pascal TD08
van Herwijnin, Marjan SB28
van Houtum, Geert-Jan SC17
van Mieghem, Jan A. TB16
Van Nieuwenhuyse, Inneke SB21
Van Oyen, Mark P. SC16, TB06

van Ryzin, Garrett J. MC16, SA37, SD16
van Scheepstal, P. WB19
Van Slyke, Richard M. SB06
van Wassenhove, Luk N. SA17, WB17
Van Woensel, Tom TB34
Vandaele, Nico J. SA21, SB15, SB21, SB46, TB34
Vandenbussche, Dieter SA08, SA11
Vanderbei, Robert J. MC14, MC15, MD15, MK47, SC13
Vanhoof, K. MD01
Vanhoucke, Mario SA26, SD25
Vargas, Luis G. TB28
Vasudevan, Meenakshy WB44
Vaughan, Diane E. SD07
Vaughan, Lemenuel TD27
Veatch, Michael H. WA40
Vecchio, Jeffrey Del SD44
Veit, Daniel MA04
Vejnarova, Jirina WA31
Velasquez, Jesus M. TD12
Veloso, Francisco M. MC02, SC15
Venkataraman, Ray R. TD21
Venkataramanan, M. A. SA18, SD18
Venkatasubramanyan, Narayan SB23
Venkateswaran, Venkat SA11
Vera, Jorge R. TA14
Vernon, Mary SC21
Verter, Vedat SA19
Verweij, Bram MC19
Vickson, Raymond G. MA29, SB45
Vidgren, Stefan SD45
Vilas, Carlos Ocampo y SB15
Vilcassim, Naufel MA46
Villalobos, Jesus R. MB45
Villarreal, Bernardo TA29, WA16, WB29
Villarreal, Teresa WB29
Virta, Julie E. MA36
Viswanathan, Prem K. TC34
Viswanathan, S. SA10, WB04
Vitale, Maurizio TA29
Vlahovich, Vladimir MC46
Vohra, Rakesh V. MB04, TA06
Volodin, A. V. TA10
von Winterfeldt, Detlof SD30
von Zedtwitz, Maximilian TD20
Voogd, P. TA19
Voss, Stefan MA07, SC06
Vossen, Thomas SC23
Voudouris, Christos MB12
Vrahnos, Charles T. SD26
Vromans, Michiel J. WA42
Vulcano, Gustavo SD16
Vuskovic, Kristina MD08
Wagner, Michael SB13
Waisel, Laurie B. TD03
Wakker, Peter P. WB28
Wallace, Stein W. MB06
Wallace, William A. TD03
Wallach, Emmanuelle WB02
Wallenius, Hannele E. MC23
Wallenius, Jyrki MC23
Waller, S. Travis WA44, WB43
Walters, John M. MD28
Waltz, Richard MC15
Wan, Yat-Wah TB35
Wang, Ben TC38
Wang, Charles X. TC24
Wang, Cheng-Shuo MC45, SD25
Wang, Chung-Hsiao WA24
Wang, Haibo TA01
Wang, Hui TB32
Wang, Jiamin TD18
Wang, Lan WA32
Wang, M. TD13
Wang, Patrick P. TD40
Wang, Ping MC01
Wang, Qiong TC37
Wang, Siqun MD11, TB11
Wang, Te-Wei SA18
Wang, Xiubin MA35
Wang, Yunzeng SA17, SD15
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Ward, Amy R. WB40
Ward, James E. TB25
Wardono, Bagas WB45
Warsing, Donald MB22
Wasil, Edward A. SB07
Watson, Noel MB17
Weber, Charles A. SD26
Wei, Huang Yong TA12
Wei, Wenbin TB36
Wei, Yang WB33
Weigel, Peter J. WB10
Wein, Lawrence M. MB23, MB33, SD16, TD42
Weinhardt, Christof MA04
Weintraub, Andres MA40
Weismantel, Robert MA09, SB09
Weiss, Dan WA28
Weiss, Gideon SA13, TA38
Weistroffer, H. Roland SC28
Wellman, Michael P. MA31
Wen, Joseph H. WA22
Wen, Ue-Pyng SB13
Weng, Jia Hua SA20
Werbos, Paul TC09
Werner, Frank TC25
Werners, Brigitte MA07
Wesolowsky, G. O. TB18
Wets, G. MD01
Weyant, John P. TD46
Wheeler, Dave MB38
Whinston, Andrew B. TC02, TD23
Whitaker, Roger M. SD06
White, III, Chelsea C. MB35, SB44, SD35, TB15, WB08
White, J. Chris WA33
White, Norman SB23
Whiteman, Charles H. WB39
Wiecek, Margaret M. MB28, MC28
Wierzchon, Slawomir T. TA31
Wilemon, David SC20, WA45
Wiley, Mark MC39
Wiley, Victor D. SC12
Wilhelm, Wilbert E. TA11
Wilk, Szymon MD28
Willemain, Thomas R. MD46, TD03, WA36
Williams, Brian SD29
Williams, Janet E. WB40
Williams, Joy TA07
Williams, Ruth J. MC38
Williamson, Craig MC06
Willis, Henry TA30
Willis, John B. MB30
Wilson, Alicia L. TA43
Wilson, Amy R. MC33
Wilson, Bart WA04
Wilson, James R. TC29
Wilson, Terence H. MA15
Wilson, Tom TC44
Winkels, Maarten WA11
Winston, Evelyn TD19
Wittmer, Luke WB26
Wolman, Eric SD33
Wolsey, Laurence MA08, MA09
Womer, Keith MD12
Won, H. W. MB12
Wong, Chi Fat WA42
Wong, Dennis MB32
Wong, Jacky C. SA19
Wong, Richard T. SD11
Wong, Roman MA01, MB01
Woo, Jon SB45
Wood, Charles A. TA04
Wood, Graham MA05
Wood, R. Kevin MB19
Woodruff, David L. MC07, TB29
Woolsey, Robert E. WA37, WB05
Wotton, B. M. MA40
Wright, Leonard SB46
Wu, George SC30
Wu, Jia Hao MA34
Wu, Junying SA46
Wu, Lifen TD10
Wu, S. David MC22, MC24
Wu, Tong TB45
Wu, Zhang WB29
Wu, Zhengping TB24
Wul, D. J. SD22
Wurl, Robin C. MA29
Wynter, Laura SA06, WB07
Xiang, Hua SA23
Xiao, Baichun MA37, SB37
Xiao, Wen-Qiang MC25
Xiaobo, Zhao SA24
Xiong, Momiao MC01, MC07, MD14
Xu, C.-X. TD13
Xu, Deju SA24
Xu, Hang SA35
Xu, Susan H. TB06, TB17, TD02, WB02
Xu, Yi SB17
Xue, Mei TD37
Yager, R. R. MD31
Yagiura, Mutsunori MC03, MC09
Yalabik, Baris SA38
Yalcin, Ali TC45
Yamada, Yuji TC14
Yamashita, Denise S. SA15
Yamassaki, Cintia WB12
Yan, Hong WA01
Yan, Houmin MC05, SA23, SA24
Yanev, Nicola MA11
Yang, Baiyu MA35, SA34
Yang, Heng SD14
Yang, Hongsuk MB19, TA16
Yang, Jian MD34, SA05, TD23
Yang, Ta-Hui WA43
Yang, Tsu-Kuang MD45
Yang, Wanhong WA39
Yang, Yong SB45
Yano, Candace A. SA15, SD12, TA21, TB37
Yao, D. Q. MA21
Yao, David D. MD23, SD16, TA23, TC19
Yao, Tao MB33
Yao, Xiaodong TD17
Yarmish, Gavriel SB06
Yassine, Ali A. SD20
Yasuda, Masami TB09
Yatagai, Naoto SA21
Yates, J. Frank WA22
Yay, Cihangir MB30
Yazdi, Mohammad Modarres WA38
Yazici, Hulya TC24
Ye, Heng Qing MD38
Ye, Jane TD07
Ye, Yinyu MA13, SD14
Yen, Joyce SB08
Yetis, Bahar TA18
Yi, Jinxin MC02, SC17
Yih, Yuehwern MD01
Yildirim, Alper SB10
Yildirim, Mehmet Bayram MB24, MC34, SC37
Yildirim, Yildiray SC32
Yokota, Fumie TA30
Yoshida, Yuji TB09
Yoshimoto, Kazuho K. TD32
Yoshise, Akiko MC13
Yoshizaki, Hugo T. TB19
Yu, Bin WA13
Yu, Gang MB11, MD34
Yu, Yan WB32
Yuan, Xuemin MA21
Yucesan, Enver SA16, TB46
Yue, Jinfeng TD13
Yue, Wei T. MA01
Yue, Xiaohang TB24
Yuksel, Ozlem M. TA21
Yun, Myung Hwan MA29
Yun, Yeboon SA44
Zabarankin, Michael TA32
Zabinsky, Zelda B. MA05, MD24, SA41, SB05
Zaitsev, Alexander MC23
Zaki, Mohammed J. SD03
Zalkind, David L. WA16
Zanker, Markus TB08
Zantek, Paul MA03, SC27
Zappe, Christopher J. MC43, MD43
Zaras, Kazimierz MA28
Zaretsky, Marina MA10
Zaric, Gregory S. TA33
Zeevi, Assaf J. MC38, TC38
Zeleny, Milan TB01
Zeng, Amy Z. SD24

Zeni, Richard H. WB22
Zenios, Stavros A. MD32, SC32
Zenios, Stefanos MB33, MD17, TC23
Zenkevich, Nikolay A. SA03
Zhang, Danlu SD06
Zhang, Ding MB34, SA35
Zhang, Guoqing MC11
Zhang, Han TC02, TD23
Zhang, Hanqin SA23, SA24
Zhang, Jiawei SD14
Zhang, Pengcheng WB44
Zhang, Rachel Q. MA16, MB16, MC22, TC16
Zhang, Shao-Liang SD13
Zhang, Shuzhong SD14
Zhang, Yin MB13, SC14
Zhao, Hao WA14
Zhao, Hui MA15
Zhao, Wen MC45, WB36
Zhao, Yao TC23, TD22
Zhao, Yong MA34
Zhao, Zhenying TC19
Zheng, Yu-Sheng MB17
Zhong, Hongsheng SB35
Zhong, Hua TC22
Zhong, Weiping SD21
Zhou, Chen SA43
Zhou, X. MA25
Zhou, Xuesong MC35
Zhou, Yong-Pin TA17
Zhu, Jianhan MD05
Zhu, Joe TA10
Zhu, Kevin TC02, WB14
Zhu, Wenge SD20
Zhuang, Youlong MC02
Ziliaskopoulos, Thanasis MC34, SD34, WA44, WB43
Zimmerman, Randy MD27
Zinchenko, Yuriy TB12
Zipkin, Paul MA17, MB17, TA16
Zuckerberg, Mark MD09
Zuidwijk, Rob A. SB19
Zundel, Pierre MC40
Zussman, Gil TD40
Zwicker, William TA03

NOTES

Sunday 08:30-10:00

SA03 E-Commerce I
SA05 Heuristics Programming I
SA06 Telecommunications
SA07 Parallel & Serial Heuristics for Combinatorial Optimization Problems in Industry
SA08 DO-01
SA09 DO-03
SA10 Queueing
SA11 Networks & Graphs I
SA12 Heuristics for Some classes of Partitioning & Scheduling Problems
SA13 Combinatorics of the Simplex Method I
SA14 Green Logistics & Manufacturing
SA15 Scheduling IV
SA16 Inventory Pooling
SA17 Product Variety & Demand Substitution
SA18 ERP: The Implementation Process
SA19 Logistics I
SA20 Operations Management I
SA21 Manufacturing I
SA22 Supply Chain Risk Management & Coordination
SA23 Supply Chain Management
SA24 Supply Chain Management I
SA25 Scheduling in Computer & Manufacturing Systems
SA26 Cash Flow Analysis in Project Scheduling
SA27 Some Issues in Continuous Quality Improvement
SA28 Combinatorics
SA29 Tutorial: Data Mining through Activity Monitoring & Forecasting
SA30 Decision Analysis Computation
SA31 Panel: Recent Developments in Group Decision & Negotiation
SA32 Finance: Risk Management
SA33 Tutorial: Internet & Intranet in Acute Care Hospitals
SA34 Using OR for Transit Operations & Customer Information
SA35 New Developments in Logistics & Transportation Planning
SA36 Crew Management I
SA37 Revenue Management I
SA38 Business Applications I
SA39 George B. Dantzig Dissertation Finalists' Presentations
SA40 Optimization in Energy I
SA41 Panel: The Academic Job Search for PhD Students
SA43 Education I
SA44 Decision Support Systems I
SA45 Scheduling V
SA46 Marketing I

Sunday 10:15-11:45

SB03 Doing Business in the Electronic Era: Three Perspectives
SB05 Tutorial: An Introduction to Analyses of Adaptive Stochastic Search Methods for Global Optimization
SB06 Modeling the Evolving Communications Landscape
SB07 Data Mining
SB08 DO-12
SB09 DO-14
SB10 Optimization Techniques VI
SB11 Networks & Graphs II
SB12 Application & Extensions of Metaheuristics
SB13 Linear Programming
SB14 Analysis of Queueing Systems
SB15 Operations Management V
SB16 Tutorial: Operations Management in Financial Services
SB17 Managing Learning to Improve Operations
SB18 ERP: Extension to the E-Business Supply Chain
SB19 Logistics Ii
SB20 Operations Management II
SB21 Manufacturing II
SB22 Knowledge & Information Flows in Supply Chains
SB23 Collaborative Decision Making in E-Marketplaces
SB24 Supply Chain Management II
SB25 Exact & Approximation Algorithms for Scheduling Problems
SB26 New Results in Project Planning & Control
SB27 Six Sigma
SB28 MCDM
SB29 Best Student Paper Presentations
SB30 Recent Developments in Risk & Decision Analysis at Caltech/JPL
SB31 The GMCR Technology for Conflict Analysis & Management
SB32 Finance: Theory & Empirics I
SB33 Social Science Applications
SB34 OR/MS Tools for Public Transit Planning
SB35 Dynamic Vehicle Routing
SB36 Crew Management II
SB37 Revenue Management II
SB38 Yield Management in the Rail Industry
SB39 Nicholson Student Paper Prize Competition I
SB40 Optimization in Energy II
SB41 Panel: The Industry Job Search for PhD Students
SB43 Tutorial: Using VBA in the Classroom to Develop Decision Support Systems
SB44 Stochastic Dynamic Programming
SB45 Operations Management VIII
SB46 Decision Support Systems II

Sunday 13:00-14:30

SC03 Management & Impacts of Information Technology
SC05 Tutorial: Global Optimization - Software & Applications
SC06 Telecommunications Network Design Models
SC07 Metaheuristics for Transportation Applications
SC08 DO-02
SC09 DO-15
SC10 Tutorial: Complementarity Problems - Applications & Algorithms
SC11 Applications of Graph Theory to Integer Programming
SC12 Tabu Search & Military Logistics Problems
SC13 Tutorial: A New Look at Linear Optimization
SC14 Tutorial: Interior-Point Methods & Semi-Definite Programming
SC15 Operations Mangement VI
SC16 Cross-Trained Labor: Models of Workforce Agility
SC17 Complex, Stochastic Production/Inventory Systems
SC18 ERP: Extensions
SC19 Logistics III
SC20 Technology Management Education & Experiential Learning
SC21 Flexible Assembly Systems
SC22 Strategic Issues in Supply Chain Management
SC23 Addressing Bidding & Winner-Determination Complexity in High-Dimensional, Uncertain & Dynamic Environments
SC24 Supply Chain Management III
SC25 Recent Advances in Scheduling
SC26 Issues on Uncertainty in Project Management
SC27 Process Monitoring & Quality Improvement
SC28 MCDM Approaches to Portfolio Selection
SC29 Reliability I
SC30 Risky Decision Making
SC31 Decision Theory
SC32 Finance: Theory & Empirics II
SC33 OR & Breast Cancer I
SC34 Information Integration for Network Traffic Management
SC35 Dynamic Modeling of Common Carriers
SC36 Airline Operations Control
SC37 Applications of Pricing in Transportation

SC38 Panel: Current Rail Issues I
SC39 Nicholson Student Paper Prize Competition II
SC40 Pricing & Operating Decisions in Energy Markets
SC41 Opportunities for Decision Making in an Aviation Maintenance Supply Chain
SC44 Telecommunications II
SC45 Operations Management IX
SC46 Marketing II

Sunday 14:45-15:45

SO47 Omega Rho: Engineering Frontiers & the New Engineering Leader: Opportunities & Challenges for the OR/MS Profession

Sunday 16:00-17:30

SD03 Techniques for Scalable Data Mining
SD05 Recent Advances in Global Optimization
SD06 Tradeoffs in Network Design & Operation
SD07 Computational issues for Integer Programs
SD08 DO-06
SD09 Tutorial: Constraint Programming & its Relationship to Mathematical Programming
SD10 Recent Advances in Complementarity Problems
SD11 Telecommunication Networks
SD12 Integer & Combinatorial Optimization Applications in Supply Chain Management
SD13 Computational SDP & SOCP I
SD14 SDP & its Applications in Non-Convex Optimization
SD15 Models for Supply Chain Contracting & Coordination
SD16 E-Business Operations Problems
SD17 Facility Design Research
SD18 Enterprise Applications: The Future
SD19 Tutorial: Emerging Developments in Adaptive Dynamic Programming for Stochastic Resource Management
SD20 Information-Based Extended Product Development I
SD21 FMS Issues
SD22 New Directions in Supply Chain Management
SD23 Risk Management in Supply Chains: Concepts
SD24 Perspectives on Designing & Managing the Integrated Supply Chain
SD25 Methods for Data Generation
SD26 Military Application
SD27 Reliability
SD28 Philosophical Approaches to MCDM
SD29 Design & Analysis of Computer Experiments
SD30 Practioners' Award Competition
SD31 Logistics
SD32 Multi-Stage Investment Models
SD33 OR & Breast Cancer II
SD34 OR/MS Methods in Infrastructure Management
SD35 Inventory Routing
SD36 Airline Operations
SD37 Internet Auctions
SD38 Panel: Current Rail Issues II
SD40 OR/MS for Recycling
SD41 Data Quality: An OR Problem or a Problem for OR?
SD43 Education I
SD44 Telecommunications III
SD45 Operations Management VII
SD46 Marketing III

Monday 08:15-09:45

MA01 Evolutionary Algorithms: Theory & Applications
MA02 OR Models & Practice
MA03 Data Mining for Business Problems: Methods & Applications
MA04 Multi-Attribute Negotiation Support on E-Markets
MA05 Stochastic Global Optimization
MA06 Pricing & Economic Analysis of Telecommunications
MA07 IT-Based Teaching within OR/MS
MA08 DO-07
MA09 DO-10
MA10 Solving Mathematical Programs Efficiently
MA11 Some Recent Deterministic & Stochastic 0-1 Program Algorithmic Developments
MA12 Algorithms for Network Design
MA13 Computational SDP & SOCP II
MA14 Computational Aspects of Interior Point Methods
MA15 Supply Chain Management & Operations Management
MA16 New Issues in Inventory Management
MA17 MSOM Fellows
MA18 Tutorial: Coordinating Production, Inventory & Transportation Decisions in the Supply Chain: From Theory to Practice
MA19 Tutorial: Beyond Sensitivity Analysis - An Introduction to Stochastic Programming
MA21 Forecast-Facilitated Make-to-Order Production
MA22 Tutorial: Performance Measurement
MA23 Risk Management in Supply Chains: Applications
MA24 Logistics of Future Systems
MA25 A New Perspective on Machine Scheduling
MA26 Selected Topics on Tactical-Air Combat Models
MA27 Distillations I
MA28 Binary Relations in Multi-Criteria Optimization: Theory & Applications
MA29 Quality Engineering Research
MA30 Decision Making: Applications & Empirical Studies
MA31 Markets in Uncertainty
MA32 New Directions in Financial Engineering
MA33 Clinical Scheduling & Forecasting
MA34 Network Equilibrium Models I
MA35 Time-Dependent Vehicle Routing
MA36 Aviation Safety & Security
MA37 Pricing
MA38 Application of Locomotive Models
MA39 Software Demonstration I
MA40 OR/MS in Forestry I
MA43 Education II
MA45 Production & Scheduling V
MA46 Marketing IV

Monday 10:00-11:30

MB01 Knowledge Abstraction
MB02 Tutorial: Accelerating E-Business Infrastructure
MB03 Ensemble Methods for Data Mining
MB04 Auction Design & Primal-Dual Algorithms
MB05 Nonsmooth Critical Point Theory, Hemivariational Inequalities & Global Optimization
MB06 Economic Issues in Wired & Mobile E-Commerce
MB07 Optimization in Molecular Biology I
MB08 DO-13
MB09 DO-16
MB10 Algorithms for Solving Complementarity Problems
MB11 Integer & Combinatorial Optimization Applications in Manufacturing & Service Operations
MB12 Metaheuristic-Based General Purpose Solvers
MB13 Interior-Point Methods for Linear & Semidefinite Optimization I
MB14 Linear Complementarity Problems: Numerical Solutions & Applications
MB15 Large-Scale Integer Programming
MB16 E-Commerce & Supply Chain
MB17 Models on Supply Chain Operations
MB18 Location Analysis I
MB19 New Models & Applications in Stochastic Optimization
MB20 Special Issues in Technology Business Incubation
MB22 Transportation-Inventory Planning Models
MB23 Issues in Supply Chain Management

MB24 Supply Chain Design Economics
MB25 Scheduling Theory & Applications
MB26 Selected Topics on Combat Models
MB27 Distillations II
MB28 Methodological Advances in MCDS
MB29 Panel: Challenges & Opportunities of QSR Methods - A Sponsor Agencies Perspective
MB30 Portfolio Decision Analysis
MB31 Computational Dynamic Programming
MB32 Financial Engineering with Jumps
MB33 Operations Research in Medicine
MB34 Network Equilibrium Models II
MB35 Time-Critical Vehicle Routing
MB36 Air Traffic Control
MB37 Applications of Revenue Management I
MB38 Line & Terminal Capacity Assessment Methodology & Tools
MB39 Software Demonstration II
MB40 OR/MS in Forestry II
MB43 Education III: Spreadsheet Interest Research Group
MB45 Production & Scheduling VI
MB46 Marketing Decision Analysis

Monday 13:15-14:15

MK47 Keynote: The Traveling Salesman Problem
MK48 Keynote: The Value Proposition of Outsourcing - Fact or Fiction?

Monday 14:30-16:00

MC01 Aplications of Machine Learning Techniques
MC02 E-Business
MC03 Boolean Functions & Learning
MC04 Winner Determination in Combinatorial Auctions
MC05 Scheduling
MC06 Telecommunications Keynote: Distinguished Applications of Telecommunications Planning
MC07 Optimization in Molecular Biology II
MC08 DO-09
MC09 DO-05
MC10 Data Envelopment Analyses I
MC11 MIP for Cutting Stock, Capacity & Production Planning
MC12 Algorithms & Tools for Logistics Problems
MC13 Interior-Point Methods for Linear & Semidefinite Optimization II
MC14 Applications of Second-Order Optimization & Related Topics
MC15 Interior Point Methods for Nonlinear Programming
MC16 Panel: Where to Publish?
MC17 Pricing & Coordination in Supply Chains
MC18 Location Analysis II
MC19 Algorithms for Stochastic Integer Programming Problems
MC20 Best Dissertation Award Winners 2001
MC21 Information-Based Extended Product Development II
MC22 Electronic Market Driven Supply Chains
MC23 Auction Mechanisms & Ontologies for E-Commerce
MC24 Game Theoretic Models for Supply Chain Coordination
MC25 Scheduling I
MC26 Assessing the State-of-the-Art for Aggregated Force Combat Models
MC27 Ballistic Missiles
MC28 Multi-Criteria Optimization in Engineering
MC29 FasterBetterCheaper Experimentation
MC30 Panel: Pre-College Decision Analysis Education
MC31 Tutorial: A Brief Introduction to the Dempster-Shafer Theory
MC32 Portfolio Choice under Uncertainty in Hedge Funds
MC33 Cost-Effectiveness Methods in Health Care
MC34 Optimization Problems in Traffic Management
MC35 Computational Issues in Transportation Decision Models
MC36 Aviation Applications
MC37 Applications of Revenue Management II
MC38 Queueing Systems in Heavy Traffic
MC39 Software Demonstration III
MC40 OR/MS in Forestry III
MC43 Education IV: INFORMS Case Competition 2001: Finalists 1 & 2
MC45 Operations Management III
MC46 Marketing V

Monday 16:15-17:45

MD01 Applications of Data Mining
MD02 Optimization Services on the Internet I
MD03 Boolean Functions & Graphs
MD04 Multidimensional Auctions
MD05 Artificial Intelligence I
MD06 Finance: Theory & Empirics III
MD07 Tutorial: Configuration as a Key Problem for E-Commerce Success
MD08 DO-04
MD09 DO-08
MD10 Data Envelopment Analyses II
MD11 Quadratic Assignment & Related Problems
MD12 Issues for Developing Large-Scale Combinatorial Optimization Heuristics
MD13 Interior-Point Methods for LInear & Semidefinite Optimization III
MD14 Linear Optimization & Health Care
MD15 Large-Scale Optimization
MD16 Process Flexibility & Forecast Evolution in Capacitated Manufacturing Systems
MD17 Principal-Agent Models & Operations Management
MD18 Tutorial: Location Modeling
MD19 Discrete Optimization in Stochastic Programming
MD20 Distinguished Speaker: High Technology Entrepreneurship - What Happening to It & to the Academic Research About It?
MD21 Panel: Thought Leadership in Manufacturing Strategy
MD22 Supplier Selection Characteristics
MD23 Stochastic Optimization & Risk Management
MD24 Optimization in Supply Chains
MD25 Scheduling II
MD26 OOTW Toolbox
MD27 TRAC OR
MD28 MCDM Applications & Issues
MD29 IIE Transactions
MD30 Decision Analysis Awards
MD31 Belief Functions in Expert Systems
MD32 Modeling & Optimization in Finance I
MD33 Roundtable: Where is OR/MS in the Present Crises in Health Care Delivery? Cost, Quality of Care & Access Issues
MD34 Optimization Applications in Air Transportation
MD35 Transportation Science I
MD36 Airline Routes & Prices
MD37 Applications of Auctions & Revenue Management
MD38 Queueing Networks
MD39 Software Demonstration IV
MD40 OR/MS in Forestry IV
MD43 Education V: INFORMS Case Competition 2001: Finalists 3 & 4
MD45 Operations Management IV
MD46 Simulation

Tuesday 08:15-09:45

TA01 AI Applications
TA02 Optimization Services on the Internet II
TA03 Boolean Functions
TA04 Online Auctions

TA05 Recent Advances in Convexification
TA06 Modeling of OR Problems
TA07 Telecommunication Network Design & Optimization
TA08 DO-11
TA09 DO-17
TA10 New DEA Methods I
TA11 Integer & Combinatorial Optimization Applications to Product & Process Management
TA12 Optimization Techniques I
TA14 Complexity Issues in Convex Optimization & Related Topics
TA15 Solving Large-Scale Network Optimization Problems
TA16 Inventory Models with Item Substitution & Reuse
TA17 Flexibility in Call Centers & Other Service Operations
TA18 SOLA/UPS Dissertation Awards
TA19 Logistics Transportation Efficiency
TA20 CTO: The Emerging Professional
TA21 Supply Chain Strategies
TA22 Collaboration & Competition in Supply Chain Management
TA23 Optimizing Enterprise Supply Chains
TA24 Supply Chain Management IV
TA25 Scheduling III
TA26 Military OR Applications: Operational Modeling & Analysis I
TA27 Attrition
TA28 Decision Making with Dependence & Feedback: The Analytic Network Process
TA29 Quality, Management & Design
TA30 Environmental Applications of Decision Analysis
TA31 Belief Functions in Business Decisions
TA32 Modeling & Optimization in Finance II
TA33 Modeling Applications in Health Care
TA35 Transportation Science II
TA36 Models to Support Air Cargo Planning & Operations
TA37 Revenue Management Methods & Models
TA38 Performance & Stability of Multi-Class Queueing Networks
TA39 Software Demonstration V
TA40 OR/MS in Forestry V
TA41 Train Scheduling with BNSF Railway
TA42 Open Source Software I
TA43 OR Modeling in Higher Education
TA45 Operations Management X
TA46 Agent Foundations & Simulation Applications

Tuesday 10:00-11:30

TB01 Tutorial: Knowledge & Knowledge Management
TB02 XML in E-Business
TB03 Boolean Functions & Optimization
TB04 Competitive Bidding Applications
TB05 Simulation Output Analysis Methods
TB06 Stochastic Decision Processes
TB07 Applications of Constraint Programming
TB08 Configuration & Advances in Constraint Programming
TB09 Fuzzy & Hybrid Dynamic Programming
TB10 DEA Applications
TB11 Integer Programs Arising in Scheduling, Routing & Capital Budgeting
TB12 Optimization Techniques II
TB13 Primal-Dual Interior Point Methods for Linear Optimization over Cones & their Applications
TB14 Extensions of LP
TB15 Topics in Decision Analysis
TB16 Pricing, Service Quality & Market Structure in Delay-Sensitive Markets
TB17 Production & Inventory Management
TB18 Location Analysis III
TB19 Optimization Approaches in Logistics
TB20 Modularity Management
TB21 Empirical Investigations in Product Development & Supply Chain Design
TB22 Integrating Production & Distribution Decisions in the Supply Chain
TB23 Sense & Respond Supply Chain Management
TB24 Supply Chain Management V
TB25 Production & Scheduling III
TB26 Military OR Applications: Operational Modeling & Analysis II
TB27 Army OR
TB28 Theory & Application of the AHP
TB29 Statistical Analysis & Computation
TB30 DA Arcade I
TB31 Belief Functions in Management Information Systems
TB32 Risk Management & Derivatives
TB33 Optimization Applications in Health Care
TB34 Transportation I
TB35 Transportation II
TB36 Strategies & Tactics of NAS Agents
TB37 Applications of Pricing & Revenue Management
TB38 Applied Stochastic Optimization & Control
TB39 Software Demonstration VI
TB40 Supply Chain Management
TB41 OR at Merrill Lynch
TB42 Workshop: Open Source Tools for Branch, Cut & Price
TB43 Education I
TB45 Supply Chain Management IX
TB46 Simulation Analysis Methodology

Tuesday 11:45-12:45

TP47 Edelman Reprise: Pricing Analysis for Merrill Lynch Integrated Choice

Tuesday 13:00-14:00

TK47 Keynote: Rocket Science Retailing - What Research Opportunities Does it Create for Us?
TK48 Keynote: The Role of Project Management Processes as a Corporate Risk Mitigation Tool at ExxonMobil

Tuesday 14:15-15:45

TC01 Tutorial: Component-Based System Development - Technologies & Implications on System Development
TC02 Game Theory Applications in E-Commerce
TC03 Web Mining
TC04 Auction Theory
TC05 Generalized Convexity & Fractional Programming
TC06 Telecommunications IV
TC07 Bilevel Programming I
TC08 Workforce Scheduling
TC09 Neuro-Dynamic Programming
TC10 New DEA Methods II
TC11 Computational Integer Programming
TC12 Optimization Techniques III
TC13 Interior Point & Kernel Methods
TC14 Applications of Optimization in Finance
TC15 Optimization Techniques VII
TC16 Flexible Servers in Manufacturing
TC17 Advances in Factory Layouts
TC18 Location Analysis IV
TC19 Order Promising & Order Fulfillment
TC20 Learning, Incentive & Knowledge: The Organization & Incentive System of the Firm
TC21 Remanufacturing Strategy: Managing the Competition
TC22 Supply Chain Scheduling
TC23 Information & Collaboration in the Supply Chain
TC24 Supply Chain Management VI
TC25 Production & Scheduling IV
TC27 Hunters & Killers

TC28 Tutorial: Decision Making with Dependence & Feedback - The Analytic Network Process
TC29 The Interface of Simulation & Statistics
TC30 Analysis of Management & Organizational Factors
TC31 Theory of Hints & Belief Functions
TC32 Tutorial: An Introduction to OR/MS & Financial Engineering
TC33 Health Care Performance Measurement & Reporting using DEA
TC34 Transportation III
TC35 Transportation V
TC36 Robust Airline Schedule Planning
TC37 Auctions & Pricing
TC38 Stochastic Models in Revenue Management
TC39 Software Demonstration VII
TC40 DEA
TC41 Supply Chain Challenges in IBM
TC42 Open Source Software II
TC43 Education II
TC44 Combinatorial Auction Designs
TC45 Manufacturing III
TC46 Simulation II

Tuesday 16:00-17:30

TD01 Business & Industry Applications
TD02 E-Business & Supply Chain Management
TD03 Data Mining & Data Visualization
TD04 Auctions & Game Theory
TD05 Nonlinear Semi-Definite Programs & Relaxations I
TD06 E-Commerce VI
TD07 Bilevel Programming II
TD08 Graphs & Geometrical Algorithms for Global Constraints
TD09 Tutorial: Fuzzy Dynamic Programming
TD10 New DEA Methods III
TD11 Heuristics for Hard Discrete Optimization Problems
TD12 Optimization Techniques IV
TD13 Applications & Design of New Algorithms
TD15 Optimization Techniques VIII
TD16 Optimization of Practical Industrial Problems
TD17 Modeling & analysis of Semiconductor Manufacturing
TD18 Location Analysis V
TD19 Logistics of E-Commerce
TD20 Managing R&D Organization: Localization & Internationalization
TD21 Assessing the Impact of E-Business on Manufacturing Strategy
TD22 Information & Forecasting in Multi-Stage Supply Chains
TD23 Optimal Control of Supply Chains
TD24 Supply Chain Management VII
TD25 Production & Scheduling V
TD27 New Analytical Tools for Massive Change in Organizations
TD28 Decision Analyses I
TD29 QSR in Manufacturing Systems
TD30 DA Arcade II
TD31 Belief Functions & Statistics
TD32 Facilities Planning & Design
TD33 Logistics IV
TD34 Transportation IV
TD36 Models to Support Aviation Operations
TD37 Models & Methods for Electronic Markets
TD40 Queueing I
TD41 OR at Hewlett-Packard
TD42 Nontraditional OR
TD43 Education III
TD44 Strategic Management II
TD45 Operations Management XI
TD46 Operations Management

Wednesday 08:30-10:00

WA01 Artificial Intelligence II
WA02 Models of IT Impact on E-Business & Supply Chains
WA03 Optimization in Kernel Methods Training
WA04 Auctions: Field & the Laboratory
WA05 Nonlinear Semi-Definite Programs & Relaxations II
WA06 Performance Issues in High Speed Networks
WA07 Equilibria Governed by Hemivariational Inequalities
WA08 Constraint Programming & Mathematical Programming
WA10 Data Envelopment Analyses III
WA11 Integer Programming Models & Applications
WA12 Optimization Techniques V
WA13 Information Systems I
WA14 E-Commerce IV
WA16 Productivity & Competitiveness
WA18 Business Applications II
WA19 Applications in Logistics & Supply Chain Management
WA20 Management of Technology I
WA21 Product Development: Supply Chain Interface
WA22 Applications of Forecasting
WA24 Industry Applications I
WA25 Production & Scheduling VI
WA26 Undergraduate Projects in OR I
WA28 Decision Analyses II
WA29 Quantitiative Methods for Quality Improvement
WA30 Organization Theory
WA31 Belief Functions in Modeling
WA32 Statistics/Quality Control
WA33 Project Management I
WA34 Optimization Opportunities in the Cruising Industry
WA36 Air Traffic Management Models
WA37 E-Commerce I
WA38 Probability
WA39 Decision Problems for a Rapidly Changing Agriculture
WA40 Queueing II
WA41 OR at Ford
WA42 Transportation
WA43 Transportation Network Simulation & Analysis I
WA44 Transportation Network Planning & Management
WA45 Management of Technology III
WA46 Marketing VI

Wednesday 10:15-11:45

WB01 Computer Science/Applications
WB02 Queueing Models for Internet Traffic
WB04 Auctions in Finance
WB05 Geometric Programming
WB06 Security Issues in a Networked Business Environment
WB07 Bilevel Programming III
WB08 Stochastic Processes
WB10 Data Envelopment Analyses IV
WB11 Networks & Graphs III
WB12 Heuristics Programming II
WB13 Information Systems II
WB14 E-Commerce V
WB16 Strategic Management
WB17 Operations Management
WB18 Service Industry
WB19 Inventory & Routing
WB20 Management of Technology II
WB21 Strategic Implications of Operational Integration
WB22 Transportation Applications of Forecasting
WB24 Industry Applications II
WB25 Business Applications
WB26 Undergraduate Projects in OR II
WB28 Decision Analyses III
WB29 Quality Assurance & Control
WB30 Strategic Planning

WB31 Belief Functions in E-Commerce
WB32 Finance: Theory & Empirics IV
WB33 Supply Chain Management VIII
WB34 Strategic Research & Management Issues Facing the Cruising Industry
WB36 Airline Revenue Management
WB37 E-Commerce II
WB38 Risk Analysis
WB39 Modeling Decision Problems in Agribusiness
WB40 Queueing III
WB41 OR & Logistics & Supply Chain Problems: New Frontiers of Opportunities
WB42 Supply Chain Management
WB43 Transportation Network Simulation & Analysis II
WB44 Traffic Control & Flow Analysis
WB45 Production & Scheduling VII

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Transportation Science

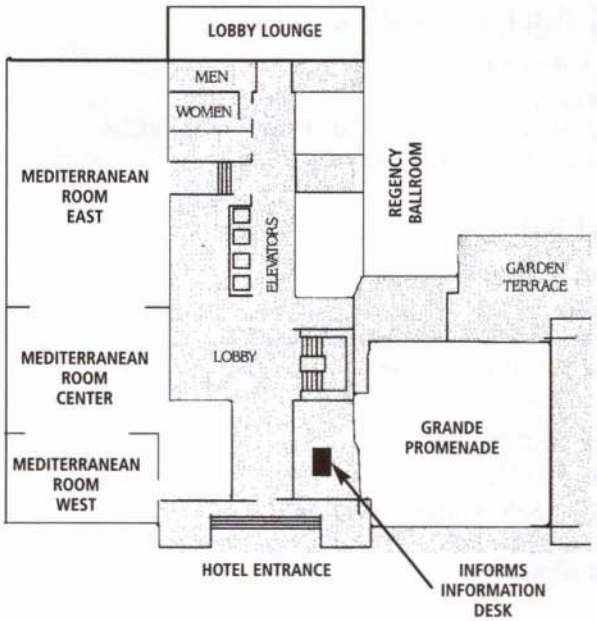
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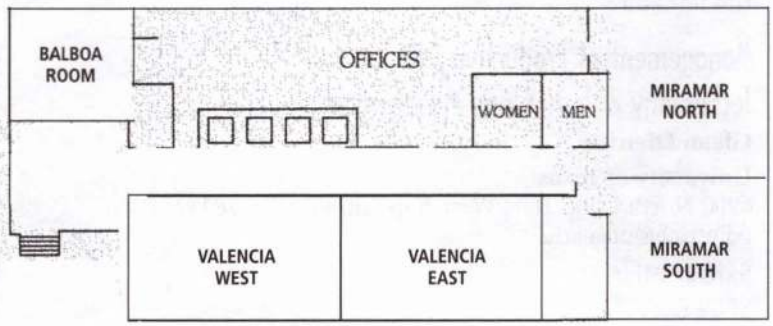
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WYNDHAM MIAMI BEACH RESORT

LOBBY LEVEL

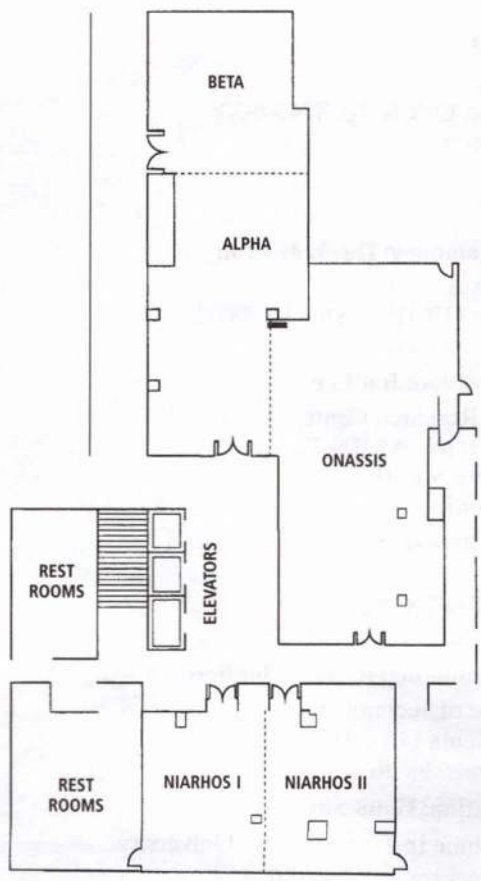




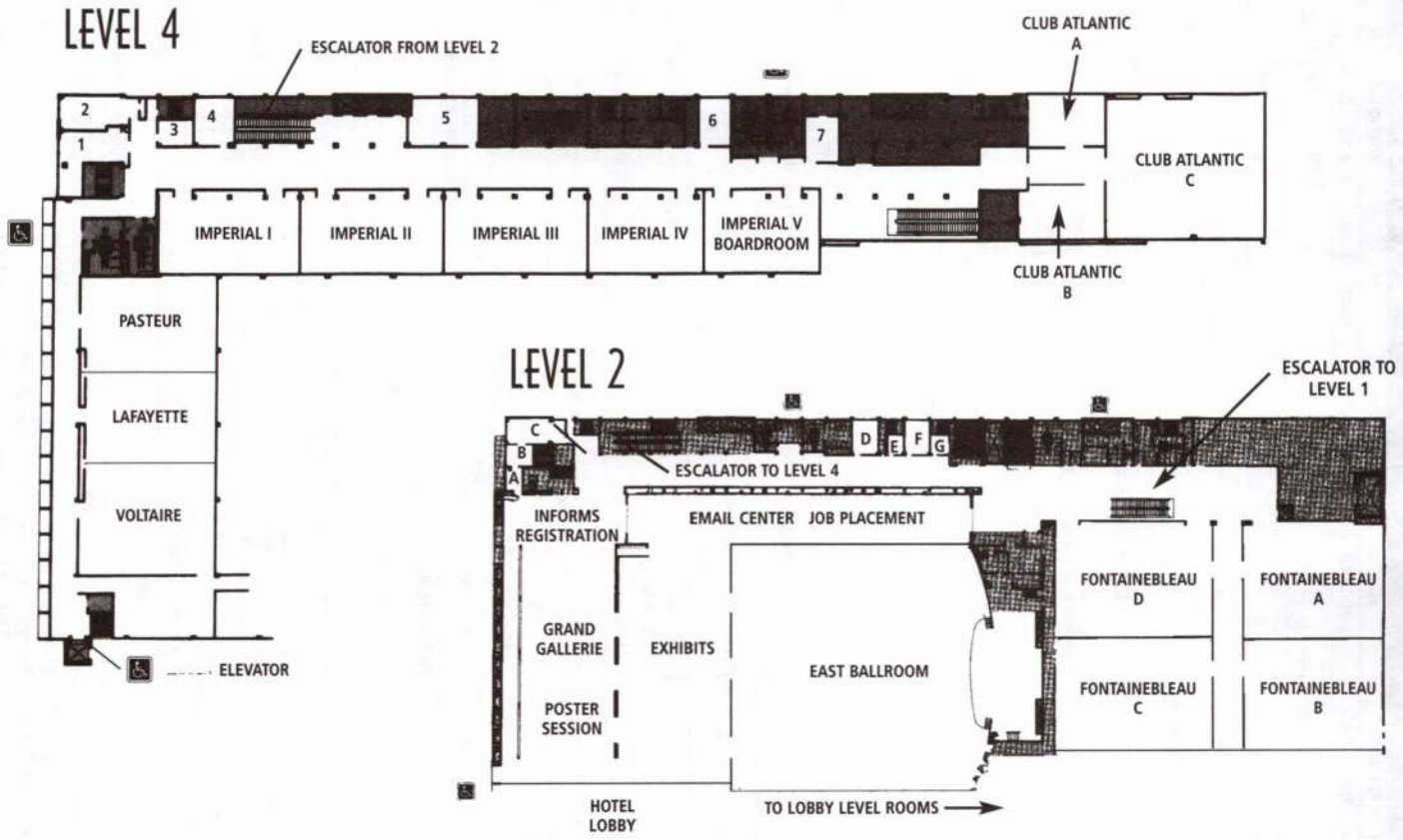
LEVEL 3

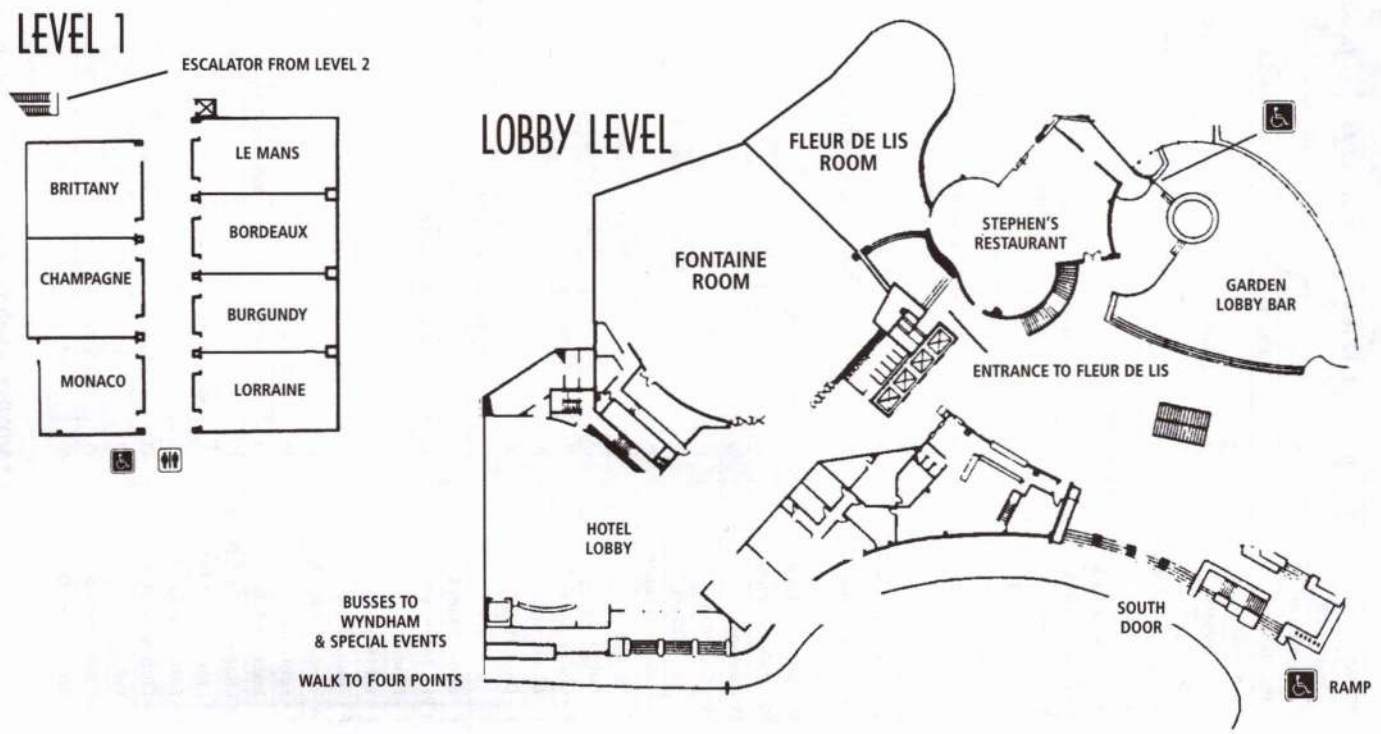
FOUR POINTS SHERATON HOTEL

LEVEL 4



FONTAINEBLEAU HILTON RESORT & TOWERS





MASTER TRACK SCHEDULE - SUNDAY AND MONDAY

Welcome & Awards Ceremony
Monday, 12:00-1:00pm, East Ballroom

		SUNDAY, NOVEMBER 4					MONDAY, NOVEMBER 5				
		SA	SB	SC	PLENARY*	SD	MA	MB	KEYNOTES*	MC	MD
ROOM	Track	8:30-10:00	10:15-11:45	1:00-2:30	2:45 - 3:45	4:00-5:30	8:15-9:45	10:00-11:30	1:15 - 2:15	2:30-4:00	4:15-5:45
F - Imperial II	1	CIST				Artificial Intelligence					
F - Imperial III	2					Saul Gass	Tutorial			E-Business	OR/MS & the Internet
4 Pt. - Beta	3	E-Comm.	Information Systems		Data Mining						
F - Imperial IV	4	CIST					Auctions				
4 Pt. - Onassis	5	Heuristics	Tutorial	Tutorial			Global Optimization			Scheduling	AI
F - Pasteur	6	Telecommunications									Finance
W - Med Room East	7	Computing									
W - Madrid	8	Discrete Optimization									
W - Valencia East	9										
F - Conf. Room 1	10	Queueing	Opt. Tech.	Complementarity & Related Problems						DEA	
4 Pt. - Alpha	11	Networks & Graphs					Integer Programming				
4 Pt. - Niarhos 1	12	Combinatorial Optimization									
W - Med. Room West	13	L& CL Opt.	LP	Tutorial	Linear & Conic Linear Optimization						
W - Grand Promenade	14	Queueing/Transportation		Tutorial							
F - Conf. Room F	15	Scheduling	Operations Mgmt.			MSOM	SCM & OM	Large-Scale Mathematical Programming			
F - Font Ballroom C	16	MSOM									
F - Font Ballroom D	17										
F - Font Ballroom A	18	Enterprise Resource Planning					MSOM	Location Analysis			
F - Lafayette	19	Logistics				Tutorial	Stochastic Programming				
W - Miramar South	20	Operations Mgmt.	Management of Productivity & Technology and Technology Management								
W - Valencia West	21	Manufacturing	Flexible Manufacturing Systems				Manag. Prod. & Tech.				Mfg. Strategy
W - Balboa	22	Supply Chain Management									
W - Castillian	23	SCM	Supply Chain & E-Market Optimization								
F - Conf. Room 2	24	Supply Chain Management				Perspectives	Mfg. Systems & Supply Chain Integration				
W - Miramar North	25	Scheduling									
F - Bordeaux	26	Project Management				Military Apps.	Military Applications				
F - Burgundy	27	Quality Management				Reliability					
F - Club Atlantic B	28	Combinatorics	Multicriteria Decision Making								
F - Champagne	29	QSR									
F - Club Atlantic C	30	Decision Analysis									
F - Imperial I	31	Group Decision & Negotiation		Dec. Analysis	Logistics		Dec. Analysis	Bell. Mem. 2			Belief Functions
F - Conf. Room C	32	Finance					Financial Engineering				
4 Pt. - Niarhos 2	33	Social Science Applications			WORMS/Health Apps.						Health Applications
F - Monaco	34	Transportation Science									
F - LeMans	35										
F - Fleur de Lis	36	Aviation Applications									
W - Regency Ballroom	37	Revenue Management									
F - Fontaine	38	Bus. Apps.	Railroad Applications								Applied Probability
F - Imperial V Boardroom	39	Dantzig	Nicholson Competition				Software Demonstrations				
W - Regency Conf. Room	40	ENRE- Energy					ENRE orestry				
W - Med. Room Ctr.	41	Job Placement - S - 2	Unsolved OR Problems				Roundtable				
F - Font Ballroom B	42	Board Meeting									
F - Club Atlantic A	43	Education	Tutorial	INFORM-ED							
F - Voltaire	44	DSS	Bell. Mem. 1	Telecommunications					Teacher Workshop		
F - Conf. Room 5	45	Scheduling		Operations Mgmt.			Production & Scheduling		Operations Mgmt.		
F - Conf. Room D	46	Mktg.	DSS	Mktg.				Dec. Analysis		Mktg.	Simulation

*** SUNDAY – Plenary 2:45-3:45pm, Omega Rho, Magnanti, East Ballroom**
*** MONDAY - Welcome & Awards 12:00-1:00pm, East Ballroom Keynote: 1:15-2:15pm, Ali, Fontainebleau A Keynote, 1:15-2:15pm, Cook, Fontainebleau D**

LEGEND: F — Fontainebleau Hilton Hotel W — Wyndham Hotel 4 Pt. — Four Points Sheraton Hotel

MASTER TRACK SCHEDULE - TUESDAY AND WEDNESDAY

		TUESDAY						WEDNESDAY	
		TA	TB	PLENARY*	KEYNOTES*	TC	TD	WA	WB
ROOM	Track	8:15-9:45	10:00-11:30	11:45-12:45	1:00-2:00	2:15-3:45	4:00-5:30	8:30-10:00	10:15-11:45
F - Imperial II	1	AI	Tutorial			Tutorial	B&I Apps.	AI	CS Apps.
F - Imperial III	2	ImOR/MS & the Internet							
4 Pt. - Beta	3	Data Mining							
F - Imperial IV	4	Auctions							
4 Pt. - Onassis	5	Generalized Convexity							Geo. Progr.
F - Pasteur	6	Saul Gass	Stochastic			Telecomm.	E-Commerce	Telecommunications	
W - Med Room East	7	Computing		Bilevel Programming					
W - Madrid	8	Discrete Optimization	Constraint Programming						Stochastic
W - Valencia East	9	Bellman Memorial							
F - Conf. Room 1	10	DEA							
4 Pt. - Alpha	11	Integer Programming							Networks/Graphs
4 Pt. - Niarhos 1	12	Optimization Techniques							Heuristics
W - Med. Room West	13	Linear & Conic Linear Optimization						Information Systems	
W - Grand Promenade	14	Linear & Conic Linear Optimization						E-Commerce	
F - Conf. Room F	15	LSMP	DA			Optimization Techniques			
F - Font Ballroom C	16	MSOM						Prod/Comp	Strategic Mgmt.
F - Font Ballroom D	17	MSOM							Op. Mgmt.
F - Font Ballroom A	18	Location Analysis						Bus. Apps.	Service Industry
F - Lafayette	19	Logistics							
W - Miramar South	20	Management of Productivity & Technology and Technology Management							Mgmt. of Technology
W - Valencia West	21	Manufacturing Strategy							
W - Balboa	22	Supply Chain Management						Forecasting	
W - Castillian	23	Supply Chain & E-Market Optimization							
F - Conf. Room 2	24	Supply Chain Management						Industry Apps.	
W - Miramar North	25	Scheduling	Production & Scheduling						Bus. Apps.
F - Bordeaux	26	Military Applications							
F - Burgundy	27	Military Applications							
F - Club Atlantic B	28	Decision Making Theory & Apps.					Decision Analysis		
F - Champagne	29	QSR							
F - Club Atlantic C	30	Decision Analysis						Org. Theory	Strat. Planning
F - Imperial I	31	Belief Functions							
F - Conf. Room C	32	Financial Engineering				Tutorial	Facilities	Stats/QC	Finance
4 Pt. - Niarhos 2	33				Health Applications		Logistics	Proj. Mgmt.	SCM
F - Monaco	34	TSS					TS	Cruise Line Apps.	
F - LeMans	35	TSS							
F - Fleur de Lis	36	Aviation Applications							
W - Regency Ballroom	37	Revenue Mgmt.				E-Business		E-Commerce	
F - Fontaine	38	Applied Probability						Probability	Risk Analysis
F - Imperial Boardroom	39	Software Demonstrations						Decision Tech. for Food	
W - Regency Conf. Room	40	Forestry	SCM				DEA	Queueing	
W - Med. Room Ctr.	41	Unsolved OR Problems							
F - Font Ballroom B	42	Open Source Software					Non-Traditional OR	Transport.	SCM
F - Club Atlantic A	43	OR in Higher Ed.	Education					Transportation Science	
F - Voltaire	44					Computing	Strat. Mgmt.	Transportation Science	
F - Conf. Room 5	45	Op. Mgmt.	SCM			Mfg.	Op. Mgmt.	Mgmt. of Tech.	Prod. & Scheduling
F - Conf. Room D	46	Simulation						Mktg.	

*** TUESDAY – Plenary 11:45am-12:45pm, Edelman, East Ballroom Keynote 1:00-2:00pm, Fisher, Fontainebleau A Keynote 1:00-2:00pm, Murray, Fontainebleau D**

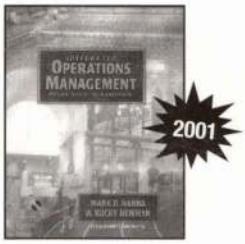
LEGEND: F — Fontainebleau Hilton Hotel W — Wyndam Hotel 4 Pt. — Four Points Sheraton Hotel

New Decision Science Titles for 2002/2001

Operations Management



Operations Management, 6/e
Lee J. Krajewski
Larry P. Ritzman



Integrated Operations Management
Mark D. Hanna
W. Rocky Newman



Operations Management, 6/e
Jay Heizer
Barry Render

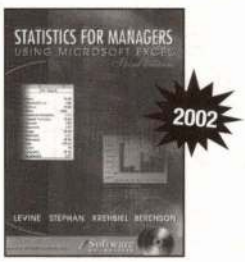


Principles of Operations Management, 4/e
Jay Heizer
Barry Render

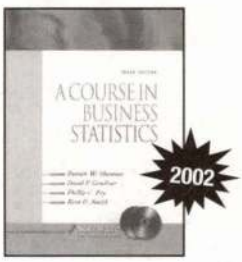
Business Statistics



Basic Business Statistics, 8/e
Mark L. Berenson
David M. Levine
Timothy C. Krehbiel



Statistics for Managers Using Microsoft Excel, 3/e
David M. Levine
David Stephan
Timothy C. Krehbiel
Mark L. Berenson

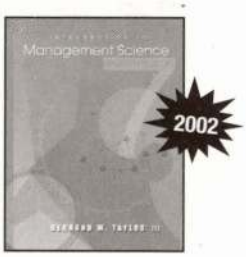


A Course in Business Statistics, 3/e
Patrick W. Shannon
David F. Groebner
Phillip C. Fry
Kent D. Smith

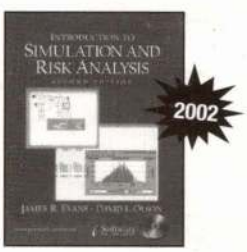


Business Statistics, 5/e
David F. Groebner
Patrick W. Shannon
Phillip C. Fry
Kent D. Smith

Other Exciting 2002/2001 Titles



Introduction to Management Science, 7/e
Bernard W. Taylor III



Introduction to Simulation and Risk Analysis, 2/e
James R. Evans
David L. Olson

Supply Chain Management by Sunil Chopra and Peter Meindl

Managing Quality by S. Thomas Foster

Project Management for Business and Technology, 2/e by John Nicholas

Decision Modeling with Microsoft Excel, 6/e by Jeffrey Moore and Larry Weatherford

SimQuick by David Hartvigsen

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