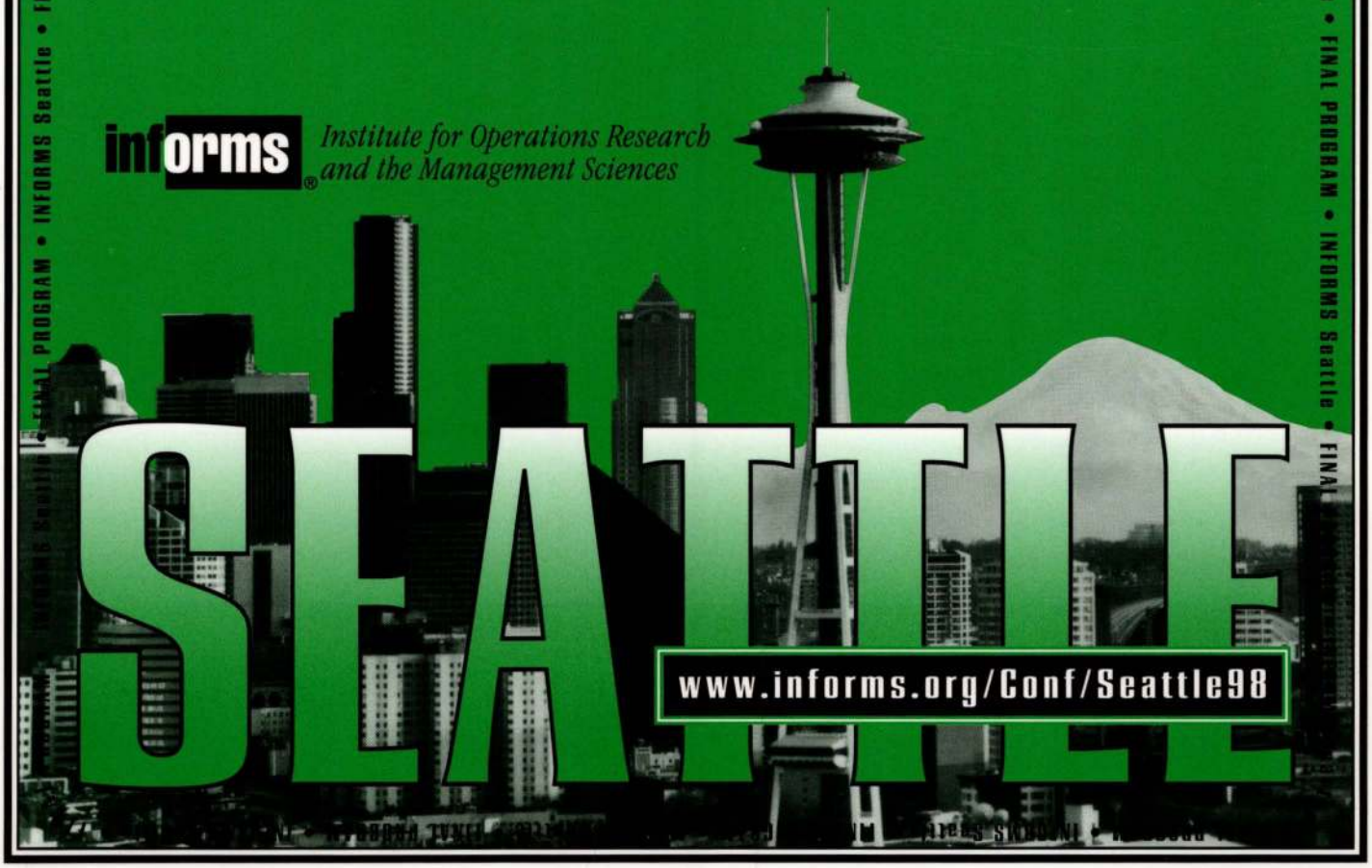
PARTNERING FOR GLOBAL TECHNOLOGY MANAGEMENT

INFORMS Seattle · Fall 1998 · October 25-28, 1998



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ILOG

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Published twice a year prior to each meeting by the Institute for Operations Research and the Management Sciences. Individual issues of the Program are available for $15 US per copy. Orders must be prepaid and sent to INFORMS, PO Box 64794, Baltimore, MD 21264-4794.

ISBN No. 0161-0295

GARY LOCKE
Governor

STATE OF WASHINGTON
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Greetings from the Governor

October 1998

As Governor, and on behalf of people of Washington, I am pleased to welcome you to Seattle for the fall meeting of the Institute for Operations Research and the Management Sciences.

I am delighted you have chosen Seattle for your gathering, and I extend my warmest hospitality to all the participants from across the United States and internationally. While you are in Seattle, I hope you can find some extra time to enjoy what the area has to offer. Seattle has one of the most spectacular settings in the Pacific Northwest, including magnificent views of Mount Rainier and the Cascade Mountains, the beautiful waters of Puget Sound and the peaks of the Olympic Mountains to the west.

From the Space Needle and Pike Place Public Market to the International District and Pioneer Square, you will find a colorful and exciting city offering you a wealth of unique entertainment and recreational opportunities.

Best wishes for a successful meeting and an enjoyable stay in the Evergreen State!

Sincerely,

Gary Locke
Governor

WELCOME FROM THE GENERAL CO-CHAIRS:
Marisa Altschul & Albert Maimon

On behalf of the INFORMS Fall 1998 organizing committee, it is our pleasure to welcome you to Seattle. This meeting's theme, **"Partnering for Global Technology Management"** *reflects the exciting and challenging opportunities that will shape our future* and the opening plenary session with Jim Evatt will be dedicated to exploring this theme within the context of global communications and information systems for commercial and military applications. In addition, there are tutorials and sessions focusing on key aspects of this theme throughout the program.

One other distinguishing characteristic of this meeting is the emphasis on Optimization. There is a plenary on **"Optimization and Equilibrium"** by Stephen Robinson, and altogether there are six tutorials and more than two hundred papers on Optimization methods and applications.

Of course, as at every INFORMS meeting, in addition to the above, there are sessions on all aspects of Operations Research, Management Science, Information Systems and related disciplines. The other four keynote and plenary sessions reflect this variety with topics ranging from OR education and technology by Richard Larson; to insights into the history of OR by Maurice Kirby; from sequencing the genome by Richard Karp; to the use of OR in the Chilean forest industries by Andres Weintraub, Rafael Epstein, Ramiro Morales and Jorge Seron.

The Local Committee has been working hard over the last two years to make this meeting a success. Jeff Arthur has done an outstanding job as Program Chair. His energy and enthusiasm, combined with his persistence and organizational skills, has resulted in a strong and stimulating program. He also organized the Invited Clusters. Bruce Bare was responsible for arranging the Sponsored Sessions, working closely with the INFORMS Colleges. Contributed Sessions were the responsibility of Bruce Faaland. Sharon Filipowski and Paul Tseng did an outstanding job in putting together the special Optimization Track. Dundar Kocaoglu arranged the Tutorials.

Graham Clapp, with Terry Ogden as co-chair, was responsible for Arrangements. Marc Brittan was our "webmeister" and Ed Seymore and Patricia Snyder shared responsibility for Publicity and Publications, including the Call For Papers, program and "special projects." Ron Hebron, Schools and Community College Liaison, and Zelda Zabinsky, Doctoral Colloquium, completed our Local Steering Committee, with many others getting involved and contributing so significantly.

It has been a joy and a privilege to work on this project with such a dedicated and talented group. If the meeting is a success, it is due to the efforts and attention of these committee chairs and the many other volunteers who put in so many hours.

Our partners in this endeavor include the Meetings Committee, chaired by Tom Gulledge, and the INFORMS staff. The professionalism and expertise of these folks made it possible for us to concentrate on our assignments and they also "came to our rescue" many times when we got stuck and needed extra help. Special thanks to Julie Eldridge, Cheryl Clark, Ginni McGee and the many others who made this happen.

Besides the technical program, we have some very special events. The new CPMS Daniel H. Wagner Prize for Excellence in OR, emphasizing the quality and coherence of the analysis used in practice, will be awarded for the first time at this meeting. The CPMS Isolated Practitioner Workshop will address issues that affect the lone practitioner community, and, of course, we will have the Forum on Women in OR/MS.

We have three tours planned: the Boeing Spares Distribution Center, the Port of Tacoma and the Microsoft Museum. For our guests, there are many attractions and opportunities for sightseeing, shopping, etc. In addition, we have arranged a 3-hour all-around narrated Seattle City Tour and a tour of the "other side of the lake" ending at the Columbia Winery.

All this, and much more, are waiting for you in Seattle. We hope you enjoy it!

SCHEDULE OF SPECIAL EVENTS

	LOCATION	FROM	TO
FRIDAY, October 23			
CPMS Practice Issues Forum Registration/Reception	Douglas (S)	7:30pm	10:00pm
SATURDAY, October 24			
IEEE Editors Meeting	Suite 412 (S)	8:00am	4:00pm
Organization Dissertation Competition	Aspen (S)	8:00am	6:00pm
CPMS Practice Issues Forum	Douglas (S)	8:00am	6:30pm
Workshop 1: Teaching OR/MS in Spreadsheets	Cedar (S)	1:00pm	5:00pm
INFORMS Executive Committee Meeting	Boardroom (S)	2:00pm	8:00pm
Registration	Convention Center Level 6	4:00pm	8:00pm
INFORMS Membership Meeting	Room 607-608 (C)	5:00pm	6:00pm
Organization Dissertation Reception	Aspen (S)	6:00pm	8:00pm
SUNDAY, October 25			
Registration	Convention Center Level 6	7:30am	5:00pm
Workshop 2: Teaching Marketing & Finance Using Excel	Cedar (S)	8:00am	12noon
INFORMS Board	West Ballroom A (S)	8:00am	6:00pm
Guest Breakfast	Madrona (S)	9:00am	10:00am
Morse Award Plenary Lecture	Grand Ballroom (S)	10:00am	11:00am
Edelman Plenary Address	Grand Ballroom (S)	11:00am	12noon
RASIG Roundtable	East Ballroom A (S)	1:00pm	5:00pm
Workshop 3: Teaching Business Statistics with Excel	Cedar (S)	1:00pm	5:00pm
Workshop 4: Decision Analysis Using Spreadsheets	Douglas (S)	1:00pm	5:00pm
Wagner Prize Presentations	Aspen (S)	2:30pm	4:30pm
MAS Council	Meetings Suite (S)	3:00pm	4:30pm
Section/Society/Fora Officers Meeting/Reception	Room 303 (C)	5:00pm	6:00pm
Roundtable Reception/Dinner	Cedar (S)	6:00pm	8:00pm
MSOM Reception	Room 206 (C)	6:15pm	7:15pm
DAS Council	TBD	6:30pm	9:30pm
Forum on Women in OR/MS Reception	Douglas (S)	7:00pm	9:00pm
Student Reception	Aspen (S)	7:00pm	9:00pm
Roundtable Meeting	West Ballroom B (S)	8:00pm	11:00pm
MONDAY, October 26			
Board/Editors/Committee Chair Breakfast	Juniper (S)	7:00am	8:00pm
Registration	Convention Center Level 6	7:30am	5:00pm
Technology Management Section Breakfast	Room 213 (C)	8:00am	9:00am
Teacher Program	East Ballroom B (S)	8:00am	4:15pm
Roundtable Meeting/Lunch	West Ballroom B (S)	8:00am	5:00pm
INFORMS Board Meeting	West Ballroom A (S)	8:00am	5:00pm
Guest Breakfast	Cedar (S)	9:00am	10:00am
Operational Research Society Plenary	Grand Ballroom (S)	9:45am	10:45am
Welcoming Session & Awards	Grand Ballroom (S)	10:45am	11:45am
Invited Plenary	Grand Ballroom (S)	11:45am	12:45pm
Section Subcommittee Lunch	Suite 418 (S)	12noon	1:00pm
MSOM Sr. Editors Lunch	Cedar (S)	12noon	1:00pm
Section on Social Science Applications Lunch	Madrona (S)	12noon	1:00pm
ACORD Lunch	East Ballroom A (S)	12noon	1:30pm
OR Area Editors Lunch	Suite 412 (S)	12noon	1:30pm
Education Committee Meeting	Suite 424 (S)	12:30pm	1:30pm
IBM Forum on Special Topics in Math Programming	Aspen (S)	4:00pm	6:00pm
Wagner Prize Awards	Cedar (S)	5:45pm	6:30pm
INFORMS Online Reception	Madrona (S)	6:00pm	7:30pm
CPMS Isolated Practitioner Workshop	Douglas (S)	6:15pm	7:15pm
INFORMS General Reception	Grand Ballroom (S)	7:30pm	9:30pm

	LOCATION	FROM	TO
TUESDAY, October 27			
Chapter Breakfast	Madrona (S)	7:00am	8:00am
Consulting Forum Organizational Meeting	Juniper (S)	7:00am	8:00am
Editors of Naval Research Logistics Meeting	Suite 418 (S)	7:00am	9:00am
Registration	Convention Center Level 6	7:30am	5:00pm
Chapter Subcommittee Meeting	Madrona (S)	8:00am	9:30am
Editors Breakfast Meeting	Suite 416 (S)	8:00am	9:30am
CPMS Council Meeting	Douglas (S)	8:00am	12noon
Guest Breakfast	Cedar (S)	9:00am	10:00am
Optimization Plenary	Grand Ballroom (S)	10:00am	11:00am
Publications Committee Meeting	Suite 416 (S)	10:00am	11:30am
Omega Rho Distinguished Plenary Lecture	Grand Ballroom (S)	11:00am	12noon
Subdivision Committee Meeting	Madrona (S)	11:30am	5:00pm
Omega Rho Executive Committee Meeting	Suite 420 (S)	12noon	1:00pm
JOC Lunch	Suite 418 (S)	12noon	1:00pm
WEDNESDAY, October 28			
Registration	Convention Center Level 6	7:30am	10:00am

SCHEDULE OF SUBDIVISION BUSINESS MEETINGS

SUNDAY, October 25			
Railroad Applications SIG	East Ballroom A (S)	5:15pm	6:00pm
Section on Location Analysis	Room 305 (C)	6:15pm	7:15pm
Section on Logistics	Room 303 (C)	6:15pm	7:15pm
Management of Medical Technology Section	Room 306 (C)	6:15pm	7:15pm
Section on Management Control Systems	Room 208 (C)	6:15pm	7:15pm
Section on Management of Productivity & Technology	Room 213 (C)	6:15pm	7:15pm
Minority Forum Organizational Meeting	Room 214 (C)	6:15pm	7:15pm
Revenue Management Section	Room 210 (C)	6:15pm	7:15pm
Quality Statistics & Reliability Section	Room 207 (C)	6:15pm	7:15pm
Technical Section on Telecommunications	Room 612 (C)	6:15pm	7:15pm
College on Information Systems	Room 203 (C)	6:15pm	7:15pm
MONDAY, October 26			
Applied Probability Society	Room 209 (C)	6:15pm	7:15pm
Section on Aviation Applications	Room 604 (C)	6:15pm	7:15pm
Computing Society	Room 205 (C)	6:15pm	7:15pm
Decision Analysis Society	Room 201 (C)	6:15pm	7:15pm
Financial Services Section	Room 608 (C)	6:15pm	7:15pm
Section Group Decision & Negotiation	Room 204 (C)	6:15pm	7:15pm
Technology Management Section	Room 213 (C)	6:15pm	7:15pm
Section on Manufacturing & Service Operations Management	Room 206 (C)	6:15pm	7:15pm
College on Marketing	Room 203 (C)	6:15pm	7:15pm
Military Applications Society	Room 308 (C)	6:15pm	7:15pm
College on Organization Science	Room 214 (C)	6:15pm	7:15pm
Transportation Science Section	Room 302 (C)	6:15pm	7:15pm
TUESDAY, October 27			
Forum on Women in OR/MS	Room 203 (C)	12noon	1:00pm
College on Artificial Intelligence	Room 211 (C)	6:15pm	7:15pm
Section on Energy, Natural Resources & the Environment	Room 310 (C)	6:15pm	7:15pm
Health Applications Section	Room 306 (C)	6:15pm	7:15pm
Optimization Section	Room 616 (C)	6:15pm	7:15pm
Section on Public Programs & Processes	Room 305 (C)	6:15pm	7:15pm
College on Simulation	Room 602 (C)	6:15pm	7:15pm
Forum on Education	Room 204 (C)	6:15pm	7:15pm

S = Seattle Sheraton
C = Convention Center

GENERAL INFORMATION

Badge Holder Recycling - A box will be provided in the Registration area for attendees to return badge holders. Please help us recycle!

Climate - Seattle's weather is quite variable. In late October, days might be sunny and cool, daily high of 50°, or overcast and mild, daily high of 60°. On overcast days, light rain often occurs.

Dining in Seattle - Members of the Seattle Local Committee offer the following suggestions for restaurants in Seattle, covering a variety of price ranges and culinary choices: Athenian Inn (American), Anthony's and Cutters Bayhouse (seafood), Bamboo Garden (vegan, kosher), Chang's Mongolian (Mongolian), Copacabana (Bolivian), Crepe de Paris (French), El Gaucho and Union Square Grill (steakhouse), Elysian Brewing Company (microbrewery with continental cuisine), Grand Central Baking (bakery/deli), Kaspar's (Northwest), La Buca, Palomino, The Pink Door, The Poor Italian, Trattoria Mitchelli (Italian), Rama on Post (Thai), Rock Bottom Brewery (pub food), Viet My (Vietnamese) and Wild Ginger (Asian). Truly something for every taste and for every budget!

E-Mail Centers - INFORMS will have e-mail centers set up in Room 6E on the 6th floor of the Exhibit Hall in the Convention Center Monday through Wednesday.

Exhibits - Exhibits will be located in the Washington State Convention & Trade Center. Publishers, computer hardware and software vendors, database service firms and others will showcase their latest products, technical reference materials and specialized services. Hours:

Monday	9:00am - 5:00pm
Tuesday	9:00am - 5:00pm
Wednesday	9:00am - 12noon

INFORMS Online - Preliminary and final meeting programs can be found on INFORMS Online at http://www.informs.org. Print your own customized program and highlight sessions you want to attend. To obtain copies of any papers abstracted in the program, please contact the authors directly.

Job Placement Center - The Job Placement Service, JPS, helps OR/MS professionals locate employment opportunities in academia, government and private industry. Employers from a wide variety of professional interest areas participate in this program regularly. It runs on a semi-annual basis: January-June and July-December. JPS is now up on our website for the Fall Seattle meeting. For information, go to http://www.informs.org/JPS/

- online registration for applicants and employers
- 24-hour access to job listings and applicant files
- on-site interviewing facilities at meetings
- hard copy booklets of all active participants
- low fees (free for student members)

To obtain additional information about JPS, on-site interviewing arrangements or to obtain a paper copy application, contact our Customer Service Department at 800-446-3676 or 410-850-0300 or via e-mail at jps@mail.informs.org.

Presentation Withdrawals - All presentation withdrawals must be received in writing at the Rhode Island office; they may be faxed to 401-274-3189, e-mailed to ginni.mcgee@informs.org or mailed to 2 Charles St., Ste. 300, Providence RI 02904.

Program - Members or authors who do not attend the Seattle meeting may purchase the final program for $15 by calling 800-446-3676 or 410-850-0300. Both the preliminary and final programs are on INFORMS Online, http://www.informs.org.

Special Services & Assistance - Attendees requiring special accommodations or services for hotel rooms, session rooms or special events may contact Cheryl Clark at 800-343-0062 or 401-274-2525, ext. 211 or via e-mail at cheryl.clark@informs.org.

Transportation - Seattle-Tacoma (Sea-Tac) International Airport serves most major carriers. Downtown Seattle is about 10 miles north of the airport. Grey Line Airport Express, 206-626-6088, operates express buses between Seattle-Tacoma International and downtown hotels, including the Sheraton. Fare is $7.50 one way/$13 round trip. If you are traveling by train, Amtrak passenger trains arrive at King Street Station, located at 3rd Avenue and S. King Street. When driving, from I-5 Northbound, take exit 165 (Seneca Street), right on 6th Avenue until you reach the Sheraton at the corner of 6th and Pike. From I-5 Southbound, take exit 165B (Union Street), right on 6th Avenue until you reach the Sheraton at the corner of 6th and Pike. From I-90 Westbound, get on I-5 Northbound, take Madison Street exit, left on Seneca, right on 6th Avenue until you reach the Sheraton at the corner of 6th and Pike.

Travel Arrangements - Get to Seattle for less! United Airlines and Northwest Airlines are the official airlines of the INFORMS Seattle Fall Meeting. Call Conventions in America (CIA) at 800-929-4242 or 619-453-3686, or fax 619-453-7076 and ask for Group #560. Reservation hours are Monday - Friday, 6:30am - 5:00pm Pacific time. When calling direct or using your own travel agent, refer to these codes: United, 800-521-4041, ID #523A0, Northwest, 800-328-1111, Worldfile #NY389. Avis Rent A Car is offering special low rates with unlimited free mileage for attendees. Call Avis at 800-331-1600, AWD #J949094.
Visit our website at www.scitravel.com or send e-mail to flycia@scitravel.com.

GUEST PROGRAM

Guest Breakfast

The guest program includes a continental breakfast Sunday through Tuesday from 9:00 - 10:00am and the General Reception on Monday evening for a $25 registration fee. Registered guests **only** may attend the breakfasts and must wear their name badge for admittance.

Tours

Sunday, October 25 - $24

Seattle City Tour

This 3-hour all-around narrated city tour begins downtown - with a maze of new high rises and art deco buildings. We then drive through Seattle's birthplace - historic Pioneer Square settled in 1852 - to the International District where pungent scents from local restaurants fill the air. See some of the magnificent gothic-style buildings on the 680-acre University of Washington campus.

One of the highlights is a tour of Caffe Appassionato, a coffee roasting plant, where you will learn how coffee beans are selected for flavor and gently roasted to become full-bodied, aromatic coffee. Sample coffee varietals and share your opinions with the "barista". Next, explore the Hiram Chittenden Locks. Inspect the fish ladders where thousands of salmon travel upstream to spawn. Finish your tour with one last stop at Magnolia Bluff, north of the city, for picture-perfect views of Elliott Bay and the stunning city skyline.

The bus will leave from the Sheraton at 10:00am and will return at approximately 1:00pm.

Monday, October 26 - $24

Cascade Winery Tour

Just east of Seattle and across the floating bridges of Lake Washington is a whole new world of marked contrasts to Seattle. Charming and beautiful vistas will greet you on this unique tour into the foothills of the Cascade Mountains.

The first stop is Boehm's Chocolate Factory at the Edelweiss chalet in Issaquah, Washington. Here you will tour the factory, which was built by Julius Boehm, as well as sample the chocolates!

Then, on to quaint Gilman Village. The collection of shops, boutiques and restaurants housed in restored turn-of-the-century buildings is one of the most popular locations for both residents and visitors to shop. All of the establishments are owner-operated and a high degree of quality and service is assured to any visitor.

We will then make a stop at the spectacular Columbia Winery, where you will have a chance to explore the grounds, enjoy wine tasting and browse in the gift shop.

The bus will leave from the Sheraton at 10:00am and will return at approximately 2:30pm.

EXHIBITORS

Visit the Exhibit Hall in the Washington State Convention and Trade Center (Level 6-Hall 6E) and gain access to the latest in computer and software products, publications, technical reference materials and specialized services. Exhibitor products and services enable you to bring back to your organization the key tools you need to make better, more informed decisions. Exhibitors are listed.

Applied Decision Analysis, Inc., 2710 Sand Hill Rd., Menlo Park, CA 94025; www.adainc.com
Booth 12
ADA is a management consulting firm specializing in applying quantitative solutions to management problems. We publish DPL, decision analysis software for Windows. DPL integrates influence diagrams, decision trees and spreadsheets for professional decision analysis modeling. Visit our booth to see our new products and learn about our new consulting and R&D directions.

AutoSimulations, Inc., 655 Medical Dr., Bountiful, UT 84010; info@autosim.com
Booth 15
AutoSimulations develops and markets the discrete event simulation software package, AutoMod, to simulate real-world conditions to design, analyze and test the efficiency of manufacturing and material handling systems. Also available is AutoSched AP, a finite capacity scheduling and planning tool to increase throughput and resource utilization.

Baltzer Science Publishers, PO Box 221, Bussum 1400 AE, The Netherlands; www.baltzer.nl
Booth 18
Baltzer Science Publishers are the publishers of the following journals: *NETNOMICS*; *Environmental Modeling & Assessment*; *Computational Geosciences*; *Health Care Management Science*; *Information Technology & Management*; *Annals of Mathematics & Artificial Intelligence*; *Annals of Operations Research*; *Applied Mathematics & Mechanics*; *Journal of Mathematical Chemistry*; *Queuing Systems*; *Advances in Computational Mathematics*; *Approximation Theory & its Applications*; *Numerical Algorithms*; *Cluster*

Computing; *Interoperable Communication Networks*; *Mobile Networks & Applications*; *Telecommunication Systems*; *Wireless Networks*; *Wireless Communication* (CD).

Dash Optimization Inc., 115 River Rd. Ste. 1203, Edgewater, NJ 07020; www.dashopt.com
Booth 40
Dash Optimization Inc. provides the most advanced modeling and optimization software. Our products and services allow our clients to significantly enhance their productivity by quickly and reliably solving their hardest optimization problems. The integrated modeling and optimization capabilities of our XPRESS-MP software make it easy for companies to develop, test and solve complex models arising from a wide variety of applications.

Decisioneering, Inc., 1515 Arapahoe St., Ste. 1330, Denver, CO 80202;
sales@decisioneering.com
Booth 39
Denver-based Decisioneering's mission is to be the modeling solution provider for companies looking for better ways to make difficult decisions. Decisioneering has 3 main product lines: Crystal Ball, Crystal Ball Pro and Analytica. Crystal Ball picks up where Microsoft Excel spreadsheets end by giving you the ability to perform Monte Carlo analysis on spreadsheet models. Crystal Ball Pro's Optquest technology provides an evolutionary step to this process by determining the optimal choice for a given business decision based upon multiple Crystal Ball simulations. Analytica is the world's first general purpose, object-oriented, visual modeling tool.

Duxbury Press, 10 Davis Dr., Belmont, CA 94002;
www.duxbury.com
Booths 23 & 24
Duxbury is an imprint of Brooks/Cole Publishing, an International Thomson Publishing company. Duxbury is an educational publisher focusing exclusively in the fields of statistics and quantitative methods in all disciplines and at all levels of learning. Come by our booths and review recent works by Chris Albright, David Bell, Bob Clemen, Bob Fourer, David Gay, Ed Kao, Craig Kirkwood, Larry Lapin, Sam Savage, Art Schleifer, Linus Schrage and Wayne Winston.

Elsevier Science, 655 Ave. of the Americas, New York, NY 10010
Booths 9 & 10
The OR/MS publication program by Elsevier Science offers comprehensive international coverage of the latest research and developments in the field. Topical handbooks and a wide range of journal publications cover a wide spectrum of topics. Come and check us out at the booth or have a preview starting at: www.elsevier.com/locate/orms

Frontline Systems, Inc., PO Box 4288, Incline Village, NV 89450; www.frontsys.com
Booth 31
Frontline Systems developed the Solvers/Optimizers in Microsoft Excel, Lotus 1-2-3 and Quattro Pro. Our Premium Solvers for Excel are compatible upgrades offering greater capacity, much greater speed, new diagnostic aids and improved ease-of-use. Our Solver DLL products are used in custom applications for linear, integer and nonlinear optimization.

IBM, 522 South Rd., MS/P356, Poughkeepsie, NY 12601;
kenruss@us.ibm.com
Booths 1 & 2
IBM, a provider of world class solver software, will showcase new products in the Optimization Solutions and Library family, with particular focus on powerful extensions to the Optimization Library and enhancements to the Optimization Solutions stand-alone solver products.

ILOG, 1901 Landings Dr., Mountain View, CA 94043;
info@ilog.com
Booths 16 & 17
ILOG produces the world's finest optimization software. The proven power of ILOG CPLEX Simplex, MIP, Barrier/QP and Parallel solvers is unmatched. Also, ILOG is the world leader in constraint-based programming. ILOG Solver is a constraint-based solving engine providing unmatched algorithmic power and a rich modeling environment. Add-on modules extend and customize the product for specific optimization problems in manufacturing, transportation, logistics and telecommunications.

Imagine That, Inc., 6830 Via Del Oro, Ste. 230, San Jose, CA 95119; extend@imaginethatinc.com
Booth 33
Extend v4.1 is here! With the best hierarchy in the industry, built-in activity-based costing, customizable animation, one-click output analysis, automatic report generation, integrated development and authoring environment and hot-links, you'll see why Extend is the acknowledged standard for discrete event/continuous/combined simulation in top universities and corporations alike.

InfoHarvest, 815 Industry Dr., Seattle, WA 98188;
sales@infoharvest.com
Booth 38
InfoHarvest is proud to announce the release of the new 32 bit version of its flagship decision analysis product, Criterium DecisionPlus 3.0. This new release features direct tradeoffs of lowest criteria, scatter plots and contour graphs as well as extensive control of the program environment. Where CDP 2.0 calculated tradeoffs from user defined preference weights, CDP 3.0 allows the user to set tradeoffs directly, then calculates preference weights from those tradeoffs. This ability to move back and forth between tradeoffs

and weights provides crucial insight and validation of the stakeholders multicriteria decision model.

INFORMS Cincinnati Spring 1999
Booth 36
The theme of the meeting is **"Delivering to the Global Consumer."** Stop by to talk with local committee members who can answer your questions and tell you about the meeting.

INFORMS – Membership, 901 Elkridge Landing Rd., Ste. 400, Linthicum, MD 21090; member.services@informs.org
Booths 21 & 22
Created in 1995 through the merger of ORSA & TIMS, INFORMS is offering exciting new services to its members. Visit the INFORMS booth and pick up complimentary copies of our 9 prestigious journals and *OR/MS Today.*

INFORMS Philadelphia Fall 1999
Booth 35
Get ready for Philadelphia Fall 1999! Stop by the booth for information on the city and meeting preparations.

Irwin/McGraw-Hill, 2 Penn Plaza, New York, NY 10121-2298; donnelly@mcgraw-hill.com
Booths 28 & 29
Irwin/McGraw-Hill is the leading college publisher for business textbooks. Our market position is the result of our world-renowned authorship, our unique product development model and our strong relationship with customers. This, combined with innovative technology solutions, helps Irwin/McGraw-Hill to offer products of the highest quality for students worldwide.

John Wiley & Sons, Inc., 605 3rd Ave., New York, NY 10158-0012; www.wiley.com
Booth 11
Founded in 1807, John Wiley & Sons, Inc. is an independent, global publisher of print and electronic products. Wiley specializes in scientific and technical books, journals, textbooks and education materials for colleges and universities and professional and consumer books and subscription services.

Kluwer Academic Publishers, 101 Philip Dr., Norwell, MA 02061; kluwer@wkap.com
Booth 20
Kluwer Academic Publishers will exhibit the latest research books and journals in the areas of OR/MS and optimization. Visit our booth at the INFORMS Fall 1998 meeting. Sample copies of the latest issues of Kluwer's prestigious journals will be on display and newly published research books, such as: *Tabu Search* – new in paperback, by Fred Glover; *Strategic Organizational Diagnosis & Design*, second edition, by Richard M. Burton & Borge Obel; and *Sample-Path Analysis of Queueing Systems* by Muhammad El-Taha.

LINDO Systems Inc., 1415 N Dayton St., Chicago, IL 60622; info@lindo.com
Booth 30
LINDO Systems will demonstrate our line of popular mathematical modeling packages, including releases of: LINDO, our powerful linear and integer programming engine, LINGO, our integrated modeling language with linear/nonlinear solvers and What'sBest! our largescale linear/nonlinear spreadsheet solver.

Logical Decisions, 1014 Wood Lily Dr., Golden, CO 80401; www.logicaldecisions.com
Booth 33
Logical Decisions develops state-of-the-art software (LDW) to evaluate decisions involving preference and value judgments. LDW helps users consider many attributes, separate facts from values and explain their choices. Users organize attributes into a goals hierarchy and make judgments about their weights. LDW includes many results and sensitivity displays.

Maximal Software, Inc., 2111 Wilson Blvd., Ste. 700, Arlington, VA 22201; www.maximal-usa.com
Booth 14
MPL™ Modeling System is a complete model development environment for linear programming models. Full advantage is taken of the Graphical User Interface with new versions available running under MS Windows (95/NT/3.1), Macintosh and Motif (UNIX). MPL offers direct links through memory with solvers such as CPLEX, XA and OSL as well as to relational databases such as MS Access, Paradox, Dbase and FoxPro.

Palisade Corp., 31 Decker Rd., Newfield, NY 14867; www.palisade.com
Booth 8
Palisade Corporation offers advanced software for risk and decision analysis. Products include @RISK (risk analysis via Monte Carlo simulation), Precision Tree® (decision analysis via decision trees and influence diagrams) and the Decision Tools® Suite, an integrated set of risk and decision analysis programs. Contact us today for a free catalog, demo CD and trial versions.

Prentice Hall, Business Publishing Division, 1 Lake St., Upper Saddle River, NJ 07458; elena_picinic@prenhall.com
Booth 3
Prentice Hall Business Publishing is dedicated to producing the highest quality educational materials for all business-related disciplines in the worldwide higher education market. Our mission is to add value to the educational process by helping professors develop students who are better prepared to achieve global excellence!

PROMODEL Corporation, 1875 South State, Orem, UT 84097; education@promodel.com
Booth 37
ProModel, the leader in the simulation industry, features a powerful, easy-to-use interface for designing and analyzing your business processes. ProModel is the only simulation tool with a built-in optimization feature. The impressive user base includes such institutions as MIT, GE, Ford, The Mayo Clinic and NASA.

Quant Systems, Inc., 1023 Wappoo Rd., Ste. 6A, Charleston, SC 29407; www.quantsystems.com
Booth 7
Quant Systems is a leader in the educational software market. Our goal is to help institutions of higher education integrate technology into their classrooms. Products include Operations Management and Business Statistics. We will be giving away FREE evaluation copies of our software during exhibit hours.

South-Western College Publishing, 5101 Madison Rd., Cincinnati, OH 45227; www.swcollege.com
Booth 25
Welcome to South-Western College Publishing. Our position as a market leader in Decision Sciences and Business Statistics higher education is built on time-tested values and adaptability to changing market needs. You'll find a wealth of information on the latest South-Western texts, like those by Anderson/Sweeney/Williams, Norman Gaither and James Evans! South-Western is part of the International Thomson Publishing family of publishers.

Springer-Verlag New York, Inc., 175 5th Ave., New York, NY 10010; www.springer-ny.com
Booth 19
For over 155 years Springer-Verlag has published high quality books and journals covering a wide array of topics. Please stop by the Springer booth to see our very latest titles in pure and applied probability, artificial intelligence, business process re-engineering, combinatorics, decision analysis, information systems, linear programming, statistics/quality control and stochastic processes - all at a 20% discount!

Stockton Press, Houndmills, Basingstoke, Hampshire RG21 6XS, UK; www.stockton-press.co.uk
Booth 26
Stockton Press, an international publisher, will be displaying various OR titles such as the *Journal of the Operational Research Society*, *European Journal of Information Systems* and *International Abstracts in Operations Research*. Also available will be a demo of the new *International Abstracts in Operations Research* CD-ROM.

Tecnomatix Technologies, Inc., 39810 Grand River Ave., Ste. 100, Novi, MI 48375-2108; www.tecnomatix.com
Booth 13
Tecnomatix provides Computer-Aided Production Engineering (CAPE) tools to fully computerize the industrial process and to achieve a seamless transition from design to production. SIMPLE++ from Tecnomatix, a fully object-oriented, graphical and integrated discrete events simulation environment, is used to optimize manufacturing systems as well as business processes. SIMPLE++ is also unique in enabling the reuse of the simulation model for on-line forecasting, scheduling and monitoring.

Tom Sawyer Software, 804 Hearst Ave., Berkeley, CA 94710; www.tomsawyer.com
Booth 27
Tom Sawyer Software produces object-positioning and diagramming component technology for use by corporate enterprises, software providers and educational institutions. Software application developers utilize Tom Sawyer Software's technology to solve difficult modeling, complexity management and diagram visualization problems. The company's product families include the Graph Layout Toolkit and the Graph Editor Toolkit, which are both available for a wide range of platforms and operating systems.

Visual Thinking International Ltd., 55A Port St. East, Mississauga, Ontario Canada; www.vtil.com
Booth # 6
Visual Thinking presents the next generation of simulation products. SIMUL8 uses the most advanced software design technology to provide you with a powerful yet intuitive and easy-to-learn simulation system. SIMUL8, at $495, offers you an unbelievable value-for-money simulation tool with 3D walk-through animation, optimization, time view presentation and activity-based costing plug-ins.

REGISTRATION

Advance Registration (Deadline 10/1)

We urge attendees to register in advance for the meeting. Complete the registration form and mail to INFORMS Seattle, 2 Charles St., Ste. 300, Providence RI 02904 by **October 1.** Fees may be paid by credit card (American Express, MasterCard or VISA only) - fax to 401-274-3189, or by check or money order payable to INFORMS Seattle '98. Registration payments may be made via the Web at http://www.informs.org using your credit card - **this is a secure server.** Registration materials will be available in the registration area in the Washington State Convention & Trade Center.

On-Site Registration

Registration will be located in the Washington State Convention & Trade Center on Level 6.

Saturday, October 24	4:00pm - 8:00pm
Sunday, October 25	7:30am - 5:00pm
Monday, October 26	7:30am - 5:00pm
Tuesday, October 27	7:30am - 5:00pm
Wednesday, October 28	7:30am-10:00am

The registration fee includes admittance to all technical sessions, the General Reception and to the exhibit hall. Name badges **MUST** be worn to all INFORMS sessions, functions and events. Misplaced badges may be replaced at the registration desk - please bring your receipt for verification. Meals are not included in the registration fee. If you attend workshops or special paid functions, an additional fee is required. ALL ATTENDEES, INCLUDING CLUSTER AND SESSION CHAIRS AND SPEAKERS, MUST REGISTER AND PAY THE REGISTRATION FEE.

Rates

Deadline Dates	On/Before 10/1	After 10/1
INFORMS Members	$180	$205
Non-Members	$220	$245
Retired/Students	$65	$65
Guests	$25	$25

Refund & Registration Cancellation Policy

Registration payments will be refunded only if a written cancellation is received in the Rhode Island office no later than October 21. Cancellations may be faxed to 401-274-3189 or e-mailed to meetings@informs.org.

SPECIAL EVENTS

CPMS' Daniel H. Wagner Prize for Excellence in OR - CPMS, The Practice Section of INFORMS, is pleased to announce the establishment of an Operations Research Practice Prize, with a cash award, in memory of the late Daniel H. Wagner, supported by generous endowment commitments from the firms Metron, Inc., Daniel H. Wagner Associates, Inc., and Applied Mathematics, Inc.

The judging will emphasize the quality and coherence of the analysis used in practice, along with good writing, strong analytical content and verifiable practice successes. Four finalists will present their papers at a free session on Sunday, October 25, 2:30 - 4:30pm in the Aspen Room.

CPMS will award the 1998 prize of $1,000 in the Cedar Room on Monday, October 25, 5:45 - 6:30pm. Please be sure to join us!

CPMS Isolated Practitioner Workshop - CPMS, the Practice Section of INFORMS, sponsors workshops on topics of interest to isolated practitioners, i.e., Lone Rangers, of OR/MS. The 13th workshop in this series will address timely issues that affect the growing isolated practitioner community. All are welcome to participate in the workshop and discussion to be held Monday evening, 6:15 - 7:15pm in the Douglas Room in the Sheraton. Wine and cheese will be served.

Forum on Women in OR/MS

Business Meeting & Luncheon - Everyone interested in issues related to women professionals in OR/MS is encouraged to join us in Room 203 in the Convention Center. ***Please note that this is being held on Tuesday, October 27 from 12noon - 1:00pm in Seattle.***

Reception - The Reception for the Forum on Women in OR/MS will be held on Sunday, October 25 from 7:00 - 9:00pm in the Douglas Room in the Seattle Sheraton. All are welcome to mingle and converse with women researchers and practitioners in OR/MS.

General Reception - For an opportunity to sample Seattle cuisine, meeting participants and their registered guests are invited to attend the General Reception on Monday night in the Grand Ballroom of the Sheraton Seattle from 7:30 – 9:30pm. The Garfield High School Jazz Band will provide entertainment. ***Please present the ticket included with your registration materials for admittance.***

IBM Forum on Special Topics in Math Programming - IBM presents the first Forum on Special Topics in Math Programming. Our keynote speaker will be George Dantzig of Stanford University speaking on the past, present and future of math programming. Bill Ziemba of UBC will speak on current state-of-the art in stochastic programming; Steve Murray of Frank Russell Company will present user experiences in developing stochastic applications; Bob Entriken of ERPI will discuss using SMPS.pl to solve stochastic AMPL problems with IBM's Stochastic Programming products; Gyana Parija will present an overview of those IBM products. Please join us on

Monday, October 26, 4:00 - 6:00pm in the Aspen Room at the Sheraton.

INFORMS Membership Meeting - Meet the new officers, hear about some exciting new INFORMS activities and socialize with colleagues before the start of the INFORMS Seattle meeting, on Saturday, October 24. Join us in Room 607-608 in the Convention Center from 5:00 - 6:00pm. Refreshments will be served.

Student Reception - To network and meet other student attendees, don't miss the Student Reception on Sunday evening in the Aspen Room of the Seattle Sheraton Hotel from 7:00 - 9:00pm. All student registrants welcome. ***Please present the ticket included with your registration materials for admittance.***

Welcoming Session - The INFORMS President's Award, the George E. Kimball Medal, the George B. Dantzig Dissertation Award, the Lanchester Prize, the INFORMS Prize and the INFORMS Expository Writing Award will be presented during the Welcoming Session. Be sure to attend this exciting session on Monday, October 26 from 10:45 - 11:45am in the Grand Ballroom of the Seattle Sheraton Hotel. Marisa Altschul and Albert Maimon, the General Co-Chairs of the Seattle Local Committee, and Karla Hoffman, President of INFORMS, will welcome attendees.

TECHNICAL PROGRAM

Keynote & Plenary Presentations

Sunday, October 25

Morse Lecture Plenary, 10:00 - 11:00am

Technology-Enabled OR Education: What it may do for Professors & Practitioners, Richard C. Larson, MIT

Abstract: Will the WWW create superstar OR professors? Will learners in several continents take courses all at the same time from the same professor? Will the new learning technologies allow OR to get back to its empirical roots by helping to get students off campus and into the field?

The 1990's have given us unprecedented growth in technologies related to learning. In particular, the WWW is hosting rich learning communities for students and scholars in numerous disciplines. Building from the author's 3-year experience as Director of MIT's New Center for Advanced Educational Services, CAES, we focus on OR and technology-enabled learning. We review current examples of professors teaching and students learning OR and related disciplines in new technology-enabled ways. We revisit the meanings of collaborative research, field work and data collection, visualization of algorithms and problem formulation. Finally, we speculate, building from current trends, on how the OR student will learn and how the OR professor will teach OR in the year 2015. Speculative answers to these questions will be given along the way.

Biography: Richard C. Larson received his PhD from MIT where he is Professor of Electrical Engineering and Director of CAES, the Center for Advanced Educational Services. Dr. Larson has initiated a number of major experiments in technology-enabled learning, the results of which will be published in the coming years. This year, he is giving major presentations on technology-enabled education at the University of Connecticut, University of Massachusetts at Lowell, and as a Philip M. Morse distinguished lecturer at the INFORMS meeting in Seattle.

Prior to CAES, Dr. Larson served as CoDirector of the MIT Operations Research Center (over 15 total years in that post). He is co-author of *Urban Operations Research*, (Prentice Hall 1981). He is author, co-author or editor of five other books and author of over 70 scientific articles, primarily in the fields of emergency response systems, technology-enabled education, queueing and logistics. His first book, Urban Police Patrol Analysis, (MIT Press 1972) was awarded the Lanchester Prize from ORSA. In 1993-4, he served as President of ORSA. He is internationally known for his work in applied OR and is a member of the National Academy of Engineering. Dr. Larson has served as consultant to many organizations, including American Airlines, Coca-Cola, Johnson Controls, EDS, United Artists Cinemas, Union Carbide Corp., Rand Corp., the Kuwait Foundation for the Advancement of Science and the US Department of Justice.

Edelman Plenary Address, 11:00am - 12noon

Use of OR Systems in the Chilean Forest Industries, Andres Weintraub, Rafael Epstein, Ramiro Morales, University of Chile; Jorge Seron, Bosques Arauco

The 1998 Franz Edelman Award for Achievement in Operations Research and the Management Sciences has been awarded to Bosques Arauco S.A., which represents a consortium of 5 Chilean timber companies. By utilizing OR, Bosques Arauco developed tools that enabled them to improve efficiency while having a positive impact on workers' lives and the ecology of their forest plantations.

Timber is Chile's second largest industry. Bosques Arauco's consortium partner firms are Forestal Arauco, Forestal Mininco, Forestal Bío-Bío and Forestal Millalemu. The impact of these systems has been organizational and financial, with Bosques Arauco reporting a total saving of $5 million a year over a total annual timber production of $140 million. Since the implementation of the technology in 1989, the 5 major firms report minimum annual savings of $17 million. Equally impressive, those units impacted by the work have reported up to 25% savings in operational costs.

The Chilean consortium developed 5 different systems designed by a team from the University of Chile. The systems include a daily truck scheduling system (ASICAM); a short term harvesting system (OPTICORT); a harvesting equipment and access road location optimization system (PLANEX); a medium-range planning tool (OPTIMED); and a long-term strategic planning tool (MEDFOR).

Monday, October 26
Operational Research Society Plenary, 9:45 - 10:45am
Operations Research Trajectories: The Anglo-American Experience, 1940-1970, Maurice Kirby, University of Lancaster, UK
Abstract: This presentation, derived from the author's commissioned history of OR in the UK, highlights the interrelationships between the development of OR in the UK and the US in the period to 1970. In focusing on the area bombing campaigns in WW II, we compare and contrast the wartime origins of OR in both countries with particular reference to the strategic capabilities of the USAAF and RAF Bomber Command. This serves as a precursor to analysis of the peacetime diffusion of OR, focusing on educational and methodological developments, and the take-up of OR in the corporate and public sectors. In these respects, there were major points of contrast between the 2 countries which can only be explained satisfactorily by reference to socio-economic developments reaching back into the 19th century.

Biography: Professor Maurice Kirby has taught business and economic history at the University of Lancaster since 1985. He previously taught at the Universities of Stirling and Nottingham and Heriot-Watt University, Edinburgh. He currently holds the position of Provost of Colleges and Student Relations at Lancaster and will take up the headship of the Department of Economics in the University's Management School at the end of this year.

Professor Kirby's research has focused on British business and economic history since 1750. He is currently writing a history of OR in the UK on behalf of the UK Operational Research Society. Several substantial articles charting the progress of his research have been published in recent issues of the Journal of the Operational Research Society in 1997 and 1998.

Invited Plenary, 11:45am - 12:45pm
Partnering for Global Technology Management, James W. Evatt, Boeing Information, Space & Defense Systems
Abstract: Mr. Evatt will speak on the revolution in information technology and its galvanizing influence on global partnering issues. He will discuss the expanding importance of commercial-off-the-shelf information and communication systems for government and international use. In addition, he will review key technology opportunities and challenges to be faced in the next millennium.

Biography: James W. Evatt was named president of Information & Communications Systems, one of 3 major business units of Boeing Information, Space & Defense Systems, in August 1997. He is responsible for the following product lines: satellites, Airborne Warning & Control Systems, airborne lasers, Teledesic, aircraft information systems and strategic missiles.

Before joining Boeing in 1987, Evatt spent 22 years in government service, including experience in R&D and associated programs with considerable involvement in reduced signature technology development. His last government assignment was in the dual jobs of Director, Special Programs, DCS Research, Development & Acquisition and Director for Low Observable Technology for the DoD. He was responsible for identifying and designing operational capabilities and characteristics for new military systems, subsystems and modifications. Evatt is a graduate of the US Air Force Academy with a degree in general engineering. He also earned a master's degree in electrical engineering from AFIT.

Tuesday, October 27
Optimization Plenary, 10:00 - 11:00am
Optimization & Equilibrium, Stephen M. Robinson, University of Wisconsin
Abstract: Equilibrium has been a very useful modeling device in many areas, including physical science as well as economics, logistics and other fields. Further, this idea has had a close connection with optimization: optimization can furnish good models for some (but not all) equilibrium problems; the tools and methods of optimization have contributed much to our ability to solve equilibrium problems, while the analysis and solution of those problems have, in turn, stimulated the development of new methods in optimization.

We outline several kinds of equilibrium situations useful in applications,

showing some ways of modeling these and of analyzing and solving the resulting models, using tools from optimization. In the process, we exhibit ways in which the applications drive further theoretical and computational development. Finally, we look at areas where further research advances would help us to deal more effectively with practical problems.

Biography: Stephen M. Robinson is a Professor of Industrial Engineering & Computer Sciences at the University of Wisconsin-Madison, where he has been on the faculty since 1972. He has held administrative appointments as Chair of the Department of Industrial Engineering and as Assistant Director of the Mathematics Research Center. His research specialty is in mathematical programming. He has published 70 scientific research papers and has directed numerous funded research projects at the University. His research accomplishments have been recognized with the award of the honorary doctor's degree from the University of Zurich, Switzerland and of the George B. Dantzig Prize of the Mathematical Programming Society and the Society for Industrial and Applied Mathematics.

In addition research, Robinson has been heavily involved in professional and public service. He has been an elected member of the councils of ORSA, now INFORMS, and of the Mathematical Programming Society, an editor of several scientific journals and has served on numerous governmental and professional advisory committees. He is an Overseer of Simon's Rock College (Great Barrington, Massachusetts) and is a former Trustee of the Village of Shorewood Hills, Wisconsin.

Omega Rho Distinguished Lecture Plenary, 11:00am - 12noon

Sequencing the Genome: A New Application Domain for the Mathematics of Operations Research, Richard M. Karp, University of Washington

Abstract: The hereditary information that each of us passes to his offspring is encoded as genes within DNA molecules. A DNA molecule can be viewed as a long string of symbols from the alphabet {A,C,T,G}, and the genes can be viewed as programs that direct the production of proteins, which in turn control chemical processes within the cells. The total content of these molecules within an organism is referred to as a genome. The Human Genome Project is dedicated to determining and interpreting the sequence of the human genome. The genomes of a growing number of other species have already been sequenced.

Predicting the performance of different strategies for sequencing a genome requires stochastic models. We present one such model and describe its analysis using renewal theory.

The problem of sequencing a genome leads to combinatorial problems of the following kind: a large number of fragments of an unknown sequence x are given; the relative positions of these fragments within the sequence are unknown but partial, noisy information about the sequence of each fragment can be derived experimentally. Which of the available experiments shall we perform, and how shall we combine the results of the experiments to determine the positions of these fragments within the sequence x? This problem comes in many different forms, each of which leads to NP-hard combinatorial problems of the type often encountered in operations research applications. An important difference, however, is that our goal is not to find an optimal solution according to some objective function, but rather to determine the solution that nature has selected.

Biography: Richard M. Karp was born in Boston, Massachusetts in 1935 and was educated at the Boston Latin School and Harvard University, where he received his PhD in Applied Mathematics in 1959. From 1959 to 1968, he was a member of the Mathematical Sciences Department at the IBM T.J. Watson Research Center. From 1968 to 1994, he was a Professor of Computer Science, Mathematics & OR at the University of California, Berkeley. From 1988 to 1995, he was also associated with the International Computer Science Institute in Berkeley. In 1995, he became a Professor of Computer Science & Engineering and an Adjunct Professor of Molecular Biotechnology at the University of Washington. Karp has received the US National Medal of Science, the Turing Award (ACM), the Harvey Prize (Technion), the Fulkerson Prize (AMS and Math Programming Society), the von Neumann Theory Prize (ORSA/TIMS), the Lanchester Prize (ORSA), the von Neumann Lectureship (SIAM) and the Distinguished Teaching Award (Berkeley). He is a member of the National Academy of Sciences, the National Academy of Engineering and the American Philosophical Society, as well as a Fellow of the American Academy of Arts & Sciences. He holds 4 honorary degrees.

Information Technology Keynote, 2:45 - 4:15pm

Benefiting from Information Technology, Al Erisman, The Boeing Company

Abstract: Information technology is touching every corner of the processes and products of many businesses today. When technology is used to automate an old process it often adds cost and falls short of its goals, but when it is used to enable new ways of doing things it can transform both products and work often with tremendous benefit to the business. This close linkage to the business suggests that the major benefits of technology come when the technology development is done in close collaboration with business needs. I will discuss some recent and emerging technologies and show their impact in airplane design and support and some ideas for getting technology out of the research environment and put to work.

Biography: Al Erisman is the Director of Applied Research & Technology, Information Science, The Boeing Company. His organization consists of 250 computer scientists, mathematicians and engineers. He has a PhD in Applied Mathematics from Iowa State University and has worked in various fields from mathematical algorithms to the application of IT to business transformation. He has published 2 books and numerous journal articles. In 1990, he was selected as one of 11 inaugural Technical Fellows of the Boeing Company. He has also taught at the university level in mathematics, engineering and business at the University of Washington, Seattle Pacific University, Seattle University and Carnegie Mellon University.

PLANT TOURS

Monday, October 26
Boeing Spares Distribution Center
$15

The Boeing Commercial Airplane Spares Distribution Center is the central location for shipping parts to meet orders of airlines and it serves as the main depot for replenishing inventories of regional distribution centers in the US, Europe and Asia. It incorporates an automated conveyor system, computer activated carousels and bin rows in high bay areas. Functions include receiving, quality assurance, packaging engineering, manufacturing support, container fabrication and shipping. Typically, over one million spare parts issues and shipments are handled per year, to approximately 700 customers world wide. Researchers and practitioners involved in warehousing, materials management or inventory would be interested in visiting this modern and highly automated facility.

Please do not bring cameras, as The Boeing Company does not permit still photos or video cameras on company property. Cameras will be checked with security at the entrance.

The bus will leave from the Sheraton Seattle Hotel at 8:30am and will return at approximately at 12noon.

Tuesday, October 27
Port of Tacoma $15

The Port of Tacoma is one of the fastest growing ports in the US. Strategically located in Puget Sound, the port offers efficient connections to sea, rail, highway and air transportation networks and enjoys strong international trade ties with nations on the Pacific Rim and around the world. The Port of Tacoma is the sixth largest container port in North America and ranks in the top 25 for worldwide container trade. It has proven itself an ideal import/export distribution center and a gateway to both international and domestic destinations.

This is a bus tour of businesses and operations of the port. There are literally hundreds of businesses in the port; major industries include container shippers, automotive importers and forest products exporters. Visit http://portoftacoma.com.

The bus will leave from the Sheraton Seattle Hotel at 8:30am and will return at approximately at 12noon.

Microsoft Museum $15

Founded in 1975, Microsoft is the worldwide leader in software for personal computers. The company offers a wide range of products and services for business and personal use, each designed with the mission of making it easier and more enjoyable for people to take advantage of the full power of personal computing every day. The Microsoft Museum contains hands-on exhibits about the history, vision, culture and technology of Microsoft. Visit http://www.microsoft.com/museum.

The bus will leave from the Sheraton Seattle Hotel at 1:00pm and will return at approximately 4:00pm.

SOFTWARE DEMONSTRATIONS

Sunday, October 25 - Tuesday, October 27
Convention Center Room 603

See demonstrations of powerful software products, new releases and tools presented by exhibitors at the INFORMS Seattle Fall 1998 Meeting. Learn how these products can benefit your organization.

Sunday, October 25
SC32, 1:00 – 2:30pm
Decisioneering
Ben Bouillion, bbouillion@decisioneering.com
Take No Prisoners Spreadsheet Power
Companies today use traditional spreadsheet modeling to make critical financial decisions. Usually, their models include assumptions about potential outcomes that they represent as discrete numbers, e.g., forecasting sales, product demand, failure rates, etc. However, they usually lack the ability to go beyond oversimplified "what if" analysis to fully understand the risk and impact of their decisions and the probability of achieving any specific outcome. Crystal Ball Pro software solves this problem for companies looking for a powerful solution.

InfoHarvest
Philip Murphy, philipmurphy@infoharvest.com
Criterium DecisionPlus 3.0 and Tradeoffs in MCDA
InfoHarvest is proud to announce the release of the new 32-bit version of its flagship decision analysis product, Criterium DecisionPlus 3.0. This new release features direct tradeoffs of lowest criteria, scatterplots and contour graphs as well as extensive control of the program environment. Whereas CDP 2.0 calculated tradeoffs from user defined preference weights, CDP 3.0 allows the user to set tradeoffs directly, then calculates preference weights from those tradeoffs. This ability to move back and forth between tradeoffs and weights provides crucial insight and validation of the stakeholder's multicriteria decision model.

SD32, 2:45 – 4:15pm
Logical Decisions
Gary Smith, gary@logicaldecisions.com
Logical Decisions for Windows 95 – Software for Multiattribute Decision Analysis
LDW is state-of-the-art software to evaluate decisions involving preference and value judgments. Based on multiattribute utility theory, LDW helps users simultaneously consider many attributes, separate facts from values and explain their choices to others. We will demonstrate how to use LDW to structure a decision problem, how to select and use LDW's 5 different weight assessment methods and how to present your decision using LDW's results displays. The use of LDW in group settings will also be described.

Irwin/McGraw Hill
Michael A. Moses, mmoses@stern.nyu.edu
Classroom Experiences with Using the HOM Software System
We shall describe the HOM software system used for teaching operations management at both the graduate and undergraduate levels. Examples drawn from classic cases will be illustrated. The software is available for downloading at http://www.stern.nyu.edu/HOM .

SE32, 4:30 – 5:15pm
ILOG
Irvin Lustig, irv@cplex.com
New Optimization Products from ILOG
ILOG has recently introduced 2 new products for optimization. We will demonstrate one or both of these products. Come to this demonstration to hear about these new innovative optimization tools!

Monday, October 26
MA32, 8:00 – 9:30am
Duxbury Press
Sam L. Savage, savage@leland.stanford.edu
INSIGHT.xla Business Analysis Software
INSIGHT.xla is a suite of software add-ins for Microsoft Excel that provides Monte Carlo simulation, queuing, decision trees, Markov chains, forecasting and numerous optimization models. This allows multiple analytical tools to be applied to management science problems in the familiar spreadsheet interface. The accompanying tutorials provide both applications and demonstrations of basic theoretical concepts that allow the user to easily employ INSIGHT.xla in real world situations.

IBM
Gyana Parija, parija@us.ibm.com
Stochastic Programming with IBM Stochastic Extensions
This demonstration will use a new IBM Optimization Solutions capability, a Java-based Graphical User Interface, to illustrate programming techniques for the IBM Stochastic Extensions Product. The GUI allows the user to read input files chosen from a pulldown menu, analyze the stochastic decision tree, store models in SPL format, specify solver to be used - Benders | Nested, view solutions and distributions of optimal solutions and view the progress of the solver in real time. The demonstration will show how to define a stochastic model and the SMPS files; how to create, save, retrieve and modify the model and how to use the GUI with roll-your-own applications.

MC32, 1:00 – 2:30pm
LINDO Systems Inc.
Mark Wiley, mwiley@lindo.com

Optimization Modeling with LINDO, LINGO and What'sBest
We will highlight the enhancements in our new, faster linear programming solver as well as demonstrate our line of popular optimization modeling packages: LINDO, our powerful linear and integer programming engine, LINGO, our integrated modeling language with linear/nonlinear solvers and What'sBest! - our large scale linear/nonlinear spreadsheet solver.

AutoSimulations, Inc.
Tyler Phillips, info@autosim.com
Rule Based Scheduling – It Works!
AutoSched AP is a finite capacity planning and scheduling tool that helps you increase throughput, reduce in-process inventory and increase equipment and personnel utilization. AutoSched efficiently schedules all of the constraints in your factory, such as shift schedules, work setup rules, batching, preventative maintenance, machine efficiency and operator skill classes.

MD32, 2:45 – 4:15pm
Applied Decision Analysis, Inc.
Dan Smith & Chris Dalton, www.adainc.com
Introducing DPL 4.0 Decision Analysis Software
DPL is the professional DA software using influence diagrams, decision trees and spreadsheets. Graphical outputs include Rainbow Diagrams, Tornado Diagrams, Risk Profiles, Policy Trees, and Policy Summaries. New in DPL 4.0: Win95 interface, strategy tables, graphical value of perfect information and control and more!

PROMODEL Corp.
Jeff Gulbransen, education@promodel.com
PROMODEL Simulation Technology
ProModel, the leader in the simulation industry, features a powerful, easy-to-use interface and a built-in optimization tool for designing and analyzing your business processes. The impressive user base includes such institutions as MIT, GE, Ford, The Mayo Clinic, and NASA. We illustrate the advanced capabilities of the software and its ease of use in the professional world and in the classroom.

ME32, 4:30 – 6:00pm
Frontline Systems, Inc.
Daniel H. Fylstra, dfylstra@frontsys.com
Global Optimization in the Excel Solver
Frontline Systems' Premium Solver for Excel now includes new probabilistic methods for finding the global optimum in a problem with multiple local optima, and for solving problems involving non-smooth functions such as the spreadsheet's IF and CHOOSE. These methods are akin to evolutionary or genetic algorithms, but are often faster and more robust. We'll demonstrate these new Premium Solver capabilities and program, thus exploiting all computational power of our optimization engines while preserving a natural description of the problem.

discuss their application to both industrial problems and management science teaching.

Visual Thinking International Ltd.
Jaret Hauge, jaret@visualt.com
SIMUL8 – Simulation for the Mass Market
Come and see why SIMUL8 is quickly becoming the most popular simulation modeling tool ever. SIMUL8 is being sold to large organizations in packs of 100! Companies like Ford, Fidelity, US Steel, and General Foods are buying SIMUL8 in volume to equip their engineers with a high-quality, professional decision-making tool. Educational institutions are taking advantage of SIMUL8's intuitive easy-to-use interface and its extensive library of worked examples to teach students the true potential of simulation as a powerful, flexible and fun-to-use problem-solving technique.

Tuesday, October 27
TA32, 8:15 – 9:45am
Irwin/McGraw-Hill
Ken Wegrzyn, ken_wegrzyn@mcgraw-hill.com
Integrating the Internet into the Classroom
McGraw-Hill Higher Education will present several web content and creation tools that will help incorporate the web into the classroom. Discussions will include PageOut, a web-based content and course development tool for professors, OnLine Learning Centers, McGraw-Hill's digital content and the McGraw-Hill Learning Architecture, a complete course web-based delivery system.

ILOG
Sanjay Saigal, saigal@ilog.com
The AMPL Plus Mathematical Modeling Environment
When released in 1995, AMPL Plus represented a major step up in ease of use over the text-based (command-line) interface of AMPL. The recently released 32-bit version of AMPL Plus allows AMPL users to solve even larger "industrial-strength" models faster. We present an overview of modeling with AMPL Plus, together with a discussion of its data-interface, project management and application-building capabilities.

TC32, 1:00 – 2:30pm
Dash Optimization, Inc.
Sebastian Ceria, sceria@dashopt.com
XPRESS-MP: A Fully Integrated Modeling and Optimization System
XPRESS-MP is a state-of-the-art software solution for modeling and optimization. We will show how XPRESS-MP can be used to model and solve complex problems arising from a wide variety of applications. We will introduce our new product EMOSL, which allows users to integrate modeling and optimization into any program.

Imagine That, Inc.
David Krahl, davek@imaginethatinc.com
Extend Simulation Software
Come see why Extend™ is the acknowledged standard for discrete event/continuous/combined simulation in top universities and corporations alike. With top-down, bottom-up hierarchy, built in activity-based costing, customizable animation, one click output analysis, automatic confidence intervals, sensitivity analysis, control panel interface, interactive model execution, integrated development and authoring environments, plus hot-linking with other applications.

TD32, 2:45 – 4:15pm
Maximal Software, Inc.
Bjarni Kristjansson, info@maximal-usa.com
MPL and Optimization on the Internet
Over the last few years, the Internet and the World Wide Web have become increasingly more important in the computer world as a new way of interfacing with the user. We will discuss how the MPL Modeling System is currently being developed to give the user new ways to solve optimization problems through the Internet as well as the new MPL On-line Tutorial on the Web.

Quant Systems, Inc.
Michael Gilliland, mgilliland@quantsystems.com
Taking Your Classroom into the 21st Century
Adventure Learning Systems software for operations management and business statistics is a software-based curriculum. It tutors and tests your students on these topics and enables instructors to effectively manage the results via a classroom management system. Learn how easy it is to integrate technology into your classroom.

TE32, 4:30 - 5:15pm
Tecnomatix Technologies, Inc.
Werner Busenius, wbusenius@tecnous.com
SIMPLE++ Business Development Manager
Tecnomatix provides Computer-Aided Production Engineering (CAPE) tools to fully computerize the industrial process and to achieve a seamless transition from design to production. SIMPLE++ from Tecnomatix, a fully object-oriented, graphical and integrated discrete events simulation environment, is used to optimize manufacturing systems as well as business processes. SIMPLE++ is also unique in enabling the reuse of the simulation model for on-line forecasting, scheduling and monitoring.

TEACHER PROGRAM

The middle school/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! An introduction to OR/MS will be followed by probability modeling, computer simulations, queueing or waiting line models and Teacher Instructional Modules (TIMS) linear programming examples. 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 TIMS. The program will be held on Monday, October 26 from 8:00am to 4:15pm in East Ballroom B of the Seattle Sheraton.

TUTORIALS

SC03 Using Technology in Instruction
Chair: James R. Coakley, Oregon State University

Speaker: David R. Sullivan, Oregon State University
This tutorial shares a collection of tips and tricks that apply information technology to improve both teaching and administration in the classroom environment. We assume that students are given network storage areas and e-mail accounts. Given this environment, the tutorial shows how to harvest student assignments automatically, generate "personalized" e-mail status reports, conduct peer-review exercises of student assignments, prepare pictorial class lists and coordinate all these activities with a spreadsheet workbook that works like a central command post for class activities.

SC31 Technological Forecasting
Chair: Dundar F. Kocaoglu, University of Portland

Speaker: Harold Linstone, Portland State University
This survey of the forecasting tools will include trend extrapolation, growth curves, cycles, invariance, technological substitution, precursors, technological progress functions, Delphi, needs analysis, relevance trees and scenarios. The problem of bias and other sources of error will be examined. In its wider societal context, technology assessment and cross-impact analysis, as well as risk analysis, will be illustrated. The overarching roles of information technology and biotechnology will be considered. Finally, attention will be drawn to the important implications of recent work in complexity science for forecasting.

SD03 Implementing the Global Classroom: Science & Technology Commercialization
Chair: Pedro Conceicao, Instituto Superior Tecnico

Speakers: David V. Gibson, Chris Stiles, University of Texas; Manuel Heitor, Instituto Superior Tecnico
Since January 1996, the IC2 Institute, UT-Austin has used 2-way video to offer an innovative 1-year MS Degree Program in Science & Technology Commercialization, taught simultaneously in Austin and the Washington, DC area. In January 1998, IC2 partnered with IST to offer this program in Lisbon, Portugal and in 1999, the objective is to bring the program to Moscow through a partnership with the Academy of National Economy, Russian Federation. In this program, students work on cross-functional and geographically dispersed teams to globally source technology, talent, capital, know-how and markets. The program includes the leveraging of partnerships built through IC2's Global Networked Entrepreneurship Initiative. We describe challenges and lessons learned from the implementation of this global network and classroom.

SD07 Lean Supply Chain Management
Chair: William Flannery, University of Texas

Speakers: Jeffrey Liker, University of Michigan, Dann Engels
Creating a total value chain that emphasizes flexibility, efficiency and order to delivery is a major challenge facing US manufacturing today. One proven system being adopted broadly throughout auto and other industries is lean manufacturing, exemplified in the Toyota Production System, TPS. But TPS as applied by its orthodox founders at Toyota assumes a relatively stable final assembly schedule, limited variety of end products and minimal use of information technology. We will identify approaches to lean supply chain management, organizationally and technically, to achieve time-based competition.

SD31 The Metrics of Intersector Technology Cooperation
Chair: John E. Hebert, University of Akron

Speaker: Eliezer Geisler, University of Wisconsin
Industry, university and government collaborations for technology and technology management will be discussed. Interactions between industrial research labs and academic institutions will be explored. Cases will be presented as examples of successful and unsuccessful approaches. Methods and measures used in the field will be explained. Conclusions will be drawn on where we should be going from here.

SE03 Using Commercial Software & Experiential Learning to Teach the First Management Science Course

Chair: Glenn B. Dietrich, University of Texas

Speakers: Matthew Liberatore, Robert Nydick, Villanova University
We offer a proven alternative to spreadsheets that synthesizes management science modeling, commercial software and experiential learning. We illustrate how to apply our integrated approach to 3 modules: mathematical programming (linear, integer, non-linear); decision analysis (primarily AHP) and simulation (primarily discrete event), using LINGO, Expert Choice and Extend, respectively. We share lessons learned regarding the development of successful student projects that have reached varying stages of implementation. We believe that our approach leads to a paradigm shift: the focus changes from what could and would be done with management science to what students can and will do with management science. This tutorial will be of interest to anyone who wishes to empower ordinary students to produce extraordinary results.

SE31 - Publishing Technology Management Research in IEEE Transactions on Engineering Management
Chair: David V. Gibson, University of Texas

Speakers: D. F. Kocaoglu, University of Portland, R. Balachandra, Northeastern University, F. Betz, A. K. Chakrabarti, NJIT, B. V. Dean, San Jose University, G. F. Farris, Rutgers University, C. Gaimon, Georgia Institute of Technology, J. K. Liker, University of Michigan
IEEE Transactions on Engineering Management is the refereed research journal in engineering and technology management published quarterly by IEEE since 1954. The journal covers research in the management of engineers, scientists and technical organizations; R&D and engineering projects; models and methodologies; quality, innovation, technology; manufacturing systems; information and knowledge; strategic and policy issues. Papers on strategic management of technology, research articles, papers focused on implementation research, technical management notes and book reviews are considered for publication. Special issues are developed to identify and support research in emerging areas. The editor-in-chief and the department editors of the journal will discuss the strategic direction of the journal, give insight into the review process and provide guidance to authors.

MA15 Semidefinite Programming: Applications, Duality & Interior-Point Methods
Chair: Paul Tseng, University of Washington

Speaker: Michael J. Todd, Cornell University
During the past 8 years there has been a substantial increase in research in semi-definite programming, which is concerned with optimizing a linear function of a symmetric matrix subject to linear equality constraints and the requirement that the matrix be positive semi-definite. This interest has been partly due to the modeling power of this class of problems, but has been bolstered by our recent ability to solve moderately large instances using interior-point methods. We will discuss applications of semidefinite programming to eigenvalue optimization, relaxations of combinatorial optimization problems and control theory; duality theory for semi-definite programming and interior-point methods for solving such problems.

MA19 Turning Crowds into Teams by Design: Problem Solving Using the Value Methodology
Chair: Marlo Stebner, The Boeing Company

Speaker: Henry Ball, Boeing ISDS
Solving complex problems using the VM is a proven practice. We will introduce the history and theory of VM, the sequential steps used in the VM "job plan," the selection of the VM team and identify several of the commonly used "tools" employed in value studies.

MC15 Some Applications of Semidefinite Programming to Combinatorial Optimization
Chair: Robert M. Freund, MIT

Speaker: David Williamson, IBM
I will review applications of semidefinite programming to problems in combinatorial optimization. I will review some of the first uses of semi-definite programming in combinatorial optimization, such as Lovasz's theta function, then turn to its recent uses in approximation algorithms. An approximation algorithm is an algorithm which runs in polynomial time and is guaranteed to find a solution whose value is within a given factor of the value of an optimal solution. Semi-definite programming has been used to find significantly improved approximation algorithms (in terms of nearness to optimality) for the maximum cut, maximum satisfiability and graph coloring problems, as well as others.

MC19 An Introduction to the Theory of Constraints
Chair: Steven Dightman, The Boeing Company

Speaker: Chuck Gauthier
Theory of constraints, a systems approach to continuous improvement to make more money now and in the future - WHAT to change, what to change TO and HOW to change - consists of logical thinking (5 focusing steps, thinking processes), logistics (drum-buffer-rope, critical chain), performance measurements (throughput, inventory, operating expense).

MD15 LGO - A Program System for Continuous/Lipschitz Global Optimization
Chair: Zelda Zabinsky, University of Washington

Speaker: Janos D. Pinter, Dalhousie University/Pinter Consulting Services
GO is aimed at finding the best solution of non-linear decision models, in the presence of multiple local solutions. The program system LGO serves to solve GO problems under very general (continuity or Lipschitz) structural assumptions. Hence, it is particularly suitable to solve GO problems related to "black box" system models, or to models supported by limited, difficult-to-use analytical information. Problem formulations can be submitted to LGO by simply providing the functions describing the problem: the functions can be given explicitly, in object code program form, or even by executable programs. LGO integrates several robust and efficient, derivative-free global and local scope solvers which can be applied in fully automatic or interactive modes. LGO can be used on various PC and workstation platforms, in professional Fortran 77 and 90 environments. The program system is accompanied by a User's Guide. The PC version is directly integrated under a menu interface, assisting rapid prototyping and application. Similar development for workstations, and/or integration with other development environments is also possible. During the presentation, the full functionality of the LGO system will be demonstrated.

ME15 Using the Integral Simplex Algorithm for Finding Pseudo Polynomial Algorithms for Some NP Complete Problems
Chair: Robert D. Carr, Sandia National Labs.

Speaker: Gerald L. Thompson, Carnegie Mellon University
The author's recently announced integral simplex method was originally developed to solve set partitioning problems and was shown to have pseudo polyomial time computational complexity. The method begins with the initial tableau of the problem and makes pivots on ones until no more such pivots can be found. If the local optimum found is also a global optimum, the process stops. Otherwise, a global integral simplex method creates and solves the problems in a search tree consisting of a polynomial number of subproblems, subproblems of subproblems, etc. The optimal solution to one of these problems is shown to be optimal for the original problem. Since its inception the author has extended the integral simplex method to also be a solution algorithm for solving set packing, set covering, matching and other NP complete problems. The author will first cover the original method and some variants, then explain its extensions to other problems.

TA15 Complementarity Problems: Applications, Modeling and Solution
Chair: Richard W. Cottle, Stanford University

Speaker: Michael C. Ferris, University of Washington
Complementarity problems arise naturally in many engineering, economic and financial applications. Interesting examples include carbon taxation policies, tolling procedures in a congested traffic network, option pricing and predicting structure failure. We will describe the mixed complementarity format and give simple examples of how such applications fit into this format. Extensions of modeling languages such as AMPL and GAMS that allow very large mixed complementarity problems to be easily formulated and solved will be outlined. A description of various state-of-the-art solvers for complementarity problems, including the PATH solver, will be given along with details of available software to interface to such solvers. Recent extensions of the modeling formats to allow mathematical programs with equilibrium constraints to be generated will be mentioned, together with tools to allow algorithmic design in MATLAB.

TC15 Approximation Algorithms via Linear Programming
Chair: Leslie Hall, JHU

Speaker: David Shmoys, Cornell University
LP has been the basis for solving hard combinatorial optimization problems for over 40 years. One of the oldest strategies for finding a good solution is as follows: formulate the problem as an integer problem; find an optimal solution to its LP relaxation, and round it to an integer solution that is (hopefully) nearly as good and nearly as feasible. There has been substantial recent progress in the design and analysis of approximation algorithms based on this philosophy. We shall explain several of these results for a variety of problems, including examples from scheduling and facility location.

TD15 Data Mining & Knowledge Discovery in Databases I
Chair: Kristin Bennett, RPI

Speakers: Usama Fayyad & Paul Bradley, Microsoft Research
This 2-session tutorial presents the basics of this new and emerging area and emphasizes relations to constituent fields including statistics, databases, pattern recognition, learning, optimization and visualization. We provide a basic overview of the KDD process and cover the basics of each step in the process: data warehousing, selection and cleaning, data transformation, data mining, evaluation and visualization. We cover details of some mining methods and how they may be integrated in database systems. Continued in TE15.

TE15 Data Mining & Knowledge Discovery in Databases II
Chair: Kristin Bennett, RPI

Speakers: Usama Fayyad & Paul Bradley, Microsoft Research
The second part of the tutorial focuses on scaling data mining methods to work with large databases. We then present formulations of many of the tasks of data mining as mathematical programming problems. We discuss optimality conditions and implications of the formulations. We also cover a sampling of successful applications and outline challenges and issues to be addressed in future research.

TE22 Stochastic Modeling with Deterministic & Stochastic Petri Nets
Chair: Kathryn E. Stecke, University of Michigan

Speaker: Christoph Lindemann, University of Dortmund
Deterministic and stochastic Petri nets are a graphical modeling formalism for the specification of discrete-event stochastic systems with exponentially distributed and deterministic delays. This tutorial gives an overview of the numerical analysis of deterministic and stochastic Petri nets (DSPN) for their application to stochastic modeling. The speaker provides comprehensive and fully up-to-date coverage of the fundamental techniques and algorithms for steady-state analysis of DSPN. These algorithms are also immediately applicable for the analysis of other discrete-event stochastic systems with an underlying stochastic process that can be represented as a generalized semi-Markov process with exponential and deterministic events. The speaker also describes the software package DSPNexpress in which the methods presented have been implemented. Finally, application examples drawn from computer system and communication network design are discussed. Throughout, the emphasis is on the exposition of an intuitive explanation for the mathematical results rather than rigorous mathematical proof. Consequently, the tutorial is ideal for applied mathematicians, computer scientists and electrical engineers, interested in performance analysis of computer systems, communication networks, and automated manufacturing systems. The tutorial is based on a 400-page hard cover book bundled with the DSPNexpress software on CD-ROM that appeared by John Wiley and Sons in spring 1998. More information on the book can be found at the Web site http://www.first.gmd.de/DSPNexpress/

WORKSHOPS

THEME: TEACHING MANAGEMENT SCIENCE IN SPREADSHEETS - In June of 1998, Professor Stephen G. Powell led a 3-day workshop at Dartmouth College on Teaching Management Science in Spreadsheets (TMSS). This event, which attracted 60 participants and 18 presenters, may have ushered in the spreadsheet as the primary medium of OR/MS communication. Over the next few INFORMS meetings, workshops will be offered by some of the TMSS presenters in an attempt to share the energy and excitement of the Dartmouth event with the INFORMS membership at large. The workshops will be led by Sam Savage, Wayne Winston, Peter Bell and Mike Middleton. Other TMSS presenters or anyone else who would like to offer workshops at future meetings should contact Dennis Fuller, Chairman of the Workshop committee at fullerd@imc.lee.army.mil. Steve Powell deserves much credit for bringing together a diverse group of participants and presenters who, through both formal and informal discussion, established some new directions for INFORMS. For more information on the conference, see http://www.dartmouth.edu/tuck/tmss/

Saturday, October 24, 1:00 - 5:00pm
Workshop I - Teaching Management Science in Spreadsheets: An Overview
Sam Savage, Stanford University

Synopsis: Although spreadsheets have limitations in large-scale OR/MS applications, they have rapidly become the standard for teaching OR/MS techniques. However, using spreadsheets to teach a traditional OR/MS course is analogous to laying a wheel on its side, loading luggage on it and dragging it behind a yak. This workshop will show how the interactive nature of the spreadsheet offers new opportunities to enliven and motivate the teaching of mathematical subjects. Topics covered include:

- Pros and cons of spreadsheets;
- Animatics - understanding mathematics through animation;
- Object-oriented modeling;
- Analytical enhancements to Excel
- Audio visual considerations for using spreadsheets in class.

Sam Savage received his PhD in computer science from Yale University in 1973. After spending a year at General Motors Research laboratory, he joined the faculty of the University of Chicago Graduate School of Business, with which he has been affiliated since 1974. In 1985, he led the development of a software package that couples linear programming to Lotus 1-2-3®. This popular package, called ***What's Best!®***, won *PC Magazine's* Technical Excellence Award. Dr. Savage is currently a Consulting Professor of Engineering Economic Systems & Operations Research at Stanford University. He also consults and lectures extensively within industry with clients including: Wells Fargo Bank, Hewlett-Packard, PG&E, Texaco and Shell. He was principal investigator of a recent Air Force SBIR project to integrate optimization

into Lotus Improv. Current areas of interest include optimization under uncertainty and the integration of analytical techniques with OLAP database systems.

Sunday, October 25, 8:00am - 12:00noon
Workshop II - Marketing & Finance with Excel

Wayne Winston, Indiana University

Synopsis: We will give a detailed overview of some sophisticated applications of optimization and simulation to marketing and finance that can be easily be done with Excel or an Excel add-in. The following examples will be covered:

- marketing models
- valuing a customer
- conjoint simulator
- non-linear pricing
- product bundling
- finance models
- introduction to risk neutral
- valuing European options with simulation
- valuing real options with simulation
- analyzing foreign exchange risk with simulation
- valuing American options with binomial trees
- simulating pro-forma statements

Wayne Winston has a bachelor's degree in math from MIT and a PhD in OR from Yale. He is a Professor of Decision Sciences at Indiana University where he has won the school-wide MBA teaching award 4 times. He is the author of more than 20 refereed articles and best-selling texts. He has consulted for Eli Lilly, Bristol-Myers, GM, Coopers-Lybrand, Pine Grove Associates and NCR, is currently writing two books and is a 2-time JEOPARDY! Champion.

Sunday, October 25, 1:00 - 5:00pm
Workshop III - Teaching Business Statistics with Excel

Peter C. Bell, University of Western Ontario

Synopsis: Participants in this workshop will be encouraged to try teaching the required business statistics course using Excel. Topics covered will include integrating Excel into the instruction of the introductory materials (data, graphs), descriptive statistics, estimation and regression which are generally encountered in the first course in Business Statistics.

Peter C. Bell earned BA and MA degrees from Oxford University and MBA and PhD degrees at the Graduate School of Business, the University of Chicago. He is a Professor of Management Science and Information Systems, and has served as Visiting Professor at the London Business School and as Chevron Distinguished Visiting Professor at Simon Fraser University. He is the author of 6 books and has published more than 50 articles in academic and business journals. He serves as the Editor-in-Chief of *International Transactions in Operational Research*, as an Associate Editor of *INFOR* and a member of the Editorial Advisory Board of *Omega*. He serves as a consultant to corporations, hospitals, small businesses, charities and government agencies in the areas of operations and/or computer systems.

Sunday, October 25, 1:00 -5:00pm
Workshop IV - Teaching Decision Analysis Using Spreadsheets

Michael R. Middleton, University of San Francisco

Synopsis: This workshop will discuss modeling concepts and decision analysis techniques that can be included in the introductory MS course. We will focus on various kinds of sensitivity analysis for providing insight and determining which assumptions are critical in what-if financial planning models. Specific tools include data tables, spider charts and tornado diagrams, each of which can help us decide whether additional modeling is warranted. In decision tree models for sequential decision problems, we examine payoff distributions for strategies (risk profiles), perform sensitivity analysis of risk attitude and compute expected value of perfect information.

To model problems involving trade-offs among conflicting objectives, we will use the swing weighting approach in a spreadsheet to determine a multiattribute utility function. We will also discuss teaching methods and ways to help students become active modelers of messy business decision problems. Attendees will receive a diskette with sample files and 3 Excel add-ins for facilitating decision analysis: ***TreePlan*** for decision trees, ***SensIt*** for sensitivity analysis and ***RiskSim*** for Monte Carlo simulation. Attendees with Excel on a laptop computer may use the add-ins and sample files during the workshop.

Michael R. Middleton received his PhD from the Graduate School of Business, Stanford University, his MS in OR from Stanford University, his MBA from the University of Iowa and his BS degree in Electrical Engineering from Iowa State University. He is currently with the University of San Francisco where he is involved in the disciplines of data analysis, decision modeling, management science, business statistics, decision analysis, statistical forecasting techniques, computer models for management, information systems, decision support systems, systems analysis and design and database management. He is affiliated with the Decision Sciences Institute, INFORMS and the American Statistical Association.

Sunday 08:15-09:45

SA01 Panel: Decision-Analytic Concepts in Computing Applications

Sponsor: Decision Analysis
Sponsored Session
Chair: Eric Horvitz, Microsoft Research, One Microsoft Way, Redmond, WA 98052, horvitz@microsoft.com

1) Panel: Decision-Analytic Concepts in Computing Applications, ***Jack Breese***, Microsoft Research, One Microsoft Way, Redmond, WA 98052, breese@microsoft.com, ***Steve Hanks***, University of Washington, Comp. Sci. & Eng. Dept., Box 352350, Seattle, WA 98195-2350, hanks@cs.washington.edu, ***David Heckerman***, Microsoft Research, One Microsoft Way, Redmond, WA 98052, heckerma@microsoft.com, ***Eric Horvitz***, Microsoft Research, One Microsoft Way, Redmond, WA 98052, horvitz@microsoft.com

Ongoing work at harnessing decision-theoretic principles in computing applications has led to software solutions that take advantage of explicit handling of uncertainties, costs and user preferences. We present experiences with using probability and utility for enhancing software functionality, followed by discussion of key issues in merging decision-analytic concepts with computing.

SA02 Customer Satisfaction Issues in the Software Industry/Product Delivery & Quality Issues in Electronic Networks

Sponsor: Information Systems
Sponsored Session
Chair: Sury Ravindran, University of Texas, Sch. of Mgmt., 2601 N Floyd Rd., Richardson, TX 75080, suran@utdallas.edu

1) Assessing Alignment of Product Variety in the Software Industry: A Framework, Modeling Approach & Managerial Implications, ***Mary C. Meyer***, University of Michigan, ***Mayuram S. Krishnan***, ***Venkatram Ramaswamy***, ***Paul Damien***

We provide a framework and modeling approach to assess alignment of product variety for a software firm in meeting customer requirements and efficiently managing customer satisfaction. Our framework includes assessment of customer satisfaction and market alignment at multiple levels such as the market, firm and product levels...

2) The Internet & Health Care Delivery: Potential Impacts & Barriers, ***David L. Paul***, University of Kansas, Sch. of Bus., 345 Summerfield Hall, Lawrence, KS 66045, dpaul@ukans.edu

The Internet has the potential to radically change health care delivery worldwide. We discuss the barriers to such change. Technological barriers, while significant, are in the process of being overcome, leaving organizational, cultural and legal issues. We conclude with possible strategies to overcome these challenges.

3) Internalization of Electronic "Lemon Market" & Information Asymmetry in Electronic Commerce, ***Byungtae Lee***, University of Arizona, Dept. of MIS, McLelland Hall, Tucson, AZ 85721, blee@arizona.edu, ***Taeha Kim***, ***Byungjoon Yoo***

Electronic trading of physical goods may face a serious problem of quality discovery, especially when the goods are not standardized. Historically, in order to mitigate this problem, several auction markets have devised third party quality grading systems and limited participation of auction to only relatively higher quality products...

4) Privacy Concerns on the Internet: Implications for Advertising Revenues, ***Patrali Chatterjee***, Rutgers University, Dept. of Mktg., 180 University Ave., Newark, NJ 07102-1897, patrali@newark.rutgers.edu

Identification procedures at commercial Web sites are a necessary evil. Despite consumer concerns about privacy, identification procedures, explicit (registration) or implicit (cookies) are necessary in order to generate any useful consumer-level information. We empirically investigate how the use of identification procedures affects revenues at an advertising supported Web site.

SA03 Education & Information Technology

Contributed Session
Chair: Sunil P. Kumar, Stanford University, Grad. Sch. of Bus., Stanford, CA 94305-5015, skumar@leland.stanford.edu www.stanford.edu/~skumar

1) Evaluating Distance Education, ***Priscilla Chaffe-Stengel***, California State University, 5245 N Backer Ave., MS 7, Fresno, CA 93740-8001, pchaffe@csufresno.edu

Institutions have been so engaged in providing access to various educational technologies that few have implemented adequate means to determine how technologies are used and what impact they have on teaching and learning. We report results of an innovative survey and report areas that warrant further attention.

2) Development of the Advanced Information Technology: A Collaborative Learning Facility for Information Systems Courses, ***Kala C. Seal***, Loyola Marymount University, 7900 Loyola Blvd., Los Angeles, CA 90045-8385, kseal@lmumail.lmu.edu, ***Dolphy M. Abraham***, ***Kweku Ewusi-Mensah***

We describe the conceptualization of the AIT Laboratory and the entire process from the development of the NSF grant proposal to the final implementation and operations of the Laboratory. The AIT-Laboratory setup, its role in education and research programs and the logistics of the implementation are discussed.

3) Constructing & Maintaining an OR/MS-Based Website, ***John F. Kros***, Hawaii Pacific University, 1132 Bishop St., Ste. 504, Honolulu, HI 96813, jkros@hpu.edu

With the proliferation of the Web, web-based OR/MS learning is becoming more widespread. However, constructing and maintaining a website for instruction is not a trivial task. Based on my experience, the general process as well as basic resources needed to accomplish this task are discussed.

4) Only on the Web: A Competitive OM Assignment for MBA Students, ***Samuel C. Wood***, Stanford University, Grad. Sch. of Bus., Stanford, CA 94305-5015, wood@quetzal.stanford.edu www.stanford.edu/~swood, ***Sunil P. Kumar***

The Stanford MBA Core Operations course uses a Web-based factory simulator where students make capacity, inventory and scheduling decisions over 2-week periods based on the status of their own continuously running factories. Successful implementation of Web-based material is illustrated by the simulator's development, use and positive response.

SA04 Internet Applications I

Contributed Session
Chair: Robert F. Easley, University of Notre Dame, Mgmt. Dept., Coll. of Bus. Admin., Notre Dame, IN 46556-0399, reasley@nd.edu http://nd.edu/~reasley

1) An Investigation of Web Surfing Patterns, ***Xavier Dreze***, University of Southern California, Marshall Sch. of Bus., ACC-306M, Los Angeles, CA 90089-1421, xdm@sbaxdm.usc.edu http://sbaxdm.usc.edu, ***Kirthi Kalyanam***

We propose a model for segmenting Web surfers into casual and serious visitors based on their online behavior. We then provide a set of key descriptors of the 2 surfer groups that will allow Web site managers and marketers to increase their ability to effectively communicate to each group.

2) A Web-Based Chemical Formulation Optimization Tool, ***Young M. Lee***, BASF Corporation, 1100 The American Rd., Morris Plains, NJ 07950, leey@basf.com, ***Thomas I. Maindl***

A computational framework for delivering an optimization tool on the WWW has been developed. It enables users using an computer platform and web browser to access the optimization tool to interactively compute optimal chemical formulations. The framework integrates the Internet, optimzation tools and database access.

3) Bidding Strategies in Internet Yankee Auctions, ***Robert F. Easley***, University of Notre Dame, Mgmt. Dept., Coll. of Bus. Admin., Notre Dame, IN 46556-0399, reasley@nd.edu http://nd.edu/~reasley, ***Rafael A. Tenorio***

We derive and characterize equilibrium strategies in Yankee auctions, a popular form of Internet auction. We show that costly monitoring may induce earlier bidders to bid very high or jump-bid, and that strategic demand reduction will seldom arise in equilibrium. Data from hundreds of Internet Yankee auctions support these findings.

4) withdrawn - author request of 9/21, ***Indranil Bose***, University of Texas, 2015 Wesley Dr. #J, Arlington, TX 76012, bose@omega.uta.edu

SA05 Financial Considerations & Production Models

Sponsor: MSOM
Sponsored Session
Chair: Rachel Zhang, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, rzhang@ungin.umich.edu

1) Option Values in Capacity & Inventory Decisions, *John R. Birge*, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, jrbirge@engin.umich.edu jrbirge@umich.edu

Inventory and capacity decision models often rely on a given discount factor. The discount factor, however, depends on risk which in turn, depends on the inventory and capacity decisions. We will show how option pricing methodology can overcome this inconsistency and give examples of policy changes that result from the option analysis.

2) Production with Dividends, Default Penalties & Pricing Decisions, *Matthew J. Sobel*, NYU, Stern School Ste. 7-01A, 40 West 4th St., New York, NY 10012-1118, msobel@stern.nyu.edu

We describe properties of a dynamic model in which decisions are simultaneously made on production, dividends and prices. Various kinds of decisions interact directly with each other in the presence of demand uncertainty and financial constraints. The results build on previous work with Li & Shubik. and financial constraints. The results build on previous work with Li & Shubik.

3) Managing Material Flow & Financial Flow in a Start-up Firm, *John Buzacott*, York University, Schulich Sch. of Bus., 4700 Keele St., North York, Ontario, M3J 1P3, Canada, jbuzacot@bux.yorku.edu, ***Rachel Zhang***

We are concerned with the development of models that capture the interaction between the flow of materials and the flows of money that are required in order to transform raw materials and parts into products delivered to customers.

4) Base Stock Inventory Policies Under Backorder Correlated Demand & Supply Uncertainty, *Nesim K. Erkip*, Middle East Technical University, IE Dept., Ankara, 06531, Turkey, erkipn@rorqual.cc.metu.edu.tr, ***Nilay T. Argon***, ***Refik Gullu***

We investigate a backorder-correlated stochastic inventory model where the supply in a given period is governed by a Markov chain. We consider base stock policies under a profit maximizing objective function, which is not a concave function in general. We show that the shortfall inventory below the base stock level is a Markov chain and characterize its stationary distribution.

SA06 Recent Effects of Globalization

Contributed Session
Chair: Mary G. Crissey, US Air Force, AFPC/DPSAA, 550 C St. W, Ste. 35, Randolph AFB, TX 78150-4737, crisseym@hq.afpc.af.mil

1) The Effects of the Global Paradigm on International Human Resource Management, *Won P. Shim*, Andong National University, 388 Songchun Dong, Andong, South Korea, wpshim@anu.andong.ac.kr

The global paradigm provides a rich and robust framework not only for analyzing the determinants of IHRM but for our understanding of a wide variety of other global business issues. We discuss IHRM which is derived from the effects of the global paradigm.

2) Telecommunications in Latin America, *Steven R. Powell*, California State Polytech University, CIS Dept., 3801 West Temple Ave., Pomona, CA 91768, srpowell@csupomona.edu

The telecommunications industry in Latin America has undergone a dramatic transformation in recent years. We analyze the dimensions of the industry's transformation and discuss its implications for the future.

3) Business Globalization in China: An Economics View from Micro-Macro Survey, *Zhiwei Liao*, Beijing Light Ind. College, #11 Fucheng Rd., Beijing, 10037, PRC

The features of the business globalization trends in China are viewed through completed micro-macro economical surveying, including the Chinese medical equipment market, government owned big enterprises, Shanghai Bao-Steel and Beijing Steel, special economic zones: Shanghai and Dalian and job market analysis in China.

4) Round-the-World, Round-the-Clock Data Access, *Mary G. Crissey*, US Air Force, AFPC/DPSAA, 550 C St. W, Ste. 35, Randolph AFB, TX 78150-4737, crisseym@hq.afpc.af.mil, ***Brooks E. Stevens***

The global nature of the US Air Force requires managers to have around-the-clock access to personnel demographics. In the past, many OR analysts had to answer these requests one by one. Now, the Interactive Demographics Analysis System provides immediate access to more than 2.7 million data combinations across the WWW.

SA07 Computer Science Applications

Contributed Session
Chair: Daniel Solow, Case Western Reserve University, Dept. of OR, 10900 Euclid Ave., Cleveland, OH 44106, dxs8@po.cwru.edu

1) Genetic Algorithm-Based Hybrid Learning Systems, *Riyaz Sikora*, University of Illinois, 108 Commerce West Bldg., 1206 S 6th St., Champaign, IL 61820, rtsikora@uiuc.edu www.staff.uiuc.edu/~rtsikora

We present the design of a family of GA-based hybrid learning systems that use one paradigm to mask the problems of other paradigms and present some experimental results. We also discuss the potential of using such systems to study simulation of group dynamics in computational domain.

2) On a Fast Rounds Approach for VLSI Layouts, *Alexandre Linhares*, National Sp Research Institute, LAC-INPE, Av Astronautas 1758, S.J. Campos, SP 12227-010, Brazil, linhares@nucleo.inpe.br www.pgrad.inpe.br/~linhares

We present a fast rounds heuristic for a NP-hard combinatorial optimization problem arising in VLSI layouts. The heuristic applies rounds of parameter optimization and finds competitive solutions over less computational effort than competing methods, such that our numerical results either match or improve those obtained by established algorithms.

3) Impacts of the Internet on Banking in Portugal, *Manuel J.C. Pereira*, Universidade Catolica Portuguesa, Palma de Cima, Lisboa, 1600, Portugal, mjp@server.dislogo.ucp.pt

Three Portuguese banks, Banco Comercial Portugues, Banco Comercio e Industria, a branch of Bank Santander Negicios, and Barclays Bank launched their business Internet sites in 1997. We analyze and compare the preparation, implementation and set of services offered and the competitive impact on strategy.

4) Model Development with SMTL - SABRE Modeling Template Library, *James Armstrong*, SABRE Technology Solutions, 1 E Kirkwood Blvd., MD 7390, Southlake, TX 76092, jim_armstrong@sabre.com, ***Tim L. Jacobs***, ***Charles H. Rosa***

SMTL is a callable library designed to facilitate rapid development of math programming models in C++. Utilizing a...

5) Sorting in Linear Average Time without Using Linked Lists, *Daniel Solow*, Case Western Reserve University, Dept. of OR, 10900 Euclid Ave., Cleveland, OH 44106, dxs8@po.cwru.edu, ***Apostolos N. Burnetas***, ***Rishi Agarwal***

We present an implementation of bucketsort that runs in linear average time and does not use linked-list structure, all sorting is done in arrays that require only a linear amount of additional storage, determined by the user. Computer simulations are presented to support the theory.

SA08 Applied Probability

Contributed Session
Chair: Lawrence M. Leemis, College of William & Mary, Mathematics Dept., PO Box 8795, Williamsburg, VA 23187-8795, leemis@math.wm.edu http://www.math.wm.edu

1) Optimal Admission to Reader-Writer Systems with No Queueing, *Tugrul Sanli*, University of North Carolina, Dept. of OR, CB 3180, Chapel Hill, NC 27599, sanli@or.unc.edu http://www.or.unc.edu/~sanli, ***Vidyadhar G. Kulkarni***

We consider a reader-writer system with no queueing. Readers and writers arrive according to independent Poisson processes and request iid service times. Every admitted customer generates a revenue and a holding cost. We derive optimal stationary admission policies that depend only on the number of readers and writers to maximize the total expected discounted net profit and the long run net profit rate.

2) Indirect Moment Estimation of the Coefficient of Variation for Model Discrimination in Queues, *Gregory K. Miller*, Stephen F. Austin State Univ., 312 MNB-Box 13040-SFA Station, Nacogdoches, TX 75962, miller@math.sfasu.edu

We use a Pollaczek-Khintchine formula as the basis of indirect moment estimation. This estimation is for the coefficient of variation of the service-time distribution in a M/G/1 queue. The purpose of the estimation is to guide the researcher in his choice of parametric model for G.

3) Analysis of a Workstation Consisting of Batch Servers Subject to Downtimes, ***Mathias A. Duemmler***, University of Wuerzburg, Informatik III, Am Hubland, Wuerzburg, 97074, Germany, duemmler@informatik.uni-wuerzburg.de

We study a workstation consisting of identical batch servers. The servers are subject to downtimes, service times are deterministic. Such workstations are common in the manufacturing of semiconductors. We present a simple and effective algorithm to analyze this system and compare different system configurations in terms of throughput and utilization.

4) Triangular Approximations in Risk Analysis, ***David G. Johnson***, Loughborough University, The Business School, Loughborough, Leicestershire, UK, d.g.johnson@lboro.ac.uk

We examine further the problem of approximating the mean, variance and distribution function of a continuous random variable based on the median and the 5% points. It is shown that triangular approximations can provide universally accurate mean and variance estimates and give a reasonably good fit to the distribution function for a wide range of distributions.

5) Computational Probability, ***Lawrence M. Leemis***, College of William & Mary, Mathematics Dept., PO Box 8795, Williamsburg, VA 23187-8795, leemis@math.wm.edu http://www.math.wm.edu, ***Andrew G. Glen***

A prototype computational probability language that can be used to find the distribution of transformations of random variables, sums of independent random variables, products of independent random variables, expected values, parameters estimates, etc., is presented and demonstrated. Applications to reliability, goodness-of-fit and input modeling are presented.

SA09 New Product Development

Contributed Session

Chair: Richard M. Franza, 200 Jeanne Dr., Springboro, OH 45066, rfranza@afit.af.mil

1) A Control Theoretic Approach for Resource Allocation in New Product Development Projects, ***Yanfeng Wang***, Boston University, 15 St. Mary's St., Boston, MA 02215, wyanfeng@bu.edu, ***James R. Perkins***, ***Pirooz Vakili***

A key decision in the management of new product development projects is the dynamic and efficient allocation of scarce resources. The interchangeability of resources and the possibility of simultaneous sharing of the same resource among multiple projects are distinct characteristics of these projects. We introduce a fluid model that explicitly incorporates these features...

2) Demand-Pull or Technology-Push? A New Product Development Debate, ***Natasa Christodoulidou***, Arizona State University, Coll. of Bus., PO Box 874006, Tempe, AZ 85287-4006, natasa@asu.edu, ***Susan D. Amundson***, ***Kevin Dooley***

An organization can view the demand-pull, technology-push question in a decision-theoretic context. An organization is faced with 2 sequential decisions: whether or not to develop technology before market demand exists and if technology is developed prior to demand, whether or not to develop a specific design before market demand exists.

3) Sequential Product Development & Supplier Alliance, ***Stella Y. Hua***, University of Wisconsin, Sch. of Bus., Madison, WI 53706-1323, yhua@bus.wisc.edu, ***Urban Wemmerlov***

In sequential product development, firms purchase modules from suppliers while integrating technology advances into new products. This ties firms and their suppliers in the design process. The framework proposed captures the impact of the differences in the rate of change in firms' and suppliers' product design on business performance.

4) Process Models for Managing Multiple-Concurrent New Product Development Projects: Analysis of Best Practices, ***Devesh Verma***, University of Minnesota, 321 19th Ave. S, Minneapolis, MN 55455, dverma@csom.umn.edu www.msi.umn.edu/~verma, ***Kingshuk K. Sinha***

The product development processes for high technology firms are characterized by the presence of multiple-concurrent NPD projects. These multiple-concurrent projects exhibit several types of time varying project level interdependencies. We develop a set of models for effectively managing NPD processes characterized by such time varying project level interdependencies.

5) Investment Strategies to Increase Speed of New Product Development, ***Richard M. Franza***, 200 Jeanne Dr., Springboro, OH 45066, rfranza@afit.af.mil, ***Janice E. Carrillo***

To sustain competitive advantage, firms must enter new markets rapidly. Various approaches are available to speed up new product market entry, including investment-in-process technology, R&D, design tools and worker training. We present a model that examines the relationship between a firm's NPD investment strategy and its performance in terms of time-to-market and profitability.

SA11 Technology Management: Application to Mexican Industries

Sponsor: **Technology Management/Management of Productivity & Technology**

Sponsored Session

Chair: Rocio Cassaigne-Hernandez, Univ. Nacional Autonoma de Mexico, Fac. of Chemistry, Circuito Institutos Edif D, Mexico, 04510, Mexico, cassaigl@servidor.unam.mx

1) Globalization & Technology Management in the Mexican Food Industry, ***Ariadna Rodriguez-Diaz***, Univ. Nacional Autonoma de Mexico, Pablo L. Rivas No 220, Colonia Escuadron 201, Mexico, DF 09060, Mexico, julyed@usa.net

The MFI is changing to be more competitive in both the local and global arenas. To cope with this change, the MFI requires technology managers capable of using historical and updated knowledge in prospective models to develop strategies leading to competitive advantages.

2) Managing Global Technology in Regional Industrial Sectors, ***Rocio Cassaigne-Hernandez***, Univ. Nacional Autonoma de Mexico, Fac. of Chemistry, Circuito Institutos Edif D, Mexico, 04510, Mexico, cassaigl@servidor.unam.mx, ***Carlos Escobar-Toledo***

Although technology transfer has driven the globalization and standardization of technology, there are industrial sectors, such as construction and agriculture, that are not as receptive to technology transfer efforts. We analyze how globalization and international standards, such as environmental protection and industrial health and safety standards, impact non-receptive industrial sectors.

3) The Curriculum of Management of Sciences & Technology in the Pharmaceutical Area Toward Year 2010, ***Ramon Soto-Vazquez***, Univ. Nacional Autonoma de Mexico, Calle 45 # 11, Col. Ignacio Zaragoza, Mexico, DF 1500, Mexico, ***Patricia Parra-Cervantes***

The characteristics of the pharmaceutical industry in Mexico and the impact of NAFTA on that industry are discussed. The role of the manager of science and technology in this industry and projections as to how those roles will change by the year 2010 will also be discussed.

4) A Technology Evaluation Model for the Petrochemical Industry in Mexico, ***Carlos Escobar-Toledo***, Univ. Nacional Autonoma de Mexico, Fac. of Chemistry, Circuito Institutos Edif D, Mexico, 04510, Mexico, carloset@servidor.unam.mx, ***Rocio Cassaigne-Hernandez***

We propose a model for use by technology managers in the Mexican petrochemical industry for the critical task of evaluating and selecting technologies for the future. The model includes the analysis of strategic forces driving competitive advantage, the value chain activities and characteristics of available technologies...

SA12 Replication Strategy

Sponsor: **Technology Management/Management of Productivity & Technology**

Sponsored Session

Chair: Sidney G. Winter, University of Pennsylvania, The Wharton Sch., 2000 SH-DH, Philadelphia, PA 19104-6370, winter@wharton.upenn.edu

Co-Chair: Gabriel Szulanski, University of Pennsylvania, Wharton Sch., 2000 Sh-Dh, Philadelphia, PA 19104-6370, szulanski@wharton.upenn.edu

1) Interorganizational Learning, Barriers to Intra-Firm Knowledge Transfers & Competitive Advantage, ***Jeffrey Dyer***, University of Pennsylvania, The Wharton Sch., 2000 SH-DH, Philadelphia, PA 19104-6370, dyer@wharton.upenn.edu

Using a sample of 42 suppliers in the automotive industry, evidence is found that firms that provide technical assistance to non-exclusive suppliers receive in return differential quality and productivity advantages relative to other clients of those suppliers. The productivity/quality differences seem to persist due to barriers associated with intra-firm knowledge transfers.

2) Imitation, Replication & Complexity, ***Jan Rivkin***, Harvard Business School, 239 Morgan Hall, Boston, MA 02163, jrivkin@hbs.edu

It is commonly assumed that it is easier for a firm to replicate its own success than for others to imitate because the replicator has access to a "template" of that success while the imitator doesn't. We analyze why a template might be valuable and what affects its value.

3) Intra-Firm Knowledge Transfer: A Replication Perspective on Internal Stickiness, ***Gabriel Szulanski***, University of Pennsylvania, Wharton Sch., 2000 SH-DH, Philadelphia, PA 19104-6370, szulanski@wharton.upenn.edu, ***Sidney G. Winter***

Mounting evidence suggests that transfers from within the firm, as much or even more than from without, can be difficult. Drawing on evolutionary economics, we develop a replication perspective on such internal stickiness and test its explanatory value on a data set of internal transfers of best practices.

SA13 Knowledge & Organizations

Sponsor: Organization Science
Sponsored Session
Chair: To be announced

1) College on Organization Science Subconference: Knowledge & Organizations

SA14 Yield Management, Pricing & Analysis of Transportation Systems

Contributed Session
Chair: Richard E. Chatwin, Applied Decision Analysis, Inc., 2710 Sand Hill Rd., Menlo Park, CA 94025, rchatwin@adainc.com

1) The Effect of Demand-Driven Dispatch on Yield Management, ***Tuncer Ozcan***, Columbia University, 612 W 114 St. 1-R, New York, NY 10025, tao4@columbia.edu, ***Garrett J. van Ryzin***

Yield management models typically assume a fixed capacity. With demand driven dispatch, seat capacity at departure is uncertain. We investigate the effect of such flexible capacity options on the structure and behavior of traditional yield management controls.

2) Efficient Pricing of Transportation Systems, ***Manuel E. Cid***, Stanford University, Dept. of EES & OR, Escondido Village Apt. 44D, Stanford, CA 94305, manolo@leland.stanford.edu

We combine concepts of congestion pricing with a multi-modal traffic model that assumes a non-homogeneous distribution of values of times. System objectives are redefined with the intent of determining more efficient pricing schemes of public transportation utilities.

3) A Queueing-Based Traffic Flow Model, ***Nico J. Vandaele***, University of Antwerp, Prinsstraat 13, Antwerp, 2000, Belgium, nico.vandaele@ufsia.ac.be, ***Ilse Bilsen***, ***Aviel Verbruggen***

Queueing approximations are used to model uninterrupted traffic flows and to obtain speed-flow-density diagrams in an analytic (non-empirical) way. We show experiments and results from counted traffic flows in Flanders. This approach allows us to conduct what-if scenarios, useful for traffic management and modeling of environmental impacts of road traffic.

4) Analysis & Prediction of Activity Frequencies by Activity Type, ***June Ma***, The O & M Group, 2560 Westwinds Dr. #3, Iowa City, IA 52246, junema@uiowa.campus.mci.net, ***Konstadinos G. Goulias***

We present a variety of econometric models to analyze individuals' daily activity participation and trip making using a panel data set. These models are then used to predict activity frequencies at a later time. Model validity, prediction accuracy and problems encountered in frequency prediction are discussed.

5) Continuous-Time Models for Yield Management & Pricing, ***Richard E. Chatwin***, Applied Decision Analysis, Inc., 2710 Sand Hill Rd., Menlo Park, CA 94025, rchatwin@adainc.com

We formulate the inventory problem of how to dynamically price a perishable asset and establish the equivalence of the well-known discount allocation and pricing problems. We apply a general dynamic-programming approximation technique to establish structural properties of the optimal policy and maximum expected value function.

SA15 Methodologies in Traffic Safety & Infrastructure Modeling

Sponsor: Transportation Science
Sponsored Session
Chair: Venky Shankar, Washington State Dept. of Transportation, Box 47329, Olympia, WA 98504, shankav@wsdot.wa.gov

1) Modeling Non-Motorized Safety Using Limited Dependent Variable Models: An Application to Pedestrian Accidents, ***Venky Shankar***, Washington State Dept. of Transportation, Box 47329, Olympia, WA 98504, shankav@wsdot.wa.gov, ***R. Glad***

The plausibility of mixing count distributions and generalized extreme-value structures in modeling pedestrian accidents is explored. Zero-altered probability models and nested logit structures will be discussed along with findings from their applications to a case study conducted in Washington State.

2) Three-Stage Least Squares Analysis of Traveler Information Systems, ***Linda Ng***, University of Washington, 121 More Hall, Box 352700, Seattle, WA 98195, ***Fred Mannering***

We present results of a statistical analysis of driver behavior as it relates to the use of 2 types of TISs, in-vehicle systems and on-road variable message systems. Findings show that the mean speed driven and the standard deviation in mean speed over a 1-kilometer stretch is significantly impacted by the use of these systems.

3) Introducing Causality into Highway Infrastructure Design Policy: The Usefulness of Panel & Cross-Sectional Count Models, ***Venky Shankar***, Washington State Dept. of Transportation, Box 47329, Olympia, WA 98504, shankav@wsdot.wa.gov, ***R. B. Albin***, ***Fred Mannering***

We focus on infrastructure-related design policy formulation. A panel count model is examined in concert with a cross-sectional count model to assess the information and distribution advantages they offer over existing practice which employs nave 2-dimensional relationships. Applications in a median barrier context are discussed...

4) Causality in Traffic Flow-Safety Relationships: Modeling Insights & Implications for Intelligent Transportation Systems, ***Venky Shankar***, Washington State Dept. of Transportation, Box 47329, Olympia, WA 98504, shankav@wsdot.wa.gov, ***Fred Mannering***

We focus on the inter-relationship between traffic flow and traffic safety through the use of surrogate structures. Instead of directly modeling safety in terms of accident counts, we examine a major causal aspect in corridor safety, namely, speed deviation and how that relates to corridor traffic flow. A rural freeway case study in Washington State is discussed...

SA16 Dynamic Traffic Assignment I

Sponsor: Transportation Science
Sponsored Session
Chair: Athanasios Ziliaskopoulos, Northwestern University, Dept. of Civil Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, a-z@nwu.edu

1) Stochastic & Dynamic Traffic Assignment Problems: Analysis, Formulation & Solution Algorithms, ***Steven T. Waller***, Northwestern University, Dept. of ISE, 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, travis@trans.civil.nwu.edu, ***Athanasios Ziliaskopoulos***

We discuss S-DTA formulations that provide robust solutions for user specified levels of reliability. The model can be a useful decision-aid tool in producing robust control and management strategies in SO-DTA applications, i.e., route guidance, computing alternate routes around freeway incidents and establishing lower bounds on network performance, etc...

2) Analytical Dynamic Traffic Assignment Algorithms, ***Ismail Chabini***, MIT, Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1263, Cambridge, MA 02142, ***Yiyi He***, ***Sridevi Ganugapati***

We show efficient data structures designed to develop faster than real-time solution algorithms and computer implementations for analytical traffic assignment models. Solution algorithms efficiently integrate shortest paths. We show how this integration was done. The efficiency of these algorithms is demonstrated by solving real-size problems much faster than real-time.

3) Time-Dependent Marginal Travel Times for a Combined System Optimal Assignment & Signal Control Problem, ***Akmal S. Abdelfatah***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, akmal@mail.utexas.edu, ***Hani S. Mahmassani***

We consider a central controller seeking to jointly set signals and route tripmakers to optimize system performance. We present the mathematical formulation for the marginal travel times for the joint SO assignment and signal control problem, and a simulation-based algorithm to calculate it. Numerical results are discussed.

SA18 Economics

Contributed Session

Chair: Maureen P. Lojo, Cornell University, Johnson Sch. of Mgmt., 555 Malott Hall, Ithaca, NY 14853, mpl2@cornell.edu

1) On Extension of Information Transmission & Interaction in Economic Property Rights Agreements, ***Vesna Pasetta***, Cornell University, Coll. of Arts & Sci., 482 Uris Hall, Ithaca, NY 14853-7601, vp11@cornell.edu

New concepts of economic property rights, date compression, superdance coding and entanglement concentration, which exemplify nontrivial extensions of traditional economic devices of communication and corporate management, have recently been developed. They also seem to offer suitable procedures for partnership arrangements in complex global information management discussed here.

2) The Structure of Competing Takeover Bids: An Empirical Analysis, ***Chander Shekhar***, University of Melbourne, Melbourne Bus. School, 200 Leicester St., Carlton, Victoria, 3053, Australia, c.shekhar@mbs.unimelb.edu.au

We analyze the structure of competing takeover bids in relation to the form and structure of the initial bids. The results provide support for the view that non-preemptive initial bids often provide the subsequent bidders, who have overlapping businesses with the target more often than not.

3) Optimal Capacity Expansion in Interrelated Transmission & Energy Markets, ***Amy B. Craft***, Stanford University, EES & OR Dept., PO Box 8340, Palo Alto, CA 94309, craft@leland.stanford.edu

Deregulation of the electric utility industry will change capacity expansion decision making. Regulated utilities employ integrated resource planning which jointly optimize the transmission and generation capacities. We examine the long-term inefficiencies of unbundling this investment decision and propose policies which may limit this loss.

4) Incentives for Productivity Improvement in Semiconductor Equipment Services, ***Maureen P. Lojo***, Cornell University, Johnson Sch. of Mgmt., 555 Malott Hall, Ithaca, NY 14853, mpl2@cornell.edu

Do performance-based contracts improve outcomes in semiconductor equipment services? Although formal incentives don't correlate with performance, theoretical drivers of contract terms do. Misdirected and/or conflicting incentives can stunt productivity growth. We look beyond contract terms to the informal context of contracts and the hierarchical transmission of incentives throughout supplier organizations.

SA19 Military Applications

Contributed Session

Chair: D. Marc Kilgour, Wilfrid Laurier University, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@mach1.wlu.ca

1) Modeling Stochastic Firefights, ***Ken R. McNaught***, Cranfield University, Applied Math & OR Group, RMCS Shrivenham, Swindon, SN6 8LA, UK, mcnaught@rmcs.cranfield.ac.uk

We review the field of stochastic duels and firefights and present some Markovian models of 2-on-2 and 3-on-2 firefights. Advantages and limitations of the Markovian approach are discussed.

2) Mathematical Issues in CIVFORS PC, ***Richard A. Shaffer***, General Research Corp., Inc., 1900 Gallows Rd., Vienna, VA 22182, rshaffer@grci.com, ***Joseph Walter***

A mathematical model is an abstract representation of a dynamic process where physical relationships and interactions are quantified as variable expressions. The CIVFORS mathematical model represents the Army civilian personnel system. We discuss the mathematical, statistical and computational issues which must be addressed in order to successfully model Army civilian personnel.

3) A Quality Management of Swap-Out Times at the Army Training Center, ***Matthew J. Kinley***, US Army Yakima Training Center, Range Control, Yakima, WA 98901-9399, kinley@restucci.net, ***C. Christopher Lee***, ***Ik-Whan G. Kwon***, ***Cue D. Kim***

We conduct a quality improvement study for the US Army training center, using a multivariate statistical model that analyzes causes of failures in swap-out times at artillery shooting facilities. Results of this study will contribute to reduce millions of dollars in the defense budget.

4) Applying the Strategic DSS GMCR II to Peace Operations, ***D. Marc Kilgour***, Wilfrid Laurier University, Waterloo, Ontario, N2L 3C5, Canada, mkilgour@mach1.wlu.ca, ***Liping Fang***, ***David Last***

The strategic DSS GMCR II is a diagnoisis and planning tool for decision makers in disputes where several parties with multiple options have conflicting objectives. New features of GMCR II are demonstrated based on real negotiation incidents during IFOR (1996) and SFOR (1997) operations in Bosnia.

SA20 Analysis of Small-Scale Contingency Operations

Sponsor: Military Applications

Sponsored Session

Chair: Andrew G. Loerch, US Army Concepts Analysis Agency, 8120 Woodmont Ave., Bethesda, MD 20814, loerch@caa.army.mil

1) Small-Scale Contingency Force Planning Using Time Series Analysis, ***Thomas M. Kastner***, US Army Concepts Analysis Agency, 8120 Woodmont Ave., Bethesda, MD 20814, kastner@caa.army.mil

Predictive models assist force planners to configure military units to meet mission requirements for peacekeeping, non-combatant evacuation, crisis response, humanitarian assistance, no-fly enforcement and maritime operations. A time series analysis approach is presented that fits historical data with appropriate seasonal models. The data are presented with the associated time series models.

2) Stochastic Analysis of Deployments, ***Patrick J. Dubois***, US Army Concepts Analysis Agency, 8120 Woodmont Ave., Bethesda, MD 20814

A queuing-based simulation methodology is presented that is used to estimate the distribution of occurrences and durations of simultaneous small-scale contingency operations that may be faced by the US Army in the future. Results shown support the determination of Army force structure.

3) Framework-Based Analysis for Interventions in Limited Conflicts, ***Dave Davis***, George Mason University, Inst. for Public Policy, 44000 University Dr. MS 3C6, Fairfax, VA 22030, ddavis@gmu.edu

An emerging 3-dimensional framework for the analysis of peace operations in limited conflict is presented. The framework is used to describe the conflict and to design a phased intervention using the conceptual model of peace operations. The model development is reviewed and examples are given.

4) A Framework for Optimizing Force Structure Resourcing, ***Andrew G. Loerch***, US Army Concepts Analysis Agency, 8120 Woodmont Ave., Bethesda, MD 20814, loerch@caa.army.mil

In the past, decisions regarding the force structure of the US Army were based on the need to fight and win the nation's major wars. Now, various small-scale contingencies must also be considered. A mathematical programming formulation is presented that optimizes the resourced force structure of the Army.

SA21 Electricity Markets

Contributed Session

Chair: Kiriakos Vlahos, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, kvlahos@lbs.ac.uk

1) Agent-Based Simulation Analysis of the European Cross-Border Electricity Market, ***John Bower***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, jbower@lbs.ac.uk, ***Derek W. Bunn***

The European Union is creating a single market for electricity, allowing any generator to supply any industrial customer, in any member country. An agent-based simulation model is presented as a tool for analyzing the likely strategic behaviour, dynamic complexity and emergent economic properties of this new international energy market.

2) Adjunct Modeling of Electric Transmission Networks, ***Robert T. Eynon***, US Department of Energy, 1000 Independence Ave. SW, Washington, DC 20585, reynon@eia.doe.gov

We describe the use of a detailed network model to inform the National Energy Modeling System, a general equilibria model of energy markets. A full alternating current analysis of the New England system was performed to determine if the dispatching of generating units is constrained by transmission constraints.

3) Market Power in Competitive Electricity Markets, ***Kiriakos Vlahos***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, kvlahos@lbs.ac.uk

We describe a generic simulation model of competition in electricity markets. The focus is the interplay of strategies of an incumbent generator and new entrants with respect to capacity investment and product pricing. We present results which provide insights on the exercise of market power in such markets,

barriers to entry and conditions under which new entry can succeed...

SA22 Advances in Collaborative Stewardship

Sponsor: ENRE
Sponsored Session
Chair: Deborah Shields, USDA Forest Service, Rocky Mountain Research Sta., 240 W Prospect St., Ft. Collins, CO 80526, dshields@lamar.colostate.edu

1) Concepts in Collaborative Stewardship: Sustainability, Feasibility & Acceptability, ***Wade E. Martin***, Colorado School of Mines, Envir. Policy Cntr., Div. of Econ. & Bus., Golden, CO 80401, wamartin@mines.edu, ***Deborah Shields***

We present a framework for collaborative stewardship of public lands that is built on 3 fundamental concepts: ecological sustainability, technical and economic feasibility and social acceptability. We discuss how information regarding each domain informs reasoning and analysis in the others, leading to a balanced, iterative decision process for land management.

2) Including the Public in Public Land Decisions: A Comparison of the NEPA & Collaborative Processes, ***Holly Wise Bender***, Colorado School of Mines, Envir. Policy Cntr., Div. of Econ. & Bus., Golden, CO 80401, hwise@mines.edu, ***Wade E. Martin***

The process of including the public in national forest planning is analyzed. Traditionally, this process has been dictated by the NEPA. More recently, the Forest Service has undertaken a collaborative approach. The solution from these 2 processes are compared utilizing non-cooperative voting models and cooperative games in a spatial context.

3) A Comparison of Stakeholder Motivations for Public Land Use: A Structural Equations Approach, ***Ingrid M. Martin***, University of Colorado, Economics Institute, Boulder, CO 80302, imartin@colorado.edu, ***Holly Wise Bender***, ***Wade E. Martin***

We investigate the relationship among values, goals, attitudes and behaviors for a new type of product-public lands. The study uses a structural equation approach to test these relationships among stakeholder groups though a large-scale survey of public land stakeholders in the Rocky Mountain region of the US.

4) Cluster Analysis of Stakeholder Survey Responses, ***Deborah Shields***, USDA Forest Service, Rocky Mountain Research Sta., 240 W Prospect St., Ft. Collins, CO 80526, dshields@lamar.colostate.edu, ***Eric Biltonen***

We report the degree to which values, goals, attitudes and behaviors related to wildlands are consistent within and among subsets of a sample population. Responses exhibiting similarities were identified through cluster analysis combined with iterative discriminant analysis. Applicability of clustering results to collaborative stewardship is also discussed.

SA24 Multicriteria Decision Making I

Contributed Session
Chair: Abe Feinberg, California State University, MS Dept., Northridge, CA 91330-8245, abe.feinberg@csun.edu

1) A Genetic Algorithm for the Multicriteria Ordering Decision Problem, ***Juan C. Leyva-Lopez***, Universidad Autonoma de Sinaloa, Facultad de Ingenieria, Ciudad Universitaria, Culiacan, Sinaloa, 80010, Mexico, jleyva@uas.uasnet.ms

In some multicriteria approaches, the prescription or solution is immediately deduced from the aggregation preferences process. When the aggregation model of preferences is based on the outranking approach, a special treatment is required to construct the prescription. A new GA that allows us to exploit a known fuzzy outranking relation is introduced...

2) Object-Oriented Resource Allocation for Planetary Telecommunication Services, ***William M. Heinrichs***, California Tech., Jet Propulsion Laboratory, 4800 Oak Grove Dr. MS 168-522, Pasadena, CA 91109-8099, william.m.heinrichs@jpl.nasa.gov, ***Jeffrey Smith***

Automation of equipment resource allocation is an enabling technology for efficient, low-cost telecommunications. An object-oriented approach for the definition and allocation of Deep Space Network planetary telecommunicatiin services was developed and implemented to streamline the equipment resource allocation process. Multiple decision criteria were incorporated to automatically prioritize equipment sets.

3) The Authority Delegation Model of Organizational Decision-Making & Decision Performance Evaluations, ***Jaeshin Park***, Cambridge University, Eng. Dept., Mill Ln, Cambridge, CB2 1RX, UK, jp229@eng.cam.ac.uk, ***David R. Probert***

We propose an integrative framework for the evaluation of decision performance based on the authority delegation model of organizational decision-making. Drawing upon delegation specifications from decision-makers to delegates, a set of evaluation criteria is identified and its application to the evaluation of a supplier selection decision is introduced.

4) withdrawn - author request of 7/24, ***John T. Buchanan***, University of Waikato, Dept. of Mgmt. Systems, Private Bag 3105, Hamilton, 2001, New Zealand, jtb@waikato.ac.nz http://www.mngt.waikato.ac.nz/depts/mnss/john, ***Stuart Dillon***, ***James L. Corner***

5) Applying Multicriteria Decision Analysis to Selecting a Software Development Approach, ***Abe Feinberg***, California State University, MS Dept., Northridge, CA 91330-8245, abe.feinberg@csun.edu

Many firms face a repeated problem when software development needs outstrip their in-house programming capabilities. Key criteria are initial and maintenance costs, functionality, integratability, extensibility and ease of use. MCDA is used to highlight the major tradeoffs involved in selecting among alternative external, internal and combined programming resources.

SA26 Combinatorial Algorithms & Applications

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: A. Mehrotra, University of Miami, Dept. of MS, 417 Jenkins Bldg., Coral Gables, FL 33124-8237, anuj@umiami.ir.miami.edu

1) Design of a Fast-Pick Area in a Warehouse, ***John J. Bartholdi, III***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, john.bartholdi@isye.gatech.edu, ***Steven T. Hackman***

To reduce the costs of order-picking, warehouses may concentrate stock in a fast-pick area. To get maximum benefit, one must choose the "best" SKUs and store them in the correct amounts, which entails solving a large combinatorial problem.

2) Large Scale On-Line Three-Dimensional Container Packing Problems: A Decomposition Heuristic, ***Noud Gademann***, University of Twente, PO Box 217, Enschede, 7500 AE, The Netherlands, a.j.r.m.gademann@wb.utwente.nl

We address the problem of packing rectangular items into identical containers. The objective is to minimize the number of containers needed to pack the items. The algorithm must run on-line, thus it must be fast. We present a heuristic based on a decomposition of the problem into 4 sub-problems.

3) Consolidating Maintenance Spares, ***A. Mehrotra***, University of Miami, Dept. of MS, 417 Jenkins Bldg., Coral Gables, FL 33124-8237, anuj@umiami.ir.miami.edu, ***N. R. Natraj***, ***Michael A. Trick***

We develop and implement a specialized B&P technique for solving an implicit integer programming formulation for the problem of consolidation of spare parts to reduce overall inventory. Extensive computational experimentation using data from a major telecommunications company illustrates the practicality of this approach.

SA28 Path-Following Methods for Complementarity Problems

Cluster: Complementarity Problems
Sponsor: Optimization
Sponsored Session
Chair: Steve Billups, Univ. of Colorado at Denver, Dept. of Math, CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

1) A Non-Interior Predictor-Corrector Path Following Method for Monotone LCP, ***Song Xu***, University of Washington, Dept. of Math., Seattle, WA 98195, songxu@math.washington.edu, ***James V. Burke***

We present a predictor-corrector non-interior path following algorithm for monotone LCP. The algorithm is based on some existing smoothing techniques and a new notion of neighborhoods. Under standard hypothesis, we show that the proposed algorithm is both globally linearly convergent and locally quadratically convergent.

2) An Analysis of a Non-Interior Path-Following Algorithm for Monotone Linear Complementarity Problems, ***Akiko Yoshise***, University of Tsukuba, Inst. of Policy/Planning Sci., Tsukuba,

Ibaragi, 305, Japan, yoshise@shako.sk.tsukuba.ac.jp

We propose a non-interior path-following algorithm for monotone linear complementarity problems and discuss its theoretical and practical computational efficiency. The algorithm is based on the Chen-Harker-Kanzow-Smale smoothing technique and a new type of neighbourhood.

3) Non-Interior Continuation Methods: Review & New Results, ***Bintong Chen***, Washington State University, Dept. of Mgmt. & Dec. Sci., Pullman, WA 99164-4736, chenbi@wsu.edu

We review the existing non-interior continuation methods and point out their respective advantages and disadvantages. We then propose a new continuation method that shares the advantages of the existing methods and more. The theoretical properties of the algorithm will be discussed in detail.

4) A Homotopy-Based Algorithm for Mixed Complementarity Problems, ***Steve Billups***, Univ. of Colorado at Denver, Dept. of Math, CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

We develop an algorithm for solving mixed complementarity problems that is based on probability one homotopy methods. A homotopy method is used to solve a sequence of smooth approximations to a reformulation of the complementarity problem as a system of nonsmooth equations. Global convergence properties of this approach are very strong.

SA29 Optimization: Applications & Theory

Contributed Session

Chair: Hiroshi Konno, Tokyo Institute of Technology, Dept. of IE&M, 2-12-1 Oh-Okayama, Meguro-Ku, Tokyo, 152, Japan

1) On the Directional Bias of the LBP-Norm, ***Halit Uster***, McMaster University, Fac. of Bus., Dept. of MS, 1280 Main St. W, Hamilton, Ontario, L8S 4M4, Canada, usterh@mcmaster.ca, ***Robert F. Love***

2) Some Optimization Problems in Plant Genetics, ***Brij Kashyap***, Ryerson Polytechnic University, 15 Rusty Crestway, North York, Ontario, M2J 2Y3, Canada, aarkay@pathway.pathcom.com, ***Sakti Jana***

3) Optimization of a Coupled Model for the Short-Term Hydro-Thermal Coordination Problem thru Augmented Lagrangian Relaxation Techniques, ***F. Javier Heredia***, Universitat Politecnica de Catalunya, Fac. de Math. & Stats., Pau Gargallo 5, Barcelona, 08028, Spain, heredia@eio.upc.es

The coupled model for the short-term hydro-termal coordination problem enables the optimization of the whole energy generation system of the electric utilities, that is, the hydro and thermal generators and the transmission network. When the on/off state of the termal generators must be optimized, a large-scale nonlinear mixed optimization problem arises...

4) Stochastic Dynamic Programming Using High-Order Interpolation, ***C. Russell Philbrick, Jr.***, Washington State University, Dept. of Civil & Environ. Eng., Pullman, WA 99164-2910, russp@wsu.edu, ***Peter K. Kitanidis***

New dynamic programming methods have been developed to use Hermite interpolation and to take advantage of information on "cost-to-go" first and second derivatives. The higher-order accuracy of these methods allows optimal real-time control of stochastic systems with as many as 7 state variables. Applications to multi-reservoir control are demonstrated.

5) A Branch & Bound Algorithm for Solving a Portfolio Optimization Problem Under Transaction Costs, ***Hiroshi Konno***, Tokyo Institute of Technology, Dept. of IE&M, 2-12-1 Oh-Okayama, Meguro-Ku, Tokyo, 152, Japan

We propose an efficient algorithm for solving a large-scale mean-absolute deviation portfolio optimization problem under concave transaction costs. We will show that we can generate an optimal solution very fast by a newly developed B&B algorithm for solving low rank nonconvex minimization problems.

SA30 Optimization Techniques I

Contributed Session

Chair: Zeger Degraeve, Katholieke Universiteit Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, B-3000, Belgium, zeger.degraeve@econ.kuleuven.ac.be

1) Parallel Primal-Dual Decomposition of Linear Programs, ***J. David Fuller***, University of Waterloo, Dept. of MS, Waterloo, Ontario, N2L 3G1, Canada, dfuller@mansci2.uwaterloo.ca

Many LPs have several nearly independent parts defined by regions, division, periods, stochastic scenarios, etc. A new decomposition method breaks such models into master-like subproblems which exchange primal or dual proposals in a parallel process that is proven to converge. Several examples are discussed with interesting economic interpretations.

2) Primal-Dual-Based Column Generation Approach for Solving the Traveling Salesman Problem, ***Hsuliang Chang***, Purdue University, Sch. of IE, W Lafayette, IN 47907, hsuliang@ecn.purdue.edu

We developed a primal-dual-based column generation algorithm to solve the symmetric TSP based on our proposed columnwise formulation of the TSP.

3) A Cut & Reduce Algorithm for Linear Reverse Convex Programs, ***Khosrow Moshirvaziri***, California State University, Long Beach, CA 90840, moshir@csulb.edu, ***Mahyar Amouzegar***

We present a C&R technique for the linear reverse convex program. In this approach, the polytope is systematically partitioned and reduced through the solution of a convex program and a sequence of related LPs. Bounding techniques are employed to update the best point and to limit the search.

4) A New Lagrangean Relaxation Method with Application to Large-Scale Nonlinear Scheduling Problems, ***Cesar Beltran***, Universitat Politecnica de Catalonia, Fac. de Math. & Stats., Pau Gargallo 5, Barcelona, 08028, Spain, ***F. Javier Heredia***

A new nonheuristic multiplier updating method for the augmented Lagrangean relaxation method is presented: the gradient method with radar step. This method uses a cutting plane approximation to the dual function to limit the step of the gradient step of the Lagrange multipliers, but avoids the solution of the LP problem associated with the cutting plane-like methods...

5) Benchmark Results for the Cutting Stock & Bin Packing Problem, ***Marc Peeters***, Katholicke University Leuven, Naamsestraat 69, Leuven, 3000, Belgium, marc.peeters@econ.kuleuven.ac.be, ***Zeger Degraeve***

We present an efficient implementation of the B&P technique for the exact solution of the cutting stock problem using a number of algorithmic enhancements, a dominance rule and a heuristic. We present extensive computational comparisons with other optimal procedures and the various heuristics for the problem.

SA33 Airline Revenue Management: Looking to Future

Sponsor: Aviation Applications

Sponsored Session

Chair: Tankut Atan, PROS Strategic Solutions, 3223 Smith St., Ste. 100, Houston, TX 77006, atan@prosx.com

1) The Impact of Forecast Entity on Bid-Price Revenue Management Systems, ***Andy Boyd***, PROS Strategic Solutions, 3223 Smith St., Ste. 100, Houston, TX 77006, boyd@prosx.com

In revenue management, applications arrivals are commonly forecast on discrete subsets of the space of arrival characteristics. In practice, the chosen discretization is often a significant source of disagreement. It is demonstrated that bid-price methods are probably insensitive to the specific choice of discretization in a well-defined, limiting sense.

2) Yield Management with Dynamic Flight Scheduling, ***Garrett J. van Ryzin***, Columbia University, 412 Uris Hall, New York, NY 10027, gjv1@columbia.edu, ***Tuncer Ozcan***

Dynamic flight scheduling, e.g. demand driven dispatch, assigns aircraft to legs based on realized demand. Yet, traditionally, yield management assumes capacity is fixed. We analyze the impact of schedule flexibility on yield management decisions and propose a joint optimization scheme.

3) Analyzing Revenue Management Simulation Output Using Data Warehousing, ***Keith Campbell***, MITRE/CAASD, 1804 N Quinn St., Apt. 106, Arlington, VA 22209, keithc@mitre.ord

All major airlines must periodically evaluate and compare alternative revenue management systems from time to time. We will describe the design and use of a data warehouse that allows users to drill down and compare simulated performance in specific markets and legs.

4) A General Dynamic Model for Airline Seat Allocation, ***Wen Zhao***, University of Pennsylvania, OPIM Dept., The Wharton Sch., Philadelphia, PA 19104, zhao75@opim.wharton.upenn.edu, ***Yu-Sheng Zheng***

For a general 2-fare class seat allocation model allowing nonhomogeneous Poisson demand, no shows and diversion/upgrading, we show that the threshold policy is optimal. The threshold is decreasing in time when no diversion/upgrading is assumed. A comparison between optimal static policies

and dynamic policies sheds insight and facilitates our analysis.

SA34 Simulation I

Contributed Session

Chair: Paul Savory, University of Nebraska, 175 Nebraska Hall, Lincoln, NE 68588-0518, psavory@unl.edu www.engr.unl.edu/savory/

1) Modeling & Simulaton of Variable Structure Systems: An Application to Business Modeling, ***Kostis Christodoulou***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, kchristodoulou@lbs.ac.uk, ***Kiriakos Vlahos***

We describe a variable structure, object-oriented simulation platform. The underlying motivation is to model industries and markets that can endogenously change their own structure. This is achieved by treating individual players as agents and providing the means for addition and deletion of agents as well as exchange of information among them. We build a Nelson & Winter evolutionary model that addresses the issues of market structure...

2) A Simulation Model for Detecting Prostate Cancer, ***Arthur J. Swersey***, Yale School of Mgmt., 135 Prospect St., New Haven, CT 06511-3729, arthur.swersey@yale.edu, ***Albert Y. Ha***

We use simulation to determine detection probability as a function of tumor size and the number and location of needle core tissue samples taken. We compare the results to those obtained using simple probability models and discuss implications for improving current biopsy procedures.

3) Simulation-Based Costing: When & How to Use It, ***Ingolf Stahl***, Stockholm School of Economics, Box 6501, Stockholm, S-11383, Sweden, cis@hhs.se www.hhs.se/secc/staff#IIS

In certain manufacturing systems, simulation-based costing will provide cost estimates that can lead to more profitable decisions than other costing methods when used for product choice and pricing. Cheap computing power and efficient and easy-to-use simulation software should lead to an increased usage of this methodology.

4) Using Simulation to Derive Activity-Based Costing Estimates, ***Paul Savory***, University of Nebraska, 175 Nebraska Hall, Lincoln, NE 68588-0518, psavory@unl.edu www.engr.unl.edu/savory/, ***Robert Williams***

We define how ABC concepts can be incorporated into a discrete-event simulation model. The integration of ABC and simulation is illustrated by determining the best sequencing scheme for processing a part family through a manufacturing cell.

SA35 Key Factors to Success in OR Practice

Contributed Session

Chair: To be announced

1) The Management of OR Groups: Results of a Survey, ***John C. Ranyard***, Lancaster University, 2 The Spinney, Bamford Mill, The Hollow, Hope Valley, S33 0AU, UK, jcr@onedorerd.win-uk.net, ***Robert Fildes***

We present the results of a survey of OR group managers, sponsored by the UK OR Society, which aimed to identify the current demographics of UK OR groups, to establish how OR groups work and to gain an understanding of how OR groups are managed, including the key success factors.

2) Critical Success Factors for OR/MS Teams in Industry: An Indo-American Experience, ***Goutam Dutta***, Indian Institute of Management, Vastrpur, Ahmedabad, 380015, India, goutam@iimahd.ernet.in

From the personal experiences of modeling steel companies in India and the US, the factors responsible for the success of OR/MS teams are hierarchy and composition of the OR team, problem selection and stronger emphasis on knowledge of operations. The lessons learned are also discussed.

3) Significance of Standardized Data Elements in Amoco Corporation Global SAP Implementation, ***Randy R. Reddemann***, Amoco Corp., 6302 Wynnwood Ln., Houston, TX 77008, rrreddemann@amoco.com

We focus on the purpose, value and process for the standardization of business objects, identifiers, classifiers and data elements in Amoco's global implementation of SAP. Additionally, we address the financial benefit of standardization, the cost of creation and maintenance of standards and data integrity issues.

4) In Search of Intelligent Maintenance Practices: Part II, ***Dennis F. X. Mathaisel***, Babson College, Babson Hall, Babson Park, MA 02157, dfxm@mit.edu, ***Clare L. Comm***

In an effort to assist the US Air Force in becoming "lean," Part I of our research focused on the selection of leading providers of maintenance services and the development of a benchmarking instrument. Part II addresses the results and implications of the implementation efforts.

SA36 Scheduling I

Contributed Session

Chair: Milton L. Smith, Texas Technical University, Dept. of IE, Lubbock, TX 79409, mlsmith@coe.ttu.edu

1) A Comparative Study of Manpower Scheduling Algorithms, ***Aaron P. Blossom***, Grand Valley State University, 6579 Gran Via Dr., Rockford, MI 49341, blossomp@river.it.gvsu.edu, ***Ram Narasimhan***

We compare 3 methods for finding solutions to the work tour scheduling problem with limited worker interchangeability: Loucks' heuristic and 2 other algorithms never before applied to this highly constrained problem, SA and TS.

2) A Multi-Layer Dynamic Routing & Scheduling Problem, ***Hugo P. Simao***, Princeton University, Dept. of Civil Eng. & OR, Princeton, NJ 08544, hugo@dragon.princeton.edu, ***Warren B. Powell***

The problem consists of several multi-depot, multi-vehicle dynamic routing subproblems for different types of vehicles, coupled by the scheduling of shared drivers and tractors. The framework for a heuristic, multi-layer resource assignment algorithm will be presented and discussed.

3) Scheduling Reentrant Flowshops with Sequence-Dependent Setup Times, ***Ebru Demirkol***, Purdue University, Sch. of IE, 1287 Grissom Hall, W Lafayette, IN 47907-1287, demirkolWecn.purdue.edu http://gilbreth.ecn.purdue.edu/~demirkol, ***Reha Uzsoy***

We propose a decomposition procedure for flowshops involving reentrant product flows and sequence-dependent setups. Our procedure divides the overall problem into single machine scheduling subproblems subject to sequence-dependent setups and precedence delays. We present an efficient algorithm for the subproblems and evaluate the performance of the decomposition procedure on a variety of problem classes.

4) Analysis of Assembly Systems for Throughput & Interdeparture Time Variability, ***Ihsan Sabuncuoglu***, Bilkent University, IE Dept., Bilkent, Ankara, 06533, Turkey, sabun@bilkent.edu.tr, ***Erdal Erel***, ***Gurhan Kok***

We examine effects of the number of component stations, or parallelism, work transfer, processing time distributions, buffers and buffers allocation schemes on throughput and interdeparture time variability of assembly systems. As an alternative to work transfer, variability transfer is introduced and its effectiveness assessed. Previous research indicates that optimal throughput displays an anomaly for some processing time distributions...

5) Multiple Resource Constrained Scheduling Problem, ***Milton L. Smith***, Texas Technical University, Dept. of IE, Lubbock, TX 79409, mlsmith@coe.ttu.edu, ***Elliot J. Montes***, ***Mario G. Beruvides***

We propose a mathematical model to solve the multiple resource constrained scheduling problem. A case study is presented to illustrate the model along with an efficient heuristic to solve the problem.

SA37 Telecommunications I

Contributed Session

Chair: Larry E. Stanfel, University of Alabama, Dept. of MS, Tuscaloosa, AL 35487-0226, lstanfel@cba.ua.edu

1) Pricing a Data Communications Network, ***Philipp Afeche***, Northwestern University, Kellogg Grad. Sch. of Mgmt., Leverone Hall, 2001 Sheridan, Evanston, IL 60208, p-afeche@nwu.edu kisnt8.kellogg.nwu.edu/scripts/fit/facpage.idc?sid=80, ***Haim Mendelson***

We study optimal quote-based pricing schemes for a data communications network. We derive and evaluate the welfare-maximizing, monopoly and Ramsey schemes when the delay cost is proportional to message value. We find simple, intuitive and highly-implementable pricing schemes.

2) Economic Capacity Expansion Under a Constrained Capital Budget, ***Roger L. Tobin***, GTE Labs. Inc., 40 Sylvan Rd., Waltham, MA 02254, rlt1@gte.com

When cash is tight and budgets must be constrained, the costs of placing capacity to cover forecast growth in the most economical manner may exceed the available capital budget. We investigate optimal capacity placement under a given budget and discuss complications caused when alternative technologies are available.

3) Telemedicine: What is it Good For? Emerging Patterns in Telemedicine Utilization, ***Kimberly D. Harris***, University of

Missouri, 132 F Quarter Deck, Columbia, MO 65211, kimberly_d._harris@muccmail.missouri.edu

The evolution of telemedicine technologies is constantly changing how we think about technology and medicine. Diffusion of this technology may prove hard to measure due to its' constant state of change, however. We explore what specialities within health care appear to be conducive to telemedicine and what barriers exist that prohibit the acceptance of the various technologies involved...

4) Finding Optimal Locations for Storing Data, ***Larry E. Stanfel,*** University of Alabama, Dept. of MS, Tuscaloosa, AL 35487-0226, lstanfel@cba.ua.edu

Where, in a mixed system, mainframe and client-server, should applications be located? We propose a model, reflective of actual data-processing environments, that allows straightforward solution of that problem. Further, the solution process admits geometric interpretations, easy to appreciate and expressible in significant data processing quantities.

SA38 Inventory Models I

Contributed Session

Chair: Jennifer K. Ryan, Purdue University, 1287 Grissom Hall, West Lafayette, IN 47907, jkryan@ecn.purdue.edu http://gilbreth.ecn.purdue.edu/~jkryan/

1) Pricing & Inventory Policies for Products with Expiration Dates, ***Timothy L. Urban***, University of Tulsa, Quant. Methods & MIS Dept., Tulsa, OK 74104, urban@utulsa.edu

Many retail items have expiration or pull dates printed on the container, indicating to the consumer the precise remaining life of the item, resulting in (monotonically) decreasing demand as the expiration data approaches. We present models to characterize the shelf management of "dated" items and to identify appropriate pricing and inventory policies.

2) An Approximate (Q,R) Inventory Model for Perishables with Positive Leadtimes, ***Ulku Gurler***, Bilkent University, Dept. of IE, Bilkent, Ankara, 06533, Turkey, eberk@bilkent.edu.tr, ***Emre Berk***

We consider a (Q,R) inventory system for perishable items with constant shelf lives facing unit Poisson demand and positive leadtimes. Using pseudo-regenration points, expressions are developed for the operating characteristics of the system. Numerical results are presented.

3) A Robust, Computationally Efficient Methodology to Set Service Levels for Components in Assemble-to-Order Environments, ***Hari S. Abhyankar***, MIT, Sloan Sch. of Mgmt., 42 Phillips St., Apt. 4, Boston, MA 02114, hsabhyan@mit.edu

We provide an optimization-based method for setting base stocks for components in an environment where customers order customized products that are assembled from subsets of these components. Through a simulation study, we establish that our method outperforms the equal allocation policy in all of our test problems.

4) Inventory-Sharing & Outsourcing of Shipments in a Supply Chain, ***Amiya K. Chakravarty***, Tulane University, Freeman Sch. of Bus., New Orleans, LA 70118-5669, amiyac@freeman.tulane.edu, ***Jovan Grahovac***

The emergence of carriers who deliver items to worldwide destinations at a reasonable cost has opened up new opportunities to better manage inventory. We focus on a supply chain with a large number of low-demand items. We examine inventory-sharing arrangements, overall system design and their impact on customer service and costs.

5) An Inventory Model for a Retail Assortment with Substitutable Products, ***Jennifer K. Ryan***, Purdue University, 1287 Grissom Hall, West Lafayette, IN 47907, jkryan@ecn.purdue.edu http://gilbreth.ecn.purdue.edu/~jkryan/, ***David Simchi-Levi***

We consider a simple retail assortment model for a retailer who stocks a variety of related and substitutable products. We present an inventory model for determining the optimal inventory levels of each item.

SA39 Production Scheduling I

Contributed Session

Chair: Gyana R. Parija, IBM Corporation, 522 South Rd., Poughkeepsie, NY 12601, parija@us.ibm.com

1) Neural Network-Based Batch Scheduling for an Integrated Agile Production-Distribution System, ***Ana Maria Sarmiento,*** SUNY, 3501 N Jupiter Rd., 55-C, Richardson, TX 75082, as1@eng.buffalo.edu http://www.acsu.buffalo.edu/!as1, ***Rakesh Nagi***

We propose a NN-based approach to model a PF that produces several products and supplies to n DCs. The demand faced by the DCs is considered stochastic. The goal of the NN model is to optimize the integrated operational cost of the system.

2) Improved Genetic Search for the Economic Lot Scheduling Problem, ***Dean C. Chatfield***, Pennsylvania State University, Dept. of MSIS, 303 Beam Bldg., University Park, PA 16802, dcc110@psu.edu

A procedure based on a GA is developed for the economic (capacitated multi-item) lot scheduling problem. Explicit item to period assignments are built directly into the solution structure. Computational results are given for application to a benchmark problem that has been under investigation for more than 30 years.

3) Solving Parallel Machining Operations Processes by Genetic Algorithms, ***Nan-Chieh Chiu***, North Carolina State University, Dept. of OR, Box 7913, Raleigh, NC 27695-7913, njchiu@eos.ncsu.edu http://www4.ncsu.edu/eos/users/n/njchiu/WWW/, ***Shu-CherngFang, Yuan-Shin Lee***

We present a genetic-based algorithm for finding the optimal parallel operation sequence of a parallel machine (mill/turn machining center). Two new genetic operators for solving order-based GAs are proposed. A MIP model for parallel operation machining process is also presented.

4) A Multi-Stage Economic Lot Sizing Problem with Convex Product Cost in a JIT Environment, ***Jian Yang***, University of Texas, Dept. of MSIS, Austin, TX 78713, jiany@uts.cc.utexas.edu, ***Gang Yu***

We present a multi-stage convex-cost economic lot sizing problem. The major findings are: a plant with many production stages can be treated as a single stage; a polynomial algorithm for the deterministic model is devised; and the long-term production strategy in the stochastic model is obtained using successive approximation.

5) Batch Sizing for a Multi-State Production System with Rework Processes, ***Gyana R. Parija***, IBM Corporation, 522 South Rd., Poughkeepsie, NY 12601, parija@us.ibm.com, ***Bhaba R. Sarker, Sanjay Mondal***

A multi-stage manufacturing system that considers rework processes for scrap items is modeled here for determining the manufacturing batch size. The model minimizes the total cost of production and inventory holding under 2 different options: immediate recycling and temporary holding. The results are discussed and different options are compared.

Sunday 10:00-11:00

SM40 Morse Plenary: Technology-Enabled OR Education - What it May do for Professors & Practitioners

Plenary Session

Chair: Robert M. Oliver, University of California, 4175 Etchverry Hall, Berkeley, CA 94707, denise@violet.berkeley.edu

1) Morse Plenary: Technology-Enabled OR Education: What it May do for Professors & Practitioners, ***Richard C. Larson***, MIT, Dept. of Elec. Eng. & CS, 77 Massachusetts Ave., Cambridge, MA 02139, rlarson@mit.edu

Will the WWW create superstar OR professors? Will learners in several continents take courses at the same time from the same professor? Will the new learning technologies allow OR to get back to its empirical roots by helping to get students off campus and into the field? The decade of the 1990s has given us unprecedented growth in technologies related to learning. In particular, the WWW is hosting rich learning communities for students and scholars in numerous disciplines. Building from the author's 3-year experience as Director of MIT's New Center for Advanced Educational Services, this presentation focuses on OR and technology-enabled learning. We review current examples of professors teaching and students learning OR and related disciplines in new technology-enabled ways. We revisit the meanings of collaborative research, field work and data collection, visualization of algorithms and problem formulation. Finally, we speculate, building from current trends, on how the OR student will learn and how the OR professor will teach OR in the year 2015. Speculative answers to the above questions will be given.

Sunday 11:00-12:00

SE40 Edelman Plenary: The Use of OR Systems in Chilean Forest Industries

Plenary Session

Chair: Stephen A. Strauss, AT&T Bell Labs., 379 Campus Dr., Room 2B208, Somerset, NJ 08873

1) Edelman Plenary: The Use of OR Systems in Chilean Forest

Industries, *Andres F. Weintraub*, University of Chile, Dept. of IE, Republica 701, PO Box 2777, Santiago, Chile, aweintra@dii.uchile.cl, ***Rafael Epstein, Ramiro Morales, Jorge Seron***

The Chilean forestry sector is one of the main export areas in the booming Chilean economy. It is composed of private firms which combine large timber land holdings of mainly pine plantations, and some eucalyptus, with industrial plants, basically sawmills and pulp plants to process logs. The Chilean firms are embedded in a highly competitive world market where gains in productivity are vital. Since 1988, the main Chilean forest firms, which have total timber sales of about one billion dollars, have started implementing OR models to support decision making. These systems were developed jointly with academics from the University of Chile, and support decisions on daily truck scheduling, short term harvesting, location of harvesting machinery and access roads and medium- and long-term forest planning. Most of these problems are combinatorially complex. Approaches used in solving these models include simulation, LP with column generation, MILP formulations and heuristic methods. The systems have been extremely successful, leading to a change in organizational decision making. Total gains derived from their use have been estimated to be at least 17 million dollars per year, in addition to qualitative gains in managerial productivity, quality of life for workers and reduction in environmental damage in some areas. These systems are easily portable and some have been incorporated in Brazil and South Africa. We will discuss the problems the first firms faced, why models were required to improve the solution process, the solution methodology that was implemented and the results obtained.

Sunday 13:00-14:30

SC01 DA Computation

Sponsor: Decision Analysis
Sponsored Session

Chair: Ross D. Shachter, Stanford University, Dept. of EES/OR, Stanford, CA 94305-4023, shachter@stanford.edu

1) A Monte Carlo Method for Solving Influence Diagrams Using Local Computation, *Prakash P. Shenoy*, University of Kansas, Sch. of Bus., Summerfield Hall, Lawrence, KS 66045-2003, ***John M. Charnes***

We describe a Monte Carlo technique for solving influence diagrams. The technique generates iid samples from a small set of chance variables for each decision variable. We sample using the conditionals specified in the influence diagram without any preprocessing. It's easy to determine number of samples required for given accuracy.

2) Learning Influence Diagrams from Data, *Kazuo J. Ezawa*, Mondex International Ltd., 100 Campus Dr. Ste. 109, PO Box 972, Florham Park, NJ 07932-0972, kazuo.ezawa.mondex@worldnet.att.net

There are many environments where decisions are made repeatedly and their consequences recorded. If such data is collected, it is possible to create or learn influence diagrams from the data. We discuss such an algorithm to learn influence diagrams that best integrate the strategies of different experts in a coherent manner.

3) Web-HIPRE - A Java-Applet for Multiattribute Decision Analysis, *Raimo P. Hamalainen*, Helsinki University of Technology, Systems Analysis Lab., PO Box 1100, Hut, 02015, Finland, raimo@hut.fi, ***Jyri Mustajoki***

Web-HIPRE is the first general purpose DA tool in the WWW. An essential feature is the inclusion of WWW links describing the criteria or alternatives. Web-HIPRE (www.hipre.hut.fi) supports SMART, SWING, SMARTER, AHP and value functions and their combinations. The models can be accessed simultaneously from everywhere in the world.

4) Assessment Decision Trees, *Ross D. Shachter*, Stanford University, Dept. of EES/OR, Stanford, CA 94305-4023, shachter@stanford.edu

We were all taught DA on decision trees and they are useful but not glamorous, unchanged after many years. I propose some simple changes to decision trees to make them easier to compute with when flipping, solving and computing the value of clairvoyance, essentially doing more by doing less.

SC02 Information Technologies in Management & Accounting

Sponsor: Information Systems
Sponsored Session

Chair: Rob Nehmer, Berry College, Campbell Sch. of Bus., PO Box 495024, Mt. Berry, GA 30149-5024, http://campbell.berry.edu/faculty/rnehmer/index.html

1) A Comparison of Selected Artificial Neural Networks for Financial Distress Evaluation, *Ram S. Sriram*, Georgia State University, 35 Broad St., 5th Fl., Atlanta, GA 30303, accrss@panther.gsu.edu accrss@panther.gsu.edu, ***Harlan Etherdige, H. Y. Kathy Hsu***

Accounting studies use ANNs for decisions such as caluating financial distress. We compare the performances of backpropagation, categorical neural network and probabilistic neural network. Preliminary results indicate that estimated error rate of backpropagation is higher than probabilistic neural network and lower than categorical learning. Backpropagation has higher estimated relative costs.

2) Operational & Strategic Benefits & Controls: A Study of EDI Implementation, *Vairam Arunachalam*, University of Missouri, Sch. of Accountancy, 319 Middlebush Hall, Columbia, MO 65211, acctva@showme.missouri.edu

We report on the results of an empirical study of EDI, with particular reference to the operational and strategic benefits from EDI, and control practices associated with EDI systems. Findings indicate that organizations experience several benefits from EDI, mostly operational. Control practices are prevalent but several areas raise concern.

3) Agent Modeling of Information Assurance, *Rob Nehmer*, Berry College, Campbell Sch. of Bus., PO Box 495024, Mt. Berry, GA 30149-5024, http://campbell.berry.edu/faculty/rnehmer/index.html

The American Institute of Certified Public Accountants, AICPA, is involved in the development of a major new classes of services called assurance services. These services can be understood as a generalization of the traditional audit service which attests as to the Afairness@ of the financial statements.

SC03 Using Technology in Instruction

Sponsor: Education
Tutorial Session

Chair: James R. Coakley, Oregon State University, Coll. of Bus., Bexell Hall 200, Corvallis, OR 97331-2603, coakley@bus.orst.edu

1) Tutorial: Using Technology in Instruction, *David R. Sullivan*, Oregon State University, Coll. of Bus., Bexel Hall 200, Corvallis, OR 97331-2603, coakley@bus.orst.edu

We share a collection of tips and tricks that apply IT to improve both teaching and administration in the classroom environment. We assume that students are given network storage areas and email accounts. Given this environment, we show how to harvest student assignments automatically, generate "personalized" email status reports, conduct peer-review exercises of student assignments...

SC04 Internet Applications II

Contributed Session

Chair: Binshan Lin, Louisiana State University, Dept. of Mgmt. & Mktg., One University Place, Shreveport, LA 71115-2399, blin@pilot.lsus.edu http://www.lsus.edu faculty/~blin

1) Marketing & Electronic Commerce on the Web: Are Firms Actually Doing What They Think They are Doing?, *Scott Koslow*, University of Waikato, Private Bag 3105, Hamilton, New Zealand, skoslow@mngt.waikato.ac.nz, ***Hans J. Yu***

There are many reasons why marketers claim to use the Internet, but do these issues influence website design? This is tested via online questionnaires and a website content analysis. We find no relationship between website contents and marketer motivations to use the Internet or its perceived roles.

2) Analysis of Homepages Usages in Korean Leading Companies, *Chang-Kyo Suh*, Kyungpook Ntl. University, 1370 Sankyuk-dong, Pook-gu, Taegu, 702-701, Korea, cksuh2@bh.kyungpook.ac.kr, ***Dae-Yun Kwon***

An analysis of the content of corporate home pages was conducted to investigate the current status and the future trends of home page usage by Korean leading business organizations. Initial data were collected and validated between April 1, 1998 and September 30, 1998 by searching engines on a company name search.

3) Web User Satisfaction: An Exploratory Study, *Mohammad K. Najdawi*, Villanova University, Mgmt. Dept., Villanova, PA 19085, najdawi@ucts.vill.edu, ***Jim Otto***

We study the relationship between Web page download time and various elements of user satisfaction. These elements include content, format, ease of use, appeal of graphics and download time.

4) An Empirical Test of Toulmin Argument Structures Used for Science Assessment, ***Terry Janssen***, Argonne Ntl. Lab/George Mason University, ***Paul Lehner***

It is difficult for a policy maker to understand/use all the relevant scientific evidence that is available from scientists - the inscrutability problem. Toulmin structures are used to represent expert claims including the underlying support for those claims. Internet software for group assessment and decision support was developed and tested.

5) The Strategic Use of the Internet in the Pharmaceutical Industry, ***Binshan Lin***, Louisiana State University, Dept. of Mgmt. & Mktg., One University Place, Shreveport, LA 71115-2399, blin@pilot.lsus.edu http://www.lsus.edu faculty/~blin

We address some critical issues of using Internet technology in the pharmaceutical industry, from discovery through R&D, registration, to sales and marketing of the final product. Managerial implications are provided.

SC05 Research Strategies in Operations Management I

Sponsor: MSOM
Sponsored Session
Chair: William S. Lovejoy, University of Michigan, Michigan Bus. Sch., Ann Arbor, MI 48109, wlovejoy@umich.edu

1) Research Strategies in Operations Management I, ***Lee Schwarz***, Purdue University, Krannert Grad. Sch. of Mgmt., W Lafayette, IN 47907, lee@mgmt.purdue.edu, ***Stephen C. Graves, Patrick T. Harker, Paul H. Zipkin, Sridhar Tayur***

This is the first of 2 sessions in which each speaker will discuss the thinking at their institution about the directions that operations management research should take. Each presenter will discuss a research strategy or direction, and present some examples of papers or programs to demonstrate the agenda. Time will be left for discussion after each presentation.

SC06 Global Manufacturing

Contributed Session
Chair: Constantin A. Vaitsos, University of Southern California, Marshall Sch. of Bus. BRI 400C, Los Angeles, CA 90089-1421, vaitsos@usc.edu http://www-rcf.usc.edu/~vaitsos/

1) Implementation Issues in Global Manufacturing, ***Ali R. Behnezhad***, California State University, Dept. of MS, Northridge, CA 91330-8245, ali.behnezhad@csun.edu

Companies with manufacturing facilties across the globe constantly face the challenging tasks of coordination and implementation of their manufacturing plans. Among the important issues encountered are capacity decisions, global sourcing and proper levels of standardization and manufacturing automation. We will discuss these issues and provide guidelines for implementation.

2) International Manufacturing Location Decisions, ***Chaipong Pongpanich***, University of Cambridge, Dept. of Eng., Mill Ln, Cambridge, CB1 2RX, UK, cp204@eng.cam.ac.uk, ***Mike Gregory, Yongjiang Shi***

Manufacturing location decision is an important part of most MNC's manufacturng strategy, as it directly influences their competitiveness. Based on 8 case studies, a framework of international manufacturing location strategy is proposed. The study also examines the relationship between product strategy and its manufacturing location characteristics.

3) International Manufacturing Network Configurations & Strategic Capabilities, ***Yongjiang Shi***, Cambridge University, Ctr. for Intl. Mfg., Cambridge, England, CB2 1RX, UK, ys@eng.cam.ac.uk, ***Mike Gregory***

We focus on international manufacturing networks by analysing various network configurations and identifying their strategic capabilities. Twenty cases have been studied. Findings include multinational corporations transforming manufacturing systems towards globally coordinated networks; these networks have much stronger capabilities than traditional configurations...

4) Technology Transfer: The Value of the Process Development Center, ***Constantin A. Vaitsos***, University of Southern California, Marshall Sch. of Bus. BRI 400C, Los Angeles, CA 90089-1421, vaitsos@usc.edu http://www-rcf.usc.edu/~vaitsos/, ***Robert B. Freund***

We determine the value to a global manufacturing firm of having a technology development center to design all of its products and develop their production processes at a central location. Subsequently, the firm transfers such production technologies to various international facilities to take advantage of lower production costs.

SC07 Operations & Technology Strategy

Cluster: Operations & Technology Strategy
Invited Session
Chair: Evan Porteus, Stanford University, Grad. School of Bus., Stanford, CA 94305-5015, eporteus@leland.stanford.edu

1) Valuing Responsiveness in Supply Chains, ***Uday S. Rao***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, urao@gizmo.cmu.edu, ***Alan Scheller-Wolf, Sridhar Tayur***

We build and characterize the optimal policy for a model of supply chain responsiveness, using an explicit connection between customer demand and delivery time, based on survey data. A method for computing the optimal parameters is also developed and applied on the industrial problem with actual data that motivated this work.

2) Optimal Sizing & Timing of Capacity Expansions with Implications for Modular Semiconductor Wafer Fabs, ***Alexander Angelus***, Strategic Decisions Group, 2440 Sand Hill Rd., Menlo Park, CA 94025-6900, aangelus@sdg.com, ***Evan Porteus, Samuel C. Wood***

We develop and characterize the optimal policy for a dynamic capacity expansion model that features economies of scale, contingent sizing and timing of expansions and correlated stochastic demand. Using a detailed data set, we employ the model to analyze the modular approach to capacity planning in semiconductor manufacturing.

3) Dynamic Customer Service Competition, ***Joseph M. Hall***, Stanford University, Grad. Sch. of Bus., Stanford, CA 94305-5015, jhall@gsb.stanford.edu, ***Evan Porteus***

We develop and characterize the equilibrium policies for a simple dynamic model of 2 firms that compete for customers based on service quality. Two examples are discussed: Internet service providers using a queueing model to predict service levels and make-to-stock producers using a newsvendor model.

4) The Roles of Innovative Competence & Cost Competence in Sustaining Technology Leadership, ***Glen Schmidt***, Georgetown University, Grad. Sch. of Bus., G-4 Old North, 37th & O St. NW, Washington, DC 20057, gschmidt@leland.stanford.edu, ***Evan Porteus***

Some high-tech firms appear to view technology leadership as separate and distinct from cost leadership. In contrast, we suggest that a firm's success in sustaining a technology leadership position may hinge on its ability to produce a new product, resulting from new technology at lower cost.

SC08 Algorithms for Dynamic Jobshops

Sponsor: Applied Probability Section
Sponsored Session
Chair: Dimitris Bertsimas, MIT, Sloan Sch. of Mgmt., Rm. E53-359, Cambridge, MA 02139, dbertsim@aris.mit.edu

1) An Approximate Dynamic Programming Algorithm for Scheduling Multiclass Queueing Networks, ***Florin Avram***, UNICAMP, IMEC CP 6065 CEP 13081, Campinas, Brazil, ***Dimitris Bertsimas, Jay Sethuraman***

We present an approximate dynamic programming approach to stochastic control of multiclass queueing networks. The value function approximation is constructed using insights from fluid and singular perturbation solutions. The proposed policy is very close to the optimal solution found in examples.

2) Structural Properties of Dynamic Scheduling Problems Under Fluid Scaling, ***Michael H. Veatch***, Gordon College, Dept. of Math., Wenham, MA 01984

New examples are given of dynamic scheduling problems where fluid-scaled optimal policies are, in a certain sense, similar to the optimal policy for the stochastic network. Conditions are discussed under which this policy correspondence holds.

3) An Asymptotically Optimal Algorithm for Dynamic Jobshops, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., Rm. E53-359, Cambridge, MA 02139, dbertsim@aris.mit.edu, ***David Gamarnik***

We propose an algorithm for scheduling jobshop scheduling problems with arrivals. Starting with the fluid relaxation, we construct a solution for the jobshop scheduling problem that is asymptotically optimal. Experiments with the well-known 10 by 10 example reveal that our algorithm is within 1% from optimality.

SC10 Pseudo-Boolean Functions

Sponsor: College on AI
Sponsored Session

Chair: Toshihide Ibaraki, Kyoto University, Dept. of App. Math. & Physics, Grad. Sch. of Eng., Kyoto, 606-8501, Japan, ibaraki@kuamp.kyoto-u.ac.jp

1) Roundtable Extensions of Pseudo-Boolean Functions, ***Endre Boros***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, boros@rutcor.rutgers.edu, ***Isabella Lari, Bruno Simeone, Giovanni Storchi***

Most combinatorial optimization problems can also be modeled as the minimization of a pseudo-Boolean function over the binary n-vectors. Such a function can still be extended over the entire cube U=[0,1]*n in several ways. "Roundable" functions form a special family of extensions, which suit approximation techniques particularly well.

2) Some Basic Concepts of Pseudo-Boolean Function Theory, ***Stephan Foldes***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, ***Peter L. Hammer***

Some basic concepts of the theory of Boolean functions can be extended to pseudo-Boolean functions, i.e., to real-valued functions on binary variables. We discuss the concepts of implicants, implicata, prime implicants, prime implicata, disjunctive normal forms, conjunctive normal forms and duality and present algorithmic procedures of the consensus/resolution type for the pseudo-Boolean case.

3) Equivalent Representations of a Set Function with Applications to Game Theory & Multicriteria Decision Making, ***Jean-Luc Marichal***, University of Liege, Dept. of Mgmt., FEGSS, Blvd. du Rectorat 7-B31, Liege, B-4000, Belgium, jl.marichal@ulg.ac.be, ***Michel Grabisch, Marc Roubens***

We introduce 4 alternative representations of a set function: the Mobius transformation, the co-Mobius transformation and interactions between elements of any subset of a given set as extensions of Shapley & Banzhaf values. The links between the 5 equivalent representations of a set function are emphasized through the use of the multilinear extension of pseudo-Boolean functions.

SC11 Rethinking Conventional Models in New Product Development

Sponsor: Technology Management
Sponsored Session

Chair: Durward K. Sobek, II, Montana State University, Dept. of MIE, Bozeman, MT 59717-3800, dsobek@ie.montana.edu

1) Business Cycles/Downsizing Engineering Staffs: Example of Stochastic Staffing Problem with Learning Effects & Non-Stationary Requirements, ***Edward Anderson***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edanderson@mail.utexas.edu

Managing a firm's knowledge resources under business cycles is vital but not well understood. Using the example of managing automotive engineers (who typically require years of mentoring) under business cycles, we develop an optimal dynamic programming policy for managing knowledge resources with long lead times under uncertain, non-stationary requirements.

2) withdrawn - author request of 9/1, ***Marco Iansiti***, Harvard Business School, Morgan Hall T69, Soldiers Field Park, Boston, MA 02163, miansiti@hbs.edu, ***Alan MacCormack, Jonathan West***

3) Effective Transnational Concurrent Product Development Practices, ***Paul D. Collins***, University of Washington, 22011 26th Ave. SE, Bothell, WA 98021-4900, collins@u.washington.edu., ***Frank M. Hull***

Little is known about how to effectively implement concurrent practices in transnational product development teams. Based on findings from a recent field research project on concurrent practices in Britain, France, Germany and the US, we show which practices work best in different kinds of transnational product development teams.

4) An Investigation into Best Practice Usage of Quality Function Deployment in the US & Japan, ***John J. Cristiano***, 1072 Greenhills Dr., Ann Arbor, MI 48105, jjcrist@engin.umich.edu, ***Jeffrey K. Liker***

We report on the results of a large-scale survey of companies using QFD, both in the US and Japan. Hypotheses of perceived cross-cultural differences in terms of internal motivation, management support, methodology employed and the resulting impact on products and processes are explored.

SC12 Technology Management: A Brazilian Perspective

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session

Chair: Sergio Takahashi, Universidade de Sao Paulo, Fac. de Economia Admin., Campus de Ribeirao Preto, Sao Paulo, 14040-900, Brazil, setakaha@davinci.fearp.usp.br

1) Integrated Analysis of the Product Development Process: A Perspective of Innovation, ***Sergio Takahashi***, Universidade de Sao Paulo, Fac. de Economia Admin., Campus de Ribeirao Preto, Sao Paulo, 14040-900, Brazil, setakaha@davinci.fearp.usp.br

We begin with a review of the product development process literature with attention given to 3 components of the process: competencies, process integration and organization. Case studies of innovations in 3 global automotive enterprises are analyzed. We conclude with a discussion of a product development innovation model.

2) Manufacturing Strategies & Advanced Manufacturing Technologies: An Integrated Application in the Product Development Process, ***Vania Passarini Takahashi***, Universidade de Sao Paulo, Fac. de Economia Admin., Campus de Ribeirao Preto, Sao Paulo, 14040-900, Brazil

The relationship between manufacturing strategies and AMTs in the product development process is presented. The relationship is examined in global manufacturing enterprises and the result is a strategic decision model to aid adoption of advanced manufacturing technologies.

3) Management Adoption of New Information Technologies in a Firm, ***Fernando C. de Almeida***, Universidade de Sao Paulo, R Himbere 1953, Sao Paulo, 01258-020, Brazil, falmeida@usp.br

In the dynamic environment of IT, many development opportunities may emerge. How to decide whether to invest in a new technology becomes a key issue. The research tries to explore variables that may be important in the management of IT in a firm.

4) Globalization & Information Technology's Impact in the Brazilian Supermarket Sector, ***Flavia Angeli Ghisi***, Universidade de Sao Paulo, Fac. de Economia Admin., Contabeis Av Bandeirantes 3900, Ribeirao Preto, 14040-900, Brazil, ghisi@davinci.fearp.usp.br

Globalization is creating competitive disadvantages for countries with emerging industries and technological capabilities. This study analyzes the Brazilian food products industry and applies a statistical methodology to evaluate the competitiveness of the industry.

SC13 Knowledge & Organizations

Sponsor: Organization Science
Sponsored Session

Chair: To be announced

1) College on Organization Science Subconference: Knowledge & Organizations

SC14 Vehicle Routing

Contributed Session

Chair: Vania Campos, Military Institute of Engineering, Praca Gen Tiburcio, 80-DE/2-Urca, Rio de Janeiro, 22290-270, Brazil, d2vania@epq.ime.eb.br

1) Routing of Railway Carriages, ***Peter J. S. Brucker***, University of Osnabrueck, Albrechtstr.28, Osnabrueck, D-49069, Germany, peter@mathematik.uni-osnabrueck.de, ***Johann Hurink, Thomas Rolfes***

A passenger train is composed of different types of carriages. To route the carriages of a set of regular trains, an integer multi-commodity flow problem with fixed cost objective function is formulated. We apply SA with restarts to solve this problem. Computational results are reported.

2) A Heuristic Dynamic Programming Approach for the Vehicle Routing Problem with Stochastic Demands, ***Nicola Secomandi***, University of Houston, DISC Room 260A, Coll. of Bus., 4800 Calhoun St., Houston, TX 77204-6282, nick@bau.cba.uh.edu

A version of the vehicle routing problem where customers' demands are uncertain is considered. A state space decomposition and a heuristic dynamic programming algorithm that exploits this structure are proposed.

3) An Algorithm for Detecting K-Optimal Independent Paths, ***Vania Campos***, Military Institute of Engineering, Praca Gen Tiburcio, 80-DE/2-Urca, Rio de Janeiro, 22290-270, Brazil, d2vania@epq.ime.

eb.br

We present an algorithm which aims toward an emergency transportation planning for vehicle flow allocation. This algorithm identifies these path sets in such a say that optimizes the number of vehicles to be delivered outside a region under menance of some catastrophic event in the least possible time.

SC15 Integration of Transportation & Inventory

Sponsor: Transportation Science
Sponsored Session

Chair: Anton Kleywegt, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton@isye.gatech.edu

1) Approximation Algorithms for Economic Lot-Sizing Model with Piecewise Linear Cost Structures, ***David Simchi-Levi***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, levi@iems.nwu.edu, ***Lap Mui Ann Chan***, ***Ana Muriel***, ***Zuo-jun Shen***

We consider the economic lot size problem with piecewise linear order costs and general holding costs. We develop approximation algorithms with fixed worst-case bounds for this problem.

2) A Multi-Layer Dynamic Routing & Scheduling Problem, ***Hugo P. Simao***, Princeton University, Dept. of Civil Eng. & OR, Princeton, NJ 08544, hugo@dragon.princeton.edu, ***Warren B. Powell***

The problem consists of several multi-depot, multi-vehicle dynamic routing subproblems for different types of vehicles, coupled by the scheduling of shared drivers and tractors. The framework for a heuristic, multi-layer resource assignment algorithm will be presented and discussed.

3) Computational Methods for Inventory Routing Problems, ***Anton Kleywegt***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton@isye.gatech.edu, ***Vijay S. Nori***, ***Martin Savelsbergh***

We study an inventory routing problem in which the vendor decides when customers inventory should be replenished and how this should be done using a fleet of vehicles to minimize transportation, inventory and stockout costs. We propose methods to compute good solutions and compare the results with a number of heuristics.

4) A Neuro-Dynamic Programming Approach to Retailer Inventory Management, ***Benjamin Van Roy***, Stanford University, Dept. of EES/OR, Terman Engineering Ctr., Stanford, CA 94305-4023, bvr@mit.edu, ***Dimitri Bertsekas***, ***John N. Tsitsiklis***

We discuss the application of approximation techniques from neuro-dynamic programming to a case study involving a 2-echelon inventory management problem motivated by those arising in retailer applications. We address difficulties posed by large-state spaces and decision spaces. Value function approximation and simulation-based algorithms are used to overcome the impediment of intractable state spaces...

SC16 Dynamic Traffic Assignment II

Sponsor: Transportation Science
Sponsored Session

Chair: Srinivas Peeta, Purdue University, Sch. of Civil Eng., W Lafayette, IN 47907

1) Generalized Singular Value Decomposition-Based Approach for Consistent On-Line Dynamic Traffic Assignment in Networks ATIS/ATMS, ***Srinivas Peeta***, Purdue University, Sch. of Civil Eng., W Lafayette, IN 47907, ***Srinivas Bulusu***

A rolling-horizon-based bi-level framework is proposed for ensuring the operational consistency of on-line traffic assignment in networks with ATIS/ATMS. The consistency problem is formulated as a constrained least squares model and solved using generalized singular value decomposition-based orthogonal transformations. Simulation experiment results are discussed.

2) A Linear Model for the Continuous Network Design Problem, ***Steven T. Waller***, Northwestern University, Dept. of ISE, 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, travis@trans.civil.nwu.edu, ***Athanasios Ziliaskopoulos***, ***Kyriacos C. Mouskos***

We discuss the continuous NDP under the conditions of SO-DTA with the assumption of a single destination. A linear model is formulated where no new construction is permitted, only improvements to the current system. Network improvements consist of an increase in the capacity and saturation flow for a given road segment. The model allows the specification of budget constraints...

3) Route Guidance & Network State Prediction Consistency for Real-Time Dynamic Traffic Assignment Systems, ***Khaled F. Abdelghany***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, kfaissal@mail.utexas.edu, ***Yi-Chang Chiu***, ***Hani S. Mahmassani***

We describe a real-time DTA system that provides route guidance information consistent with anticipated network conditions through rolling iterative application of a simulation-assignment model with a time-dependent k-shortest path algorithm.

SC18 Health Applications I

Contributed Session

Chair: Fatemeh Mariam Zahedi, University of Wisconsin, Sch. of Bus. Admin., PO Box 742, Milwaukee, WI 53201, zahedi@csd.uwm.edu

1) A Markov Process Model for the Economic Analysis of Hepatitis B Immunization, ***Fangjun Zhou***, Ctr. for Disease Control & Prevention, Corporate Square Blvd. NE, 1600 Clifton Rd. NE, Bldg. 12, Atlanta, GA 30333, faz1@cdc.gov, ***Robert Deuson***

A Markov process model was used to determine the incremental effects of the following hepatitis B immunization strategies in a birth cohort receiving immunization services in the public sector: prevention of perinatal HBV infection, routine infant vaccination or routine adolescent vaccination.

2) Deriving an Optimal Staffing Mix in Health Care Applications, ***Eileen Weatherby***, University of Alaska, PO Box 73512, Fairbanks, AK 99707, evwxby@alaska.net, ***Sanjeev K. Bordoloi***

A critical managerial decision in health care organizations is the staffing decision. We use linear/integer programming formulations to derive an optimum mix of different staff categories that minimize total cost subject to constraints imposed by the patient acuity system and minimum staffing policies in a medical unit in Fairbanks, Alaska.

3) Bootstrap Confidence Intervals for Cost-Benefit & Cost-Effectiveness Ratios of Hepatitis B Immunization, ***Robert Deuson***, Ctrs. for Disease Control & Prevention, Corporate Square Blvd. NE, 1600 Clifton Rd. NE, Bldg. 12, Atlanta, GA 30333, rgd3@cdc.gov, ***Fangjun Zhou***

A decision model was used to determine the incremental effects of several hepatitis B immunization strategies. CB and CE ratios are the main statistics used in most economic evaluation studies. We will present a bootstrap procedure for estimating bias-corrected confidence intervals for CB and CE ratios.

4) Optimal Design of Health Information Networks, ***Fatemeh Mariam Zahedi***, University of Wisconsin, Sch. of Bus. Admin., PO Box 742, Milwaukee, WI 53201, zahedi@csd.uwm.edu, ***Oded Berman***, ***Kim Pemble***

We develop a decision model and DSS for the optimal design of health information network. It prioritizes the connection of various types of health providers to the network based on the costs and benefits to the network owners, information providers and users of the system.

SC19 Reliability

Contributed Session

Chair: Jin Wang, Valdosta State University, Dept. of Math & CS, Valdosta, GA 31698-0040, jwang@valdosta.edu http://www.valdosta.edu/~jwang

1) Optimal Testing & Packaging Design for Diagnosis of Digital Systems, ***Adel A. Aly***, Kuwait University, Dept. of MIE, PO Box 5969, Safat, 13060, Kuwait, aaly@kuc01.kuniv.edu.kw, ***Kathleen L. McDonald***

We apply diagnosis of a modularized digital system with a single fault. A cost model encompassing testing costs incurred in packaging the modules into line replaceable units in conjuction with a multilevel remove and repair maintenance concept is developed. The model provides a basis for an algorithm to determine a minimum cost diagnostic procedure.

2) Optimal Control of a Random Inspection Model, ***Jiyeon Lee***, Yeungnam University, Dept. of Stats., 214-1 Daedong, Kyongsan, Kyongbuk, 712-749, South Korea, leejy@ynucc.yeungnam.ac.kr

We consider a deteriorating system inspected according to Poisson process. It is assumed that the system is replaced only if at inspection time, the total number of minimal repairs exceeds a specified number of the consecutive operating time of the system exceeds a specified time. After assigning corresponding costs, we show that there exists a unique inspection rate which minimizes the long-run average cost per unit time.

3) Optimal Allocation of Warranty Parameters Using Fuzzy Analysis, ***Sridevi S. Rao***, Purdue University, 2820 Ashland St., West

Lafayette, IN 47906, raoss@ecn.purdue.edu, ***Marlin U. Thomas***

Though most warranty studies reported have dealt with deterministic models with presumed known information, the major problems arise due to unknown and vague information. This study incorporates fuzzy theory in warranty analysis using imprecise or non-deterministic information regarding product characteristics. A numerical example is provided.

4) withdrawn - author request of 9/14, ***Jin Wang***, Valdosta State University, Dept. of Math & CS, Valdosta, GA 31698-0040, jwang@valdosta.edu http://www.valdosta.edu/~jwang, ***C. X. Feng***, ***Abhijit Deshmukh***

5) withdrawn - author request of 8/3, ***Mainak Mazumdar***, University of Pittsburgh, 1048 Benedum Hall, Pittsburgh, PA 15261, mmazumd@engrng.pitt.edu, ***Jayant Rajgopal***

SC20 Routing Using Tabu Search

Sponsor: Military Applications
Sponsored Session
Chair: Bruce W. Colletti, University of Texas, Grad. Program in OR/IE, PO Box 7022, Austin, TX 78713-7022, bcolletti@compuserve.com

1) Reactive Tabu Search: A Tutorial, ***William B. Carlton***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996, fw5058@exmail.usma.army.mil

The RTS metaheuristic has performed well on many difficult practical problems of combinatorial optimization. We sketch how RTS differs from other heuristic methods and reveal concepts such as aspiration, tabu status, memory and cycle prevention. We discuss how RTS has been used in practice.

2) Multi-Customer/Multi-Vehicle Routing with Time Windows in a Defense Logistics Agency, ***J. Wesley Barnes***, University of Texas, Grad. Prog. in OR & IE, Dept. of Mech. Eng. ETC 5.128, Austin, TX 78712, wbarnes@mail.utexas.edu

The Defense Depot San Diego supports Third PACFLEET and neighbor installations. The transportation network has many customers with peculiar demands and time windows and many trucks whose operating characteristics differ. Operators use software that swiftly finds high-quality routes, via TS, that cannot be quickly found using optimal methods.

3) The C-17 Airlift Loading Model, ***Glenn Bailey***, AFIT/ENS, 2950 P St., Bldg. 640, WPAFB, OH 45433-7765, gbailey@afit.af.mil

A new TS heuristic, implemented in Java, is used to load C-17 aircraft. The approach uses knapsack and packing heuristics which observe the unique constraints of military aircraft cargo loading to include aggregate volume and weight limitations. Real-world applications demonstrate the high-quality solutions obtained.

4) Unmanned Aerial Reconnaissance Vehicle Routing, ***Glenn Bailey***, AFIT/ENS, 2950 P St., Bldg. 640, WPAFB, OH 45433-7765, gbailey@afit.af.mil

We use reactive TS within a discrete event simulation to build routes for UAVs. Using MODSIM III, an object-oriented implementation of this approach uses inheritance to take advantage of a hierarchy of general VRPs. An analysis addresses operational UAV fleet size requirements.

SC21 Modeling Environmental Problems

Contributed Session
Chair: Susan L. King, USDA Forest Service, 5 Radnor Corp. Ctr., Ste. 200, 100 Matsonford Rd., Radnor, PA 19087-4585, sking/ne_fia@fs.fed.us

1) An Optimization Model for Air Pollution Control, ***Ali Elkamel***, University of Kuwait, Chemical Eng. Dept., PO Box 5969, Safat, 13060, Kuwait, elkamel@kuc01.kuniv.edu.kw

An MILP model for the optimal selecton and arrangement of pollution control equipment will be presented. The objective is to regulate total emission control. The model takes into account control costs, efficiencies, emission factors and types and characteristics of control equipment under selection. An industrial case study is considered.

2) Network Algorithms for Water Resources System Management, ***Paola Zuddas***, University of Cagliari, Piazza D'Armi, Cagliari, Sardegna, 09123, Italy, paola@a730.unica.it, ***Giovanni M. Sechi***

Several water resources system problems can be represented by pure network models for which very efficient algorithms are tested. A multiperiod graph structure as a topological support to the model is used. User-friendly input generators and data processors are developed for large-scale real physical systems.

3) Marketable Pollution Permits in Multiproduct, Multipollutant Oligopolistic Markets with Transaction Costs, ***Kathy K. Dhanda***, North Dakota State University, Coll. of Bus. Admin., PO Box 5137, Fargo, ND 58105-5137, dhanda@prairie.nodak.edu, ***Anna B. Nagurney***

We present a variational inequality framework for the modeling, qualitative analysis and computation of equilibrium patterns in multiproduct, multipollutant oligopolistic markets with marketable pollution permits in the presence of tranaction costs. An algorithm is proposed to compute equilibrium patterns and several numerical examples are presented.

4) Achieving Air Quality Standards in the European Union, ***Zeger Degraeve***, Katholieke Universiteit Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, B-3000, Belgium, zeger.degraeve@econ.kuleuven.ac.be, ***Gert Jan Koopman***

Two fundamental characteristics of air quality problems are addressed: variation across regions and interregional linkages resulting from ozone pollution. We propose a column generation approach to answer the question which policies should be introduced where to arrive at a least cost solution for the Union satisfying the emissions reduction constraints.

5) Cluster Optimization for a Honduran Forest Survey, ***Susan L. King***, USDA Forest Service, 5 Radnor Corp. Ctr., Ste. 200, 100 Matsonford Rd., Radnor, PA 19087-4585, sking/ne_fia@fs.fed.us, ***Charles T. Scott***

In a forest survey, a planner selects the attributes of interest, the sample design and the plot or cluster design to simultaneously minimize the cost of the survey and meet precision constraints on the attributes of interest. Mixed integer NLP is used to find the optimal number and the spatial arrangement of the clusters.

SC22 Innovative Uses of OR in the Environmental Arena

Sponsor: ENRE
Sponsored Session
Chair: Jack M. Kloeber, Jr., AFIT, Dept. of OS, 2950 P St. Bldg. 640, WPAFB, OH 45433, jkloeber@afit.af.mil

1) Probabilistic Methodology for Natural Gas Resource Assessment of the Wind River Basin, ***Robert A. Crovelli***, United States Geological Survey, PO Box 25046 MS 939, Denver Federal Ctr., Denver, CO 80225, crovelli@usgs.gov, ***Richard H. Balay***

Analytic probabilistic methodology was developed for natural gas resource assessment using a reservoir engineering model that resulted in a spreadsheet software system. The GRASS was applied to 22 tight-gas plays in the Wind River Basin, Wyoming, for an estimation of in-place natural gas resources.

2) Comprehensive Environmental Response, Compensation & Liability Act-Based Decision Analysis Support to Environmental Decision-Makers, ***Gregory S. Parnell***, Virginia Commonwealth University, 1015 W Main St., PO Box 842014, Richmond, VA 23284-2014, ***Jack M. Kloeber, Jr., Richard Deckro***

The DoE is concerned with clean-up of dense non-aqueous phase liquids, DNAPLs. CERCLA regualtes the cleanup of this hazardous waste. We describe a CERCLA-based DA used to directly support DNAPL remediation alternative decision-making at a DoE site.

3) Quantifying the Technological Uncertainty of DNAPL Cleanup, ***Helene Wilson***, AFIT, Dept. of Op. Sci., 2950 P St. Bldg. 640, WPAFB, OH 45433, ***Jack Jackson, Jack M. Kloeber, Jr., Richard Deckro, Gregory S. Parnell***

A difficult environmental remediation decision is the selection of technologies for cleaning up a DNAPL spill. The volume of spill as well as the performance of innovative technologies are usually uncertain. We address a DA approach that quantifies the uncertainty of the alternatives with respect to CERCLA.

SC23 Analytic Hierarchy Process

Contributed Session
Chair: Marvin D. Troutt, Kent State University, Dept. of Admin. Sci., Kent, OH 44240-0001, mtroutt@bsa3.kent.edu

1) An Application of the AHP to Jet Engine Overhaul Planning, ***Sejong Choi***, Asiana Airline, Gonghang-dong, Kangseo-gu, Seoul, Korea, sjchoi@asiana.co.kr, ***Bumhee Hahm, Moon-Gil Yoon***

Maintenance and overhaul costs of aircraft jet engines account for more than 50% of total maintenance costs in the airline industry. In general, most airlines depute the engine overhaul job to the external contractors having professional skills and specialized equipment. Therefore, each airline is faced with selecting

an appropriate contractor for managing the engine overhaul job.

2) A New Approach to the Analytical Hierarchy Process, ***Jinfeng Yue***, Washington State University, Dept. of Mgmt. & Dec. Sci., Pullman, WA 99163, yuej@wsunix.wsu.edu, ***Bintong Chen***, ***Min-Chiang Wang***

Two modifications are proposed to properly solve the rank reversal problem associated with the traditional AHP. They are referred to as geometric-AHP and pair-wise comparison AHP, respectively. The proposed methods can properly solve the problem for consistent and inconsistent comparison matrices. A combined procedure can handle multi-level AHP problem as well.

3) Strategic Planning & Change Management in Design & Production, ***Matthew P. Tedesco***, NASSCO, 6146 Calle Mariselda # 302, San Diego, CA, mptedesco@aol.com

The "quality movement" of the last decade has resulted in a dramatic increase in both the pace and scope of change in design and manufacturing. A framework and DA model are developed to facilitate the identification and introduction of elective changes linked to strategic objectives. The AHP is used.

4) Preference Functions & Tradeoffs Associated with the Hierarchic Composition Law, ***Marvin D. Troutt***, Kent State University, Dept. of Admin. Sci., Kent, OH 44240-0001, mtroutt@bsa3.kent.edu, ***Suresh K. Tadisina***, ***Parag Pendharkar***

We derive relationships between preference functions and AHP priorities based on the hierarchic composition law and a fixed reference alternative. Rank reversal can thereby be avoided without switching to the ideal mode composition law. In this setting, criterion priorities are interpreted as parameters for a class of ratio preference functions.

5) Information Resource Planning Using Analytic Hierarchy Process, ***Chang W. Lee***, Tongmyong Univ. of Info. Tech., Dept. of Mgmt. & Info., 535 Young Dang, Nam Ku, Pusan, 608-711, South Korea, cwlee@tmic.tit.ac.kr, ***C. Christopher Lee***

Effective information resource planning is complicated because of numerous factors that have to be included in the decision making process. The existence of multiple goals and criteria requires the use of an MCDM approach for a strategic information resource allocation planning. We present an application of an AHP model...

SC24 Implementation Issues in MCDM

Cluster: MCDM
Invited Session
Chair: Sai Kolli, American Airlines, PO Box 619616, MD 3457, SFW Airport, TX 75261-9616, sai_kolli@amrcorp.com

1) Interactive Multiple Objective Optimization Using Spreadsheet Software, ***Sai Kolli***, American Airlines, PO Box 619616, MD 3457, SFW Airport, TX 75261-9616, sai_kolli@amrcorp.com, ***Gerald W. Evans***

We present the implmentation of interactive algorithms for solving multiple objective integer programming problems using the solver in Microsoft EXCEL. Computational results from 2 algorithms will be presented. Advantages and disadvantages of using spreadsheet software for solving these problems will be discussed.

2) Testing the Efficiency of Pairwise Comparison Methods in Discrete Multiple Criteria Problems, ***Markku Kuula***, Helsinki School of Economics, PO Box 1210, Helsinki, 00101, Finland, kuula@hkkk.fi, ***Risto Lahdelma***, ***Pekka Salminen***

We study discrete multiple criteria methods that use pairwise preference information as their input. The goal is usually to identify the best (most preferred) alternative using a minimal amount of comparisons. The methods studied are a modification of Salminen's piecewise PLP method and the convex cone method of Korhonen, Wallenius & Zionts...

3) Efficiency in Multiobjective Combinatorial Optimization Problems, ***Walter Habenicht***, University of Hohenheim, Postfach, Stuttgart, D-70593, Germany, habenich@uni-hohonheim.de

Enumerative concepts for multiobjective combinatorial optimzation problems are presented based on the concept of efficient quad trees.

4) Stochastic Multiobjective Acceptability Analysis for Group Decision Making, ***Pekka Salminen***, University of Jyvaskyla, PO Box 35, Jyvaskyla, 40351, Finland, psalmine@tase.jyu.fi, ***Risto Lahdelma***

SMAA is a multricriteria decision support method for multiple decision makers in discrete problems. In SMAA, the decision makers need not express their preferences explicitly or implicitly. Instead, the method is based on exploring the weight space in order to describe the valuations that will result in a certain rank for an alternative.

SC25 Network Optimization & IP Applications

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: John Vande Vate, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, john.vandevate@isye.gatech.edu

1) Heuristic Algorithms for Cardinality Constrained Portfolio Optimisation, ***J. E. Beasley***, Imperial College, The Management School, London, SW7 2AZ, UK, j.beasley@ic.ac.uk, ***N. Meade***, ***T.-J. Chang***, ***Y. M. Sharaiha***

We consider the standard quadratic portfolio optimisation problem with the additional constraint that the number of assets in the chosen portfolio is limited. We apply TS, SA and a GA. Computational results are presented for a number of test problems.

2) Cruise Missile Mission Planning: A Geometric Algorithm for Automatic Path Generation, ***Jeffery L. Kennington***, SMU, Dept. of Comp. Sci. & Eng., Sch. of Eng. & Applied Sci., Dallas, TX 75275-0122, jlk@seas.smu.edu, ***R. V. Helgason***, ***K. R. Lewis***

We present a solution algorithm for the problem of finding a path composed of line segments from a given missile location to a given target location in the presence of threats. The algorithm is based on geometric concepts and the resulting paths are evaluated qualitatively based on visual displays.

3) Stability Conditions for Queueing Networks via Network Flows, ***John Vande Vate***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, john.vandevate@isye.gatech.edu, ***Jim Dai***, ***John J. Hasenbein***

Dai (1995) proved that under some distributional assumptions, a discrete stochastic queueing network is stable if the corresponding continuous deterministic fluid network is stable. We show how traditional network flows can elucidate the stability of these fluid models. This work complements and extends recent LP approaches of Bertsimas et al.

SC26 Flows, Non-Flow Cuts & Multi-Commodity Cuts

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: Lisa Fleischer, Columbia University, Dept. of IE/OR, 330 Mudd Hall, New York, NY 10027, lisan@ieor.columbia.edu

1) The Multi-Commodity Cut Problem, ***David Hartvigsen***, University of Notre Dame, Coll. of Bus. Admin., PO Box 399, Notre Dame, IN 46556-0399, hartvigsen.l@nd.edu

Gomory & Hu studied the problem of finding all the min cuts in a graph and introduced the notion of a flow tree. Hassin extended this analysis to a multi-commodity cut problem. We further extend this analysis and generalize the notion of flow tree.

2) Min Cuts Without Flows, ***T. C. Hu***, University of California, CSE Dept. 0114, La Jolla, CA 92093, hu@cs.ucsd.edu, ***Paul Tucker***, ***Mantak Shing***

We have been studying non-flow techniques for finding minimum cuts. Results will be presented from the following: new problem formulations; finding all pairwise min cuts using a minimal number of calls to a max-flow oracle and randomized non-flow algorithms for all pairwise min cuts.

3) Optimal Rounding of Fractional, Stationary Dynamic Flows When Flow is Instantaneous, ***Lisa Fleischer***, Columbia University, Dept. of IE/OR, 330 Mudd Hall, New York, NY 10027, lisan@ieor.columbia.edu, ***James Orlin***

A fractional, stationary solution for the minimum cost dynamic transshipment problem with instantaneous flow can be obtained with 1 minimum cost flow computation. We present a simple rounding procedure that produces an optimal integral solution from this fractional solution using little additional computation time.

SC27 Interior-Point Methods for Linear Optimization

Cluster: Linear Programming & Related Topics
Sponsor: Optimization
Sponsored Session

Chair: Tamas Terlaky, Delft University of Technology, ITS/TWI/SSOR, PO Box 5031, Delft, 2600 GA, The Netherlands, t.terlaky@twi.tudelft.nl

1) A Homogeneous Self-Dual Interior Point Cutting Plane Method, ***John Mitchell***, RPI, Dept. of Math. Sci., Troy, NY 12180, mitchj@rpi.edu, ***Kees Roos***, ***Tamas Terlaky***, ***Erling D. Andersen***

We investigate adding cutting planes within the context of the homogeneous self-dual cutting plane algorithm. Restart methods are described and complexity analysis is presented.

2) A Parallel Interior-Point Algorithm for Linear Programming on a Shared Memory Machine, ***Erling D. Andersen***, Technical University of Delft, TWI/SSOR, Mekelweg 4, Delft, 2628 CD, The Netherlands, e.d.andersen@twi.tudelft.nl, ***Knud D. Andersen***

We will discuss how to parallelize an interior-point algorithm for a shared memory computer. In particular, we discuss the parallelization of the Cholesky decomposition. Finally, computational results are presented.

3) Stability of the Central Trajectory of a Semi-Definite Program Under Data Perturbations, ***Manuel Nunez***, Chapman University, School of Bus. & Econ., 333 N. Glassell St., Orange, CA 92866, mnunez@chapman.edu, ***Robert M. Freund***

We present several bounds on the changes of the solutions along the central trajectory of a semi-definite program as the data defining the program is perturbed. These bounds allow us to study the stability of the central trajectory even as the semi-definite program becomes close to being ill-posed.

SC28 Complementarity

Cluster: Complementarity Problems
Sponsor: Optimization
Sponsored Session
Chair: Richard W. Cottle, Stanford University, Dept. of EES&OR, Stanford, CA 94305-4022, cottle@soe.stanford.edu

1) Option Pricing & Linear Complementarity, ***Jacqueline Huang***, JHU, Dept. of Math. Sci., 3400 N. Charles St., Baltimore, MD 21218, jhuang@brutus.mts.jhu.edu

Many complex American option pricing models can be formulated as linear complementarity problems involving partial differential operators. We examine option pricing models whose partial differential complementarity formulations involve 2 or more state variables. We discuss computational methods for finding approximate solutions and present numerical results.

2) New Algorithms for the Solution of Mixed Complementarity Problems, ***Heiko Pieper***, Stanford University, Dept. of EES/OR, Terman Eng. Ctr., Stanford, CA 94305-4023, pieper@stanford.edu

Some recent proposals to solve the MCP use NCP-functions to reformulate the problem and apply Newton type methods to it. We will investigate different combinations of reformulations and NCP-functions in their numerical and theoretical behavior. Time permitting, we will also consider some extensions.

3) withdrawn - chair request of 9/23, ***Florian A. Potra***, University of Iowa, Dept. of Math., Iowa City, IA 52242, potra@math.uiowa.edu

4) Error Bounds for Perturbation of Complementarity Problems, ***Paul Tseng***, University of Washington, Dept. of Math., Box 354350, Seattle, WA 98195-3200, tseng@math.washington.edu

It is sometimes of interest to perturb the function in a complementarity problem by adding to it another function multiplied by a small positive parameter. We study bounds on the distance from the solution of the perturbed problem to the solution set of the original problem.

SC29 Application of AI Techniques

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Murali Shanker, Kent State University, College of Bus., Dept. of ADMS, Kent, OH 44242, mshanker@bsa3.kent.edu

1) Agent Facilitated Collaboration, ***Douglas Kline***, Sam Houston State University, Dept. of Mgmt. & Mktg., PO Box 2056, Huntsville, TX 77341-2056, douglaskline@acm.org

For collaborators to effectively communicate, they must develop a common knowledge base that provides a context for communication and a basis for decision making. We assume text-based information and incorporate techniques from the field of information science to create an architecture for agent facilitated collaboration.

2) withdrawn - chair request of 9/23, ***Rema Padman***, Carnegie Mellon University, The Heinz Sch., Pittsburgh, PA 15213, rpadman+@andrew.cmu.edu, ***Gregory Cooper***

3) Remote Cytological Cancer Diagnosis, ***Nick Street***, University of Iowa, MS Dept., 5232 Pappajohn Bldg., Iowa City, IA 52242, nick-street@uiowa.edu, ***S. K. R. Mallina***

The Xcyt breast cancer diagnosis software has been highly successful in 4 years of clinical use at the University of Wisconsin Hospital. We report on the technical issues involved in porting the system to Java for remote use via the WWW and on improvements made possible by this expanded use.

4) Diagnosis & Prediction of Breast Cancer Using Neural Networks, ***Ming S. Hung***, Kent State University, Coll. of Bus., Kent, OH 44242, mhung@scorpio.kent.edu, ***Michael Hu***, ***Murali Shanker***

We discuss the application of neural networks to estimate the posterior probability of malignancy in the diagnosis and prediction of breast cancer. Reliability estimates of our prediction are presented and comparisons are made to other techniques.

SC30 Optimization Techniques II

Contributed Session
Chair: Pirooz Vakili, Boston University, 15 St. Mary's St., Boston, MA 02215, vakili@bu.edu

1) An Algorithm to Optimize Weights for the Second Degree Stochastic Dominance, ***Choonho Ryu***, Hong-ik University, 72-1 Sangsu-dong Mapo-gu, Seoul, 121-791, Korea, ryuch@wow.hongik.ac.kr

Unlike the mean-variance approach, the stochastic dominance approach is to form a portfolio that second-order stochastically dominates a predetermined benchmark portfolio, e.g., KOSPI. Analytically defining first derivatives, an optimal algorithm was developed to search a set of optimal weights systematically and tested with promising results against Korean and US stock market data sets.

2) Constrained Ordinal Optimization, ***Loo Hay Lee***, National University of Singapore, ISE Dept., Kent Ridge, Singapore, 119260, Republic of Singapore, iseleelh@nus.edu.sg http://www.eng.nus.sg/ise/leelh.html, ***David Weigang Li***

Ordinal optimization was used to solve for a lot of real world design problems. However, the problem is only limited to the unconstrained single objective problem. We aim at developing a new framework and quantification method to deal with the vector and constrained problem. We call our new framework constraint ordinal optimization.

3) Application of Simulated Annealing to System Workload Modeling, ***Marc S. Brittan***, The Boeing Company, 4217 NE 103 Place, Seattle, WA 98125, marc@math.net http://www.Math.net/workload-modeling.html, ***Brahmaiah S. Jarugumilli***

To assess scalability and performance, a large Oracle system is tested in a laboratory environment. A small set of test jobs is chosen to match weighted system and Oracle performance parameters, i.e., CPU, Disk, etc. The NP-hard matching problem is solved by SA with a quadratic programming bootstrap.

4) Optimization of a Coupled Model for the Short-Term Hydro-Thermal Coordination Problem thru Augmented Lagrangian Relaxation Techniques, ***F. Javier Heredia***, Universitat Politecnica de Catalunya, Fac. de Math. & Stats., Pau Gargallo 5, Barcelona, 08028, Spain, heredia@eio.upc.es

The coupled model for the short-term hydro-termal coordination problem enables the optimization of the whole energy generation system of the electric utilities, that is, the hydro and thermal generators and the transmission network. When the on/off state of the termal generators must be optimized, a large-scale nonlinear mixed optimization problem arises...

5) A Non-Myopic Utility Function for Statistical Global Optimization Algorithms, ***Pirooz Vakili***, Boston University, 15 St. Mary's St., Boston, MA 02215, vakili@bu.edu, ***Simon Streltsov***

We consider goal optimization algorithms that rely on a statistical model of the objective function. The search for the optimum is guided by a utility function that reflects the benefit of evaluating the function at each point. We propose a new utility function that is provably optimal in a non-adaptive context (where the model of the function remains unchanged)...

SC31 Technological Forecasting

Tutorial Session

Chair: Dundar F. Kocaoglu, Portland State University, Eng. Mgmt. Program, Portland, OR 97207-0751, kocaoglu@emp.pdx.edu

1) Tutorial: Technological Forecasting, *Harold A. Linstone*, Portland State University, Systems Sci. Program, PO Box 751, Portland, OR 97207, hwhl@odin.cc.pdx.edu

The survey of the forecasting tools will include trend extrapolation, growth curves, cycles, invariance, technological substitution, precursors, technological progress functions, Delphi, needs analysis, relevance trees and scenarios. The problem of bias and other sources of error will be examined...

SC32 Software Demonstrations

Chair: Philip J. Murphy, InfoHarvest, Inc., 815 Industry Dr., Seattle, WA 98188, philipmurphy@infoharvest.com

1) Software Demonstration: Take No Prisoners Spreadsheet Power, *Ben Bouillion*, Decisioneering Inc., 1515 Arapahoe St., Ste. 1330, Denver, CO 80202, bbouillion@decisioneering.com

Companies today use traditional spreadsheet modeling to make critical financial decisions. Usually, their models include assumptions about potential outcomes that they represent as discrete numbers, e.g., forecasting sales, product demand, failure rates, etc. However, they usually lack the ability to go beyond oversimplified "what if" analysis...

2) Software Demonstration: Criterium DecisionPlus 3.0 & Tradeoffs in MCDA, *Philip J. Murphy*, InfoHarvest, Inc., 815 Industry Dr., Seattle, WA 98188, philipmurphy@infoharvest.com

InfoHarvest is proud to announce the release of the new 32-bit version of its flagship decision analysis product, Criterium DecisionPlus 3.0. This new release features direct tradeoffs of lowest criteria, scatterplots and contour graphs as well as extensive control of the program environment...

SC33 Airline Revenue Management: Optimization Issues

Sponsor: Aviation Applications
Sponsored Session

Chair: John D. Quillinan, United Airlines, Inc., World Headquarters-WHQKB, PO Box 66100, Chicago, IL 60666-0100, john.d.quillinan@ual.com

1) Using Origin-Destination Booking Data to Bridge the Gap Between Revenue Management & Scheduling, *Judy Pastor*, Continental Airlines, Inc., 2929 Allen Parkway, Houston, TX 77019, jpasto@coair.com, ***Julie Xie***

A flight schedule involves 2 competing objectives: to maximize connection opportunities and to minimize airport congestion. Revenue management is primarily concerned with the former and scheduling/operations with the latter. An LP with O&D booking data is used to determine which connections are valuable or not.

2) Combining Pricing & Inventory Control Strategies in Revenue Management, *Ahmet H. Kuyumcu*, DFI/Aeronomics Inc., Waterstone, Ste. 300, 4751 Best Rd., Atlanta, GA 30337-5609, akuyumcu@atl.dfi-aeronomics.com

Revenue management is the use of pricing and inventory control strategies to balance supply and demand to maximize revenue. We propose general optimization models that combine pricing and inventory control strategies and show that for each problem we solve, there is an equivalent inventory control problem.

3) Opportunity Costs & Their Role in the Seat Allocation Process, *Mukundagiri Jagannath*, United Airlines, Inc., World Headquarters - WHQKB, PO Box 66100, Chicago, IL 60666-0100, mkundaragiri.jgannath@ual.com, ***John D. Quillinan***

In order to achieve the optimum seat allocation, the risk of aggressive overbooking has to be balanced against the risk of being too conservative. While denied boarding costs are relatively easy to compute, the derivation of the opportunity cost of an empty seat is not straightforward. At United, we adopted a new policy for computing the opportunity or seat-light cost.

SC34 Simulation II

Contributed Session

Chair: Paul Savory, University of Nebraska, 175 Nebraska Hall, Lincoln, NE 68588-0518, psavory@unl.edu www.engr.unl.edu/savory/

1) Using Simulation for Finding Optimal Hedging Points of Production Controllers, *Gul Gurkan*, Tilburg University, Ctr. for Economic Res., PO Box 90153, Tilburg, 5000 LE, The Netherlands, ggurkan@kub.nl, ***Fikri Karaesmen***

We model the dynamics of a fluid production controller using generalized semi-Markov processes and compute sensitivity estimates of cost functions, consisting of inventory and backlog costs, with respect to hedging points. We then discuss how they are used together with sample-path optimization for finding optimal hedging points.

2) Optimal Kanban Allocation in JIT Production Systems Using Neural Networks, *Mehmet Savsar*, Kuwait University, PO Box 5969, MIE Dept., Safat, 13060, Kuwait, mehmet@kuc01@kuniv.edu.kw, ***Hisham M. Choueiki***

Simulation has been used to evaluate kanban allocations in JIT systems. However, it is not practical to do an exhaustive search by simulation since the number of possibilities is very large. We train a neural network by simulation results and utilize it to determine the optimum kanban allocation among all possibilities.

3) Quantile Estimation in Steady-State Simulation Using Bonferroni & Bootstrap Methods, *Yoon G. Hong*, Hansung University, Dept. IE, 39 2-Ka Samsun-Dong, Sungbuk-Ku, Seoul, 136-792, Korea, yhong@hsel.hansung.ac.kr, ***Se Y. Kim, Seong I. Kim***

Both bootstrap and Bonferroni simultaneous approach are combined to estimate the quantile in steady-state simulation. Simple queueing system and time series models are employed to see the model's fidelity. Comparisons are made and results show that the narrower interval is obtained with an acceptable confidence level.

4) Using Prediction Intervals for Assessing the Operational Validity of Simulation Models, *Lotfi K. Gaafar*, Kuwait University, PO Box 5969, Kuwait, Safat, 13060, Kuwait, gaafar@kuc01.kuniv.edu.kw kuc01.kuniv.edu.kw/~gaafar

We present a methodology for maintaining the operational validity of simulation models of observable systems in order to support operational decisions. Real-time system data are continuously compared with simultaneous prediction intervals on selected responses constructed using the simulaton model. The methodology is illustrated using a case example of a simulation model of an FMS...

SC35 Business Process Reengineering

Contributed Session

Chair: Mohsen M. Fathee, Boeing Company, 8127 149th Place NE C213, Redmond, WA 98052, mohsen.fathee@boeing.com

1) Knowledge Management & Distribution, *Alan K. Adelgren*, WASTREN-Grand Junction, PO Box 4418, Grand Junction, CO 81506, al.adelgren@doegjpo.com, ***Dennis G. Sheats***

A 3-company team established a common process knowledge repository for a federal facility using disparate value engineering and business process reengineering techniques. The intent was to facilitate strategic planning while reducing costs (11% total budget). The repository was created using a CASE tool, then deployed via the site's intranet.

2) Linking Incentives & Deregulation: The Case of Denmark, *Christian Haxholdt*, Copenhagen Business School, Dept. Math. Modeling & Stats., Julius Thomsens Plads 10, Fredriksberg, 1925, Denmark, stch@statws2.cbs.dk, ***Jeanette Bodi, Erik R. Larsen***

The energy framework in Europe will, because of deregulation in the European Union, come under pressure for dramatic changes. Using a system dynamics model, we explore the consequences of the current non-profit requirement for Danish electricity companies in this future deregulated and competitive market.

3) EFT '99: Your Federal Check is NOT in the Mail, *Roger H. Bezdek*, US Dept. of the Treasury, 1500 Pennsylvania Ave. NW, Washington, DC 20220, roger.bezdek@treas.sprint.com

Legislation (EFT '99) mandates that, beginning in 1999, Federal payments be made electronically - the government will no longer issue paper checks. Of special concern are the 10 million Federal benefit recipients who cannot receive payments electronically. We describe Treasury's plans for EFT '99, identify the challenges involved and suggest required research.

4) Reengineering Complex Business Processes: Values & Limitations of Simulation Technology, *Mohsen M. Fathee*, Boeing Company, 8127 149th Place NE C213, Redmond, WA 98052, mohsen.fathee@boeing.com

Historically, simulation technology has been employed to solve complex problems that were costly for experimentation. We argue that complexity and random changes within hierarchical processes create dynamic systems that have a tendency not to reach equilibrium. Hence, simulation technology seems to have less vlaue in reengineering complex and dynamic processes.

SC36 Scheduling II

Contributed Session

Chair: Zhen Liu, INRIA, 2004 Route des Lucioles, BP 93, Sophia Antipolis, 06902, France, liu@sophia.inria.fr http://www.inria.fr/mistral/personnel/zhen.liu/

1) Job Shop Sequencing: A Quantified Decision Domain, ***Amr Abu-Suleiman***, Oklahoma State University, Ctr. for CIM, Sch. of IE&M, 322 Engineering N, Stillwater, OK 74078, abuas@okstate.edu, ***David B. Pratt***

A modification of the critical ratio rule is introduced. The modified critical ratio rule allows changing the weight of the information considered when the sequencing decisions are made. Simulation results show that this approach performs better than traditional sequencing rules in a majority of the conducted experiments.

2) Disseminating Machine Scheduling Knowledge via Expert System, ***Renato V. Belhot***, University of Sao Paulo, Av. Dr. Carlos Botelho 1465, Sao Carlos, SP, 13560-250, Brazil, rvbelhot@prod.eesc.sc.usp.br http://athenas.prod.eesc.sc.usp.br/, ***Joao V. Moccellin***

We discuss the use of computers an an effective tool for the tranference of specialized knowledge, particularly via expert systems. As an illunstration, we introduce an expert system prototype concerning production scheduling. Details of the knowledge base are presented for minimum makespan parallel machine problems.

3) Analysis & Design of an Object-Oriented Real Time Scheduling System, ***Semih Oguz***, Bogazici University, Endustri Muhendisligi Bolumu, Istanbul, Bebek, 80815, Turkey, oguzsemi@boun.edu.tr, ***Ali Tamer Unal***

We analyzed and designed an object-oriented real time scheduling system. The system architectrure, messaging mechanism between system objects and basic scheduling algorithms are defined and implemented on different scenarios.

4) A Local Search Algorithm for Minimizing Total Weighted Tardiness in a Job Shop, ***Stephan Kreipl***, University of Passau, Dept. of Productions/Op. Mgmt., Dr.-Hans-Kapfinger-Str.30, Passau, 94032, Germany, stephan.kreipl@uni-passau.de

We describe and analyze a large step random walk to solve the job shop problem with total weighted tardiness as an objective function. We use slightly different neighborhoods depending if the algorithm performs a large step or a small step. The small step consists of iterative improvement while the large step consists of a metropolis algorithm.

5) Robot Scheduling Problems for Web Search Engines, ***Zhen Liu***, INRIA, 2004 Route des Lucioles, BP 93, Sophia Antipolis, 06902, France, liu@sophia.inria.fr http://www.inria.fr/mistral/personnel/zhen.liu/, ***Edward G. Coffman***, ***Richard Weber***

We discuss scheduling problems confronting designers of Web search engines with robots, i.e., more colorfully called crawlers, spiders, etc., being used to fetch Web pages. We present solutions showing how robots should schedule their visits to Web pages in order to maximize the currency of the search-engine database.

SC37 Telecommunications II

Contributed Session

Chair: Yupo Chan, AFIT, 2950 P St., WPAFB, OH 45433, ychan@afit.af.mil

1) Solving the Multiple Facility Network Restoration Problem, ***Yi Wang***, MIT, 45 Concord Ave., Apt. 33, Somerville, MA 02143, yiwang@mit.edu http://web.mit.edu/yiwang/www, ***Thomas L. Magnanti***

We present a MIP formulation for equipping a telecommunication network with sufficient space capacity, using multiple facilities, to reroute traffic if any single link fails. We identify valid inequalities and report on computational experience using a cutting plane algorithm on realistic networks with up to 40 nodes.

2) Minimizing ADM Costs in a Network of Multiple SONET Rings, ***Eli V. Olinick***, University of California, Dept. of IEOR, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, olinick@ieor.berkeley.edu http://www.ieor.berkeley.edu/~olinick, ***Olivier Goldschmidt***, ***Dorit S. Hochbaum***

Given pairwise bandwidth demands, we wish to connect customer sites in a network of unidirectional SONET rings. Sites may be assigned to multiple rings; however, traffic between 2 sites cannot be split between rings. The objective is to minimize the cost of ADMs required for each site on each ring.

3) A Proactive Approach to Failure Recovery in Survivable Networks, ***Gheorghe M. Spiride***, SMU, PO Box 01222, Dallas, TX 75275-0122, gspiride@seas.smu.edu http://www.seas.smu.edu/~gspiride, ***V. S. Nair***

We describe a new approach to perform link and/or path restoration in survivable broadband networks, SONET or WDM, that exhibit a general mesh topology. We present numerical results for design and restoration times in such networks.

4) Multicriteria Stochastic-Network Optimization: Improving Reliability vs. Throughput, ***Yupo Chan***, AFIT, 2950 P St., WPAFB, OH 45433, ychan@afit.af.mil, ***Leonard J. Jansen***, ***William L. Gaught***

We measure the reliability of large stochastic networks. Given that a practical reliability-expression does not exist, an approximate reliability-improvement model is developed. Then, we tradeoff maximizing expected-flow and reliability. Extensive computational experiences are validated against Monte Carlo simulation.

SC38 Inventory Models II

Contributed Session

Chair: Emre Berk, Bilkent University, Fac. of Mgmt., Bilkent, Ankara, 06533, Turkey, eberk@bilkent.edu.tr

1) Inventory Models with Transshipment & Local Decision Making, ***Nils Rudi***, University of Pennsylvania, SH-DH 1300, 3620 Locust Walk, Philadelphia, PA 19104-6366, rudi24@opim.wharton.upenn.edu, ***Sandeep Kapur***

Inventory models with transshipment have been widely studied in the case of centralized decision making. In real world settings, however, the quantity and transshipment decisions are often made locally. We model and analyze this setting and compare it to the case of centralized decision making.

2) Cost Effect of Consolidating Several One-Warehouse Multi-Retailer Systems, ***Jihong Ou***, National University of Singapore, 10 Kent Ridge Crescent, Singapore, 119260, Singapore, fbaoujh@nus.edu.sg, ***Wei-Shi Lim***, ***Chung Piaw Teo***

We examine the cost effect of consolidating several one-warehouse multi-retailer inventory systems. We prove that separate systems can be consolidated into a single one-warehouse system for which a control policy can be found with a cost within 14.75% of the optimum under the original separate systems. Numerical examples show that in most cases, a consolidated single one-warehouse system can achieve a cost within 2% of the optimum of separate systems.

3) Multi-Echelon Inventory Allocation in Semiconductor Manufacturing, ***Markus Ettl***, IBM Corporation, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, msettl@us.ibm.com, ***Grace Lin***

We study a multi-echelon inventory allocation problem with budget and serviceability constraints. A 2-phase nonlinear optimization method is developed. The solution methodology and a case study of a semiconductor manufacturing company are presented.

4) Warehouse Delay Costs in Decentralized Multi-Echelon Inventory Control, ***Sven B. Axsater***, Lund University, Dept. of IE, PO Box 118, Lund, S221 00, Sweden, sven.axsater@ie.lth.se http://server1.ie.lth.se/IE/Sven/

A 2-level distribution inventory system with a central warehouse and a number of retailers is considered. We wish to decentralize the control so that each installation can minimize its own costs. We discuss cost structures where the warehouse pays a penalty cost for late deliveries to the retailers.

5) Pure Pull & Push Policies for Two-Echelon Inventory Systems, ***Emre Berk***, Bilkent University, Fac. of Mgmt., Bilkent, Ankara, 06533, Turkey, eberk@bilkent.edu.tr

We consider pure pull (S-1, S) and pure push control policies for a 2-echelon inventory system facing Poisson demand. The proposed pure push policy is a time-based single parameter policy. We develop expressions for the operating characteristics of the systems and present numerical comparisons of the policy classes.

SC39 Production Scheduling II

Contributed Session

Chair: Marcos J. Singer, University Catolica de Chile, Escuela de Admin., Vicuna Mackenna 4860, Santiago, Chile, singer@volcan.facea.puc.cl

1) A Lagrangian Approach for Periodic Order Release & Priority Scheduling in Dynamic Job Shops, ***Jay Sankaran***, University of Auckland, MSIS Dept., Private Bag 92019, Auckland, New Zealand, j.sankaran@auckland.ac.nz, ***Ganesh R. Balu***

In the context of dynamic job shops, we consider the problem of periodically

selecting a subset of orders from the backlog pool for release to the shop-floor. We develop a procedure, based on Lagrangian relaxation, for both order release and priority scheduling. Results from a simulation study are encouraging.

2) Variable Redefinition Techniques Applied to a Stochastic Production Planning Problem, ***Victor M. Albornoz***, Universidad de los Andes, Ingenieria Civil, San Carlos de Apoquindo 2200, Santiago, Chile, valborno@ing.puc.cl, ***Jose I. Arrate***

Many real world production planning problems assume that all the problem parameters are known with complete certainty. This assumption is not realistic, especially if these problems include future demands. We propose and solve a stochastic optimization model for a lot-sizing problem with setup cost under uncertain demands. We use variable redefinition techniques to solve the problem...

3) A Finite Capacity Approach to Production Management, ***Ahmet Dogramaci***, Bogazici University, Talatpasa cad No. 20/5, Gultepe, Istanbul, 80640, Turkey, dogramaa@boun.edu.tr, ***Ali Tamer Unal***

A finite capacity approach that will replace the MRP logic in current production management systems will be proposed. The suggested approach will utilize information at the level of detail it has produced, schedule production on the basis of resources and resource groups and derive material requirements and capacity plans.

4) Analysis of a Just-in-Time Production System with Temporary Line Stoppages, ***Kenichi Nakashima***, MIT, Rm. 35-438, 77 Massachusetts Ave., Cambridge, MA 02139, nakasima@cell2.mit.edu

We consider a JIT production system in which there are line stoppages for machine maintenance. Demand is stochastic and there are 2 kinds of kanbans, production-ordering and supplier kanbans. We discuss the robustness of this control policy.

5) Minimizing Expected Weighted Tardiness in Stochastic Job Shops with Proximity, ***Marcos J. Singer***, University Catolica de Chile, Escuela de Admin., Vicuna Mackenna 4860, Santiago, Chile, singer@volcan.facea.puc.cl, ***Alan Scheller-Wolf***

We seek to minimize expected total weighted tardiness in a stochastic job where uncertainty decreases with job proximity. Feasible schedules are generated using forecast policies, which select likely values for processing times. Another technique decomposes the problem into time windows, for which different policies are applied depending on the uncertainty.

Sunday 14:45-16:15

SD01 Outside-In: Insights from the Past Lives of DA Practitioners

Sponsor: Decision Analysis
Sponsored Session
Chair: Jeff Keisler, Strategic Decision Group, Two International Place, 20th Fl., Boston, MA 02110-4101, jkeisler@sdg.com

1) Insights for DA from Biological System Modeling, ***B. Girish***, Strategic Decisions Group, 2440 Sand Hill Rd., Menlo Park, CA 94025-6900, bgirish@sdg.com

Modeling biological phenomena often involves systems with multiple interacting elements, e.g., retina. Depending on existing knowledge about the individual elements and goals of the modeling effort, we build either a black-box input-output model or a more detailed gray-box model. Using canonical DA problems, we illustrate the utility of these concepts.

2) What the Great Philosophers Would Say About Decision Analysis, ***Elizabeth Ewing***

We address DA in the context of major philosophical frameworks and how things might be done differently if they were applied within DA.

3) An Ex-Physicist's Perspective on Modeling Challenges in Decision Analysis, ***William Leaf-Herrmann***, Strategic Decisions Group, Two International Pl., 20th Fl., Boston, MA 02110-4101, wleaf@sdg.com

In physics, key insights have resulted from the conceptual bridge between phenomena of different scales. The interface between astrophysics and particle physics is a good example. We focus on what insights in DA may emerge as models extend to more complex systems, e.g., dynamic systems, large portfolios, intelligent decision systems, etc.

4) Games & Decisions: Themes for Decision Analysis from the Game of Chess, ***Jeff Keisler***, Strategic Decision Group, Two International Place, 20th Fl., Boston, MA 02110-4101, jkeisler@sdg.com

Chess is a big decision tree. To evaluate points on intermediate branches, players use qualititative concepts which must map somehow to the ultimate value measure - win, lose or draw. Examples include initiative, piece values and classifying different phases of the game. We focus on ways DA uses similar concepts.

SD02 Intelligent Group Decision & Negotiation Support

Sponsor: Group Decision & Negotiation
Sponsored Session
Chair: Alexander Bordetsky, California State University, Sch. of Bus. & Econ., Hayward, CA 94542, bord@csuhayward.edu

1) A Software Agent for Multiple Business Negotiations, ***Gregory Kersten***, Carleton University, DAS Project, IIASA A-2361, Laxenburg, Austria, kersten@iiasa.ac.at, ***S. Szpakowicz***

This negotiation agent that prepares and posts offers, makes requests for proposals and counter-offers, analyzes offers and presents counter-offers on behalf of the user has been developed in Negoplan, a Prolog-based negotiation simulation environment. The agent is viewed as negotiator's advisor that interacts with others (humans and software agents) on the Web...

2) Web-Based Agents-Facilitators for Distributed Group Decision Support, ***Alexander Bordetsky***, California State University, Sch. of Bus. & Econ., Hayward, CA 94542, bord@csuhayward.edu

The approach is based on the learning model of case-based reasoning memory for capturing group decision making experience and providing feedback via collaborative work and agents-facilitators. The agents support management of multipoint multimedia conferences and access to case memory. The memory enables integration decision support model with individual communication preferences.

3) Effects of Synergy on Workgroups, ***D. Wierschem***, University of Texas, Sch. of Mgmt. MS JO 43, PO Box 830688, Richardson, TX 75083-0688, ***Joakim Kalvenes***, ***Raymond Patterson***

A problem formulation for analyzing the collaborative effects of group interaction on resource allocation is presented. The model has applications in computer and data communication network investment evaluation and business process reengineering.

SD03 Implementing the Global Classroom: Science & Technology Commercialization

Sponsor: Education
Tutorial Session
Chair: Pedro Conceicao, Instituto Superior Tecnico, Av. Rovisco Pais N. 1, Lisboa Codex, 1096, Portugal

1) Tutorial: Implementing the Global Classroom - Science & Technology Commercialization, ***David V. Gibson***, University of Texas, IC2 Inst., 2815 San Gabriel Ave., Austin, TX 78705, davidg@icc.utexas.edu, ***Chris Stiles***, ***Manuel V. Heitor***

Since January 1996, the IC2 Institute of the University of Texas - Austin has used 2-way video to offer an innivative 1-year MS degree program in Science & Technology Commercialization taught simultaneously in Austin and the Washington, DC area. In January 1998, IC2 partnered with IST to offer this progran in Lisbon, Portugal and in 1999, the objective is to bring the program to Moscow...

SD04 Symbolic Modeling Languages for Developing & Operating Math Programming Models

Sponsor: INFORMS Computing Society
Sponsored Session
Chair: Sanjay Saigal, ILOG Inc., 1005 Terminal Way, Ste. 100, Reno, NV 89502, sanjay_saigal@modeling.com

1) Symbolic Modeling Languages for Developing & Operating Math Programming Models, ***Robert Fourer***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.nwu.edu, ***David S. Hirshfeld***, ***Frederic H. Murphy***, ***Sanjay Saigal***

We review the history of symbolic optimization and describe the capabilities of modeling languages. We describe and via examples, explicitly compare products utilizing 2 common computational metaphors: AMPL (algebraic) and MathPro (matrix schematic). We discuss how modeling languages improve application development efficiency, maintenance, documentation and hardware portability.

SD05 Research Strategies in Operations Management II

Sponsor: MSOM
Sponsored Session
Chair: William S. Lovejoy, University of Michigan, Michigan Bus. Sch., Ann Arbor, MI 48109, wlovejoy@umich.edu

1) Research Strategies in Operations Management II, ***Matthew J. Sobel***, NYU, Stern School Ste. 7-01A, 40 West 4th St., New York, NY 10012-1118, msobel@stern.nyu.edu, ***Eitan Zemel***, ***Haim Mendelson***, ***William S. Lovejoy***, ***David Upton***

This is the second of 2 sessions in which each speaker will discuss the thinking at their institution about the directions that operations management research should take. Each presenter will discuss a research strategy or direction and present some examples of papers or programs to demonstrate the agenda. Time will be left for discussion after each presentation.

SD06 Globalization: Operations & Decision Modeling, and Education

Cluster: Globalization: Operations & Decision Modeling, and Education
Invited Session
Chair: Kenneth R. Chelst, Wayne State University, Dept. of IME, Detroit, MI 48202, chelst@mie.eng.wayne.edu

1) Team Dynamics in Automotive Product Development: A Case Comparing a US & Japanese OEM, ***Donald R. Falkenburg***, Wayne State University, Dept. of IME, Detroit, MI 48202, ***Marietta Baba***

We model team dynamics within the PD organization. The model, developed to understand factors that critically affect quality outcomes in PD process, considers the social structure of work, technology-enablers and business culture. Data will be presented to compare and contrast team dynamics within a US automotive firm and a Japanese OEM.

2) Global Manufacturing Operations Planning: Strategies for Global Manufacturing Performance Enhancement, ***O. Mejabi***, Wayne State University, Dept. of IME, Detroit, MI 48202

Global competition continues to force companies to change their planning assumptions and operating practices. The global manufacturing problem is defined in 2 phases: global production facilities planning involves the definition of locations, capacities and capabilities to meet production requirements. Global production planning occurs in real-time...

3) Modularity & Global Product Design, ***Musta Sefik***, Wayne State University, Dept. of IME, Detroit, MI 48202, ***Rajesh Jugulum***, ***Kenneth R. Chelst***

The literature on global supply chain management is rich with models but few papers explicitly incorporate product design. Modularity presents an opportunity for efficient use of global design resources and global supply chain management. We explore the potential of this concept even in a hierarchical global supply chain with multiple suppliers.

4) Global-Global Education, ***Kenneth R. Chelst***, Wayne State University, Dept. of IME, Detroit, MI 48202, chelst@mie.eng.wayne.edu

We review trends in reaching around the globe to provide higher education to far-flung students. We describe the beginnings of a unique university partnership that is designed to educate students about globalization. Students will work on multi-cultural team projects addressing an aspect of globalization while based around the globe.

SD07 Lean Supply Chain Management

Tutorial Session
Chair: William T. Flannery, University of Texas, Mgmt. of Tech. Program, 6900 N Loop 1604 W, San Antonio, TX 78249-0634, wflannery@utsa.edu

1) Tutorial: Lean Supply Chain Management, ***Jeffrey K. Liker***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, liker@engin.umich.edu, ***J. Dann Engels***

Creating a total value chain that emphasizes flexibility, efficiency and order to delivery is a major challenge facing US manufacturing today. One proven system that is being adopted broadly throughout auto and other industries is lean manufacturing, exemplified in the Toyota Production System, TPS...

SD08 Yield Management

Sponsor: Applied Probability Section
Sponsored Session
Chair: Dimitris Bertsimas, MIT, Sloan Sch. of Mgmt., Rm. E53-359, Cambridge, MA 02139, dbertsim@aris.mit.edu

1) Overbooking with Substitutable Inventory Classes, ***Itir Karesman***, Columbia University, 412 Uris Hall, Grad. Sch. of Bus., New York, NY 10027, gjv1@columbia.edu, ***Garrett J. van Ryzin***

In many yield management settings, a firm sells multiple classes of inventory and has the option of substituting one class of inventory for another when inventory is oversold, e.g., car rentals and hotels. We find structural properties of optimal joint overbooking levels and propose an efficient computational algorithm. Numerical results are presented.

2) Revenue Management & the Internet, ***Ioannis Paschalidis***, Boston University, 15 St. Mary's St., Boston, MA 02215, yannisp@bu.edu, ***John N. Tsitsiklis***

We model the operation of an Internet Service Provider, ISP, that can support a variety of network services. The ISP sets prices in a way that maximizes its long-term average revenue. We explore several pricing schemes, discuss their optimality properties and compare them with the current industry practice.

3) Revenue Management in a Dynamic Network Environment, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., Rm. E53-359, Cambridge, MA 02139, dbertsim@aris.mit.edu, ***Gina Mourtzinou***

We present an approach for revenue optimization in a dynamic network environment modeling the operations of an airline or a hotel. We solve large scale realistic-sized problems and report computational results that show improvements in the range of 1-4% over traditional approaches of virtual nesting and bid prices.

SD10 Boolean Models in Artificial Intelligence

Sponsor: College on AI
Sponsored Session
Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) Discrete Analysis of Data, ***Jan C. Bioch***, Erasmus University Rotterdam, Dept. of Comp. Sci., FEW H4-27, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, bioch@few.eur.nl

Recent methodologies in data mining and knowledge discovery such as the LAD and association rules search for structural information in binary datasets. We extend LAD and the theory of association rules by using discrete functions rather than Boolean or binary functions.

2) On the Characteristic Models of Boolean Functions, ***Dan Roth***, University of Illinois, Dept. of Comp. Sci., 1304 W Springfield Ave., Urbana, IL 61801

Characteristic models of a Boolean function are the extreme models of the function with respect to various order relations. This notion has been shown to be useful in knowledge representation and reasoning, learning theory, database theory and data mining. We present results on using characteristic models in representing Boolean functions and in data mining.

3) On the Optimal Condensation of Horn Theories, ***Alexander Kogan***, Rutgers University, Fac. of Mgmt., 180 University Ave., Newark, NJ 07102, kogan@rutcor.rutgers.edu, ***Toshihide Ibaraki***, ***Kazuhisa Makino***

We consider the problem of condensing a Horn theory by eliminating those variables whose values are determined by the values of other variables. In contrast with the case of general Boolean theories, any Horn theory has a unique condensation and a Horn theory can be totally condensed using a very limited number of functional dependencies.

SD11 Current Topics in Product Development Research

Sponsor: Technology Management
Sponsored Session
Chair: Viswanthan Krishnan, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu

1) Reducing Market Risk Through Visual Depiction of New Product Concepts, ***Ely Dahan***, Stanford Bus. Sch., Stanford, CA 94305, ***V. Seenu Srinivasan***

What information is needed to forecast new product success? We measure the quality of predictions about new product success using various visual depictions of the product in person and over the Internet. As high-quality visual depiction becomes more economical, firms may reduce risks by testing multiple, virtual prototypes.

2) Defining a Product Series for Market Success, ***Shantanu Bhattacharya***, University of Texas, CBA 4.202, Dept. of Mgmt.,

Austin, TX 78712, shantanu@mail.utexas.edu, ***Viswanthan Krishnan, Vijay Mahajan***

Product series design involves many complex decisions in the definition phase, including the positioning, market segmentation and introduction order of the individual products in the series. We present a model of the product series definition problem and derive expressions for the quality levels and introduction order of individual products.

3) New-Product Release Timing & Subscription Pricing for Successive Product Versions, ***Gregory Dobson***, University of Rochester, Simon Sch. of Bus., Rochester, NY 14627-0100, gdobson@tor.rochester.edu, ***Michael S. Pangburn***

The design of a firm's product improves incrementally over time; the firm aggregates developments until a new product version is released. We analyze when a firm should make product releases for a nondeterministic development process. We investigate associated pricing issues and show that subscription-pricing policies can generate more profitable solutions.

4) A Model of Preliminary Information Exchange in Concurrent Development, ***Christoph H. Loch***, INSEAD, Boulevard de Constance, Fontainebleau, 77305, France, christoph.loch@insead.fr, ***Christian Terwiesch***

The exchange of preliminary information is a key aspect of managing concurrent product development. Two strategies of exchanging preliminary information have been identified: set-based concurrency exchanges information in the form of ranges and iterative concurrency exchanges precise "point" information. We present a model that evaluates these 2 strategies.

SD12 Improving the Process of Strategic Planning in Hi-Tech Organizations

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session

Chair: W. Austin Spivey, University of Texas, 6900 North Loop 1604 West, Coll. of Bus., BB 4.0612, San Antonio, TX 78249-0634, wspivey@utsa.edu

1) Facilitating Strategic Planning with GroupSystems(r): A Review & Synthesis, ***W. Austin Spivey***, University of Texas, 6900 North Loop 1604 West, Coll. of Bus., BB 4.0612, San Antonio, TX 78249-0634, wspivey@utsa.edu

Applications of IT to support group work have been referred to as GSSs (Pervan 1997). We focus on the augmentation of strategic planning by GroupSystems(r). The extant literature is reviewed and synthesized. Enterprise examples running the gamut from Nokia Telecommunications to the Mexican government are included.

2) An Uncertainty-Based Framework to Manage Technology, ***J. Michael Munson***, Santa Clara University, Dept. of Mktg., Leavey Sch. of Bus., San Jose, CA 95055, mmunson@scuacc.scu.edu

Selecting an organization's technology portfolio is a critical activity; it greatly affects the organization's competitive position and long-run survival. We propose a conceptual framework for making portfolio selection more market focused. The framework is based on the integration of uncertainty and facilitated by GroupSystems(r).

3) Constructing Meaning & Metaphor from Focus Groups Responses: The Impact of Group Systems Facilitation, ***Ritalinda D'Andrea***, Collaborative Research Assoc., 2193 Grandbury Way, Germantown, TN 38139, rdandrea@ix.netcom.com

We will report on and explore the impact of computer-assisted decision-making and polling on the meaning-making processes of individuals and groups. Such exploration will assist facilitators in determining when and how computer-assisted systems are most useful and delineate the bias that such systems may impose.

SD13 Knowledge & Organizations

Sponsor: Organization Science
Sponsored Session

Chair: To be announced

1) College on Organization Science Subconference: Knowledge & Organizations

SD14 Issues in Airline Management

Contributed Session

Chair: William D. Hall, Draper Labs./MIT, 555 Technology Sq., MS 3F, Cambridge, MA 02139, whall@alum.mit.edu http://snipe.mit.edu/bill/

1) An Incentive Bonus System for Airline Account Managers, ***Sven E. Andersson***, Scandinavian Airlines System, Dept. Process & Project Supp., STOPV, Stockholm, SE 195 87, Sweden, sven-eric.andersson sas.se

Incentive programs are becoming widespread in Scandinavia. SAS aims at introducing incentive pay to all personnel in the marketing and sales functions. A bonus system has been implemented for the account managers, based on 3 factors reflecting the productivity of the individual, the efficiency of his team and the contribution to the bottom line.

2) The Multi-User Optimized Traffic Flow Problem, ***Jennifer R. Goodhart***, University of California, Dept. of IE & OR, 4135 Etcheverry Hall, Berkeley, CA 94720, goodhart@ieor.berkeley.edu, ***Candace A. Yano***

Modern decision support tools allow airlines to determine scheduling and sequencing priorities for aircraft. Operating procedures in the NAS do not allow airlines to take full advantage of these systems. We will present mechanisms that the FAA might use to allow airlines more influence over their own operations while facilitating a feasible flow through the airports and airspace.

3) A Study on the Evaluation Criteria of Business Travelers for Choosing an Airline, ***Yongjae Yoo***, Hankuk Aviation University, 200-1 Hwajun-dong Koynag-shi, Seoul, Korea, yjyoo@mslab.hangknog.ac.kr, ***HeeYoung Hurr, Moon-Gil Yoon***

There has been much research on the major motivation of consumer's choice for airlines. Due to the competition in airline industries, most airlines offer a various level of benefits to customers such as frequent traveler bonuses, schedule, service in flight including a meal and entertainment, discounted fare and an intangible part of personal service. However, it is very difficult to measure the performance of the customer's benefit...

4) Queueing Systems & Air Transportation: Increasing Capacity Through Collaboration, ***William D. Hall***, Draper Labs./MIT, 555 Technology Sq., MS 3F, Cambridge, MA 02139, whall@alum.mit.edu http://snipe.mit.edu/bill/

Gilbo (1993, 1997) has developed improved airport capacity models capturing the interactions between arrivals and departures. We explain how Gilbo's models may be used simultaneously to increase airport capacity and to improve airline operations through extensions to the collaborative decision making program.

SD15 Innovation & Technology Diffusion

Contributed Session

Chair: Marcus A. Rothenberger, Arizona State University, PO Box 873606, Tempe, AZ 85287-3606, marcus.rothenberger@asu.edu http://www.public.asu.edu/~rothenb

1) withdrawn - author request of 9/15, ***Peter G. Galvin***, Queensland University of Technology, Sch. of Mgmt., GPO Box 2434, Brisbane, QLD, 4001, Australia, p.galvin@qut.edu.au

2) withdrawn - author request of 9/15, ***Kerry Donohue***, Queensland University of Technology, Sch. of Mgmt., Fac. of Bus., Queensland, Australia, k.donohue@qut.edu.au, ***Damian Hine, Andrew Griffiths***

Macro factors, institutional environment and life cycle stage of industry are predictors of both innovation diffusion and dominant forms of innovation in industry. Directional relationships are explored between macro factors and the innovation strategies of current and prospective firms in the industry. An analytic framework is developed.

3) withdrawn - author request of 9/15, ***Andrew Griffiths***, Queensland University of Technology, Sch. of Mgmt., Fac. of Bus., Brisbane, QLD, Australia, a.griffiths@qut.edu.au

4) Soft Technology Diffusion in Small Business in a Developing Country: University-Based Industry Interventions in Mexico, ***Cuauhtemoc Olmedo-Bustillo***, ITESM Toluca, Amado Nervo 102-1, Toluca, 50150, Mexico, colmedo@campus.tol.itesm.mx, ***Graciela Velazquez-Sanchez***

Theory of the firm is used to analyze the systematic application of knowledge (technology) in small business in Mexico. Small-scale forces business to outsource knowledge acquisition. We report on a 3-year study of small business in a University arrangement that could lower market costs of knowledge in developing countries.

5) withdrawn - author request of 9/16, ***Marcus A. Rothenberger,***

Arizona State University, PO Box 873606, Tempe, AZ 85287-3606, marcus.rothenberger@asu.edu http://www.public.asu.edu/~rothenb, ***Natasa Christodoulidou***

SD16 Analysis & Algorithms for Path Problems

Sponsor: Transportation Science
Sponsored Session

Chair: Elise Miller-Hooks, Duke University, PO Box 90287, Dept. of Civil & Environ. Eng., Durham, NC 27708, edmh@acpub.duke.edu

1) Formal Language Constrained Path Problems, ***Madhav Marathe***, Los Alamos National Lab., MS M997, Los Alamos, NM 87545, madhav@c2.lanl.gov

In many path finding problems, certain patterns of edge/vertex labels are allowed/preferred, while others are disallowed. For example, transit users are restricted to the transit network. We investigate the complexity of finding paths in a labeled network, where the mode choice is specified by a formal language.

2) Using Node Labels to Determine Optimal Paths in Stochastic, Time-Varying Networks, ***Elise Miller-Hooks***, Duke University, PO Box 90287, Dept. of Civil & Environ. Eng., Durham, NC 27708, edmh@acpub.duke.edu, ***Hani S. Mahmassani***

We discuss the use of node labels for determining optimal paths in stochastic, time-varying networks and compare their use in this context to their use in the context of deterministic, time-varying networks and for solving problems with multiple conflicting objectives.

3) High Performance Implementation of Dynamic Shortest Path Algorithms, ***Ismail Chabini***, MIT, Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1263, Cambridge, MA 02142, ***Sridevi Ganugapati***

We develop high performance implementations of algorithms for the computation of shortest paths in dynamic networks. We investigate 2 platforms: shared memory and distributed memory machines. Algorithms for 6 classes of problems are studied and 3 parallel decomposition strategies are investigated for each algorithm. We give a recommendation for each combination of problem class...

4) Computational Study of Dynamic Shortest Path Algorithms, ***Ismail Chabini***, MIT, Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1263, Cambridge, MA 02142, ***Brian Dean***

We present an extensive computational study of a series of algorithms developed during the last 30 years for computation of dynamic shortest path problems. Algorithms are classified by class of problems solved. We recommend the best algorithm for each class of problems and recommend algorithms for different classes of problems as they arise in ITS applications.

SD17 Approaches to Evaluating R&D Policy Impacts

Sponsor: Public Programs & Processes
Sponsored Session

Chair: Barry Bozeman, Georgia Institute of Technology, Sch. of Public Policy, Atlanta, GA 30332-0345, barry.bozeman@pubpolicy.gatech.edu

1) R&D Value Mapping at the State Level, ***Gordon Kingsley***, Georgia Institute of Technology, Sch. of Public Policy, Atlanta, GA 30332-0345, ***Julia Melkers***

A survey of state R&D agencies is used to examine the variety of outcomes sought by state agencies and metrics used when evaluations are conducted. We then use R&D value mapping methods to assess branching models of R&D impacts.

2) Career Paths as Inter-Sectorial Feedback Loops in R&D: A Case Study of High Impact Academic Research, ***Juan D. Rogers***, Georgia Institute of Technology, Sch. of Public Policy, Atlanta, GA 30332-0345

Commercially-relevant academic research sponsored by the DoE is examined in a case study. The main linkages that shaped the trajectory of R&D were the peculiar career paths of graduate students. The dynamics of these linkages are examined.

3) The PhD Job Market: Implicit Contract or Open Market?, ***Vincent Mangematin***, University of Quebec, Dept. of Sci. & Economics, CP 8888, Succ. Centre-Ville, Montreal, Quebec, H3C 3P8, Canada, vincent@grenoble.inra.fr

We evaluate a model of the impact of career dynamics on science. Hypothesis are thus tested using a survey of 600 French PhDs in engineering, sciences and social science. The test of model shows that there is little incentive for collaborative research.

4) Models of Scientific Careers: Using Network Theory to Explain Transmission of Knowledge through Human Capital, ***Monica Gaughan***, University of North Carolina, Dept. of Sociology, Chapel Hill, NC 27599, ***Barry Bozeman***

Drawing from research in networks and the sociology of science, a conceptual model is presented which seeks to evaluate scientific projects in terms of their ability to enhance knowledge through the flow of human capital.

SD18 Quality of Care Measurement

Sponsor: Health Applications
Sponsored Session

Chair: Francois Sainfort, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706, sainfort@engr.wisc.edu

1) Quality of Care in Psychiatric Emergencies, ***James Ramsay***, University of Wisconsin, Health Prom. & Health Prot., Stevens Point, WI 54481, jramsay@uwsp.edu, ***Francois Sainfort***

We report on the development and validation of a model for measuring quality of care for psychiatric emergencies. Data were abstracted from medical records for 2,231 randomly selected emergency psychiatric patients treated in 2 hospitals during 12 months. The index has been found to be a reliable, valid and providing adequate discriminant ability.

2) Relationships Between Physician Job Attitudes, Encounter Behaviors & Patient Outcomes, ***Shin-Yi Wu***, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706, sainfort@engr.wisc.edu, ***Francois Sainfort***

We present preliminary results from a study designed to show empirical evidence of the relationships between physician job attitudes, medical encounter behaviors and patient outcomes in terms of functional outcomes and satisfaction with care; and to test and propose an attitude-behavior-outcome model to explain the relationships.

3) Stability of Nursing Home Quality Indicators Over Time, ***Sarita Karon***, University of Wisconsin, Health Sys. Res. & Analysis, 610 Walnut St., Madison, WI 53705, sara@chsra.wisc.edu, ***David Zimmerman***, ***Francois Sainfort***

We report on the stability over time of a set of indicators of quality of care in nursing homes. The quality indicators have been developed using resident level assessment data routinely collected in nursing homes to provide a foundation for both external and internal quality assurance and quality improvement activities.

4) Oral Health Outcomes Measurement Using Multiattribute Utility Method, ***Bridget Booske***, University of Wisconsin, Health Sys. Res. & Analysis, 610 Walnut St., Madison, WI 53705, bbooske@chsra.wisc.edu, ***David Zimmerman***, ***Francois Sainfort***

We explore the use of multiattribute utility theory to develop a model for measuring oral health status by summarizing comprehensive oral health information. Data were collected on 4,062 individuals using a data collection instrument designed to capture comprehensive point-in-time oral health information.

SD19 Issues in Commonality

Cluster: Component Commonality
Invited Session

Chair: Mark S. Hillier, University of Washington, Box 353200, Seattle, WA 98195, mhillier@u.washington.edu

1) Solving Large-Scale Component Commonality Models Using Stochastic Decomposition, ***Prakash Mirchandani***, University of Pittsburgh, Katz Grad. Sch. of Bus., 244 Mervis Hall, Pittsburgh, PA 15260, pmirchan@pitt.edu, ***Ajay K. Mishra***

We use the stochastic decomposition algorithm to solve large-scale multi-period component commonality problems with demand uncertainty and random component yields. Exploiting the problem structure and using cut strengthening and memory management techniques, we solve industry-sized problems.

2) The Effect of Advanced Demand Information on Product Design, ***Ulrich W. Thonemann***, Stanford University, Dept. of IE & EM, Stanford, CA 94305-4024, ulrich.thonemann@stanford.edu

We present an analytical model to evaluate the benefit of advanced demand information and its effect on product design. We quantify the monetary benefit of advanced demand information and show that better information leads to changes in product design: with more accurate information, the optimal product design uses less commonality.

3) How Do Platforms Influence Product Family Positioning,

Launch Sequence & Firm Profit?, ***Viswanthan Krishnan***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu, ***Saurabh Gupta***

We analyze the effect of platforms on the positioning, market segmentation, and launch sequence of the individual products of a firm's product family. We find that platforms increase market coverage and firm profit but are appropriate for only limited sets of market conditions which we identify in the paper.

4) Component Commonality in Assemble-to-Order Systems, ***Mark S. Hillier***, University of Washington, Box 353200, Seattle, WA 98195, mhillier@u.washington.edu

We consider an environment where components are stocked using a continuous-review inventory system and final products are assembled to order. We consider replacing unique components by a common component, and discuss under what circumstances this is worthwhile. We also consider using common components as backup safety stock.

SD20 Modeling & Simulation Futures

Sponsor: Military Applications
Sponsored Session

Chair: William H. Dunn, Army Model & Simulation Office, 400 Army Pentagon, DAMO-ZS, Washington, DC 20310-0450, dunnwih@hqda.army.mil

1) The Army Model & Simulation Business Model, ***William H. Dunn***, Army Model & Simulation Office, 400 Army Pentagon, DAMO-ZS, Washington, DC 20310-0450, dunnwih@hqda.army.mil, ***Lou Solomon***

We present the Army M&S business model which explains the policies and processes that make up the business practices throughout the M&S life cycle. It defines internal and external M&S customers and provides top level descriptions of guiding principles and performance measures that support these customers.

2) Value-Added Benefits from Army Models & Simulations, ***Stephen McGuire***, Army Model & Simulation Office, 400 Army Pentagon, DAMO-ZS, Washington, DC 20310-0450, mcguire@hqda.army.mil, ***Bob Graebener***

This presentation reflects the development and implementation of a definable process by which quantitative and qualitative M&S benefits are captured enabling better understanding, justification and use of M&S across the Army. A comprehensive methodology identifies the value-added of M&S across the domains of training, acquisition and analysis.

3) Technological Forecast for & with Models & Simulations, ***Oliver Hedgepeth***, GRC International Inc., 1900 Gallows Rd., Vienna, VA 22180, ohedgepeth@grci.com

M&S measures of effectiveness, their measurement elements, calibration, responsibilities and user utility are explored in a technological forecast spanning the next 10 years. This presentation should be useful to those exploring new ways to use M&S from concept formulation to synthetic testing of new battlefield systems.

SD21 Environmental Costs, Hazards & Risks

Contributed Session

Chair: Larry Jenkins, Royal Military College of Canada, PO Box 17000 STN Forces, Kingston, Ontario, K7K 7B4, Canada, jenkins-l@rmc.ca

1) Characterizing Environmental Regulatory Risk, ***Martin L. Martens***, University of British Columbia, Fac. of Comm., Vancouver, BC, V6K 2E8, Canada, martinl@unixg.ubc.ca http://www.interchg.ubc.ca/martinl/

We characterize the uncertainty created by environmental regulations by using content analysis of initial public offering prospectuses to assess and measure this risk. We also explore why some firms list environmental regulation as a risk factor while similar firms do not.

2) A Bayesian Belief Network Expert System for Screening Contaminated Sites, ***Neil A. Stiber***, Carnegie Mellon University, Dept. of Eng. & Public Policy, Pittsburgh, PA 15213, nas@andrew.cmu.edu, ***Marina Pantazidou***, ***Mitchell J. Small***

An expert judgment site-screening tool has been developed to evaluate natural attenuation as a remedial option for sites with trichloroethene (TCE) contamination of ground water. This tool combines a causative model for the phenomena of natural attenuation and knowledge obtained through expert elicitations with a BBN.

3) Decision Support for Soil Remediation, ***Euro Beinat***, Vrije Universiteit, Inst. for Environmental Study, de Boelelaan 1115, Amsterdam, 1071 XA, The Netherlands, euro.beinat@ivm.vu.nl www.vu.nl/ivm

Soil remediation is an expensive activity. The Dutch system based on strict environmental standards is now being replaced by a flexible approach, which includes trade-offs between environment and costs. We illustrate a DSS for this purpose, together with its professional applications and implications for the environment and site owner.

4) Optimal Search for Buried Hazards, ***Tony Cox***, Cox Associates, 503 Franklin St., Denver, CO 80218, tcoxdenver@aol.com

Locating high concentrations of hazardous chemicals in residential soils near Superfund sites or of buried explosives at former army proving grounds are examples of 2 problems that can best be solved through adaptive spatial search. We introduce a new adaptive search heuristic and discuss its performance on real data sets.

5) Environmental Cost Sharing Using the Shapley Value, ***Larry Jenkins***, Royal Military College of Canada, PO Box 17000 STN Forces, Kingston, Ontario, K7K 7B4, Canada, jenkins-l@rmc.ca

We consider how to determine a fair allocation of environmental costs between 2 or more products manufactured together. This is then analyzed in the context of MCDM.

SD22 Natural Resources Management I

Cluster: Natural Resources Management
Invited Session

Chair: John Sessions, Oregon State University, Coll. of Forestry, Corvallis, OR 97331, sessionsj@cof.orst.edu

Co-Chair: Peter Bettinger, Champion Pacific Timberlands, Inc., 1011 East Main Ave., Ste. 303, Puyallup, WA 98372, bettip@champint.com

1) The Scheduling of Forest Harvesting with Adjacency Constraints, ***Alastair McNaughton***, University of Auckland, Tamaki Campus, Dept. of Math., Auckland, New Zealand, a.mcnaughton@auckland.ac.nz, ***Mikael Ronnqvist***, ***David M. Ryan***

A new model of the forest harvesting problem with road construction is presented integrating both strategic (long term) and area sensitive short term tactical planning constraints. The solution algorithm involves innovative column generation and constraint branching techniques. A practical application to a New Zealand production forest will illustrate this.

2) Fine-Tuning a Tabu Search Algorithm to Solve a Harvest Scheduling/ Adjacency Problem Using Double-/Triple-Swaps, ***Peter Bettinger***, Champion Pacific Timberlands, Inc., 1011 East Main Ave., Ste. 303, Puyallup, WA 98372, bettip@champint.com, ***Kevin Boston***

A simple scheduling problem was considered: harvest 40 units over five periods, with non-adjacent harvests in any one period. We used neighborhoods which considered double- and triple- swapping of the harvest timing among units, similar to TSPs, to fine-tune the effectiveness of the search algorithm.

3) Objective Function Choice in Forest Management Regime & Harvest Scheduling, ***John Welker***, Mead Coated Board, 1000 Broad St., Phenix City, AL 36868, jcw3@mead.com

An alternative model for LP harvest scheduling is compared to the usual approach. A new objective function minimizes raw material delivery cost to interdependent processing facilities and additional decision variables are introduced for purchase of outside stumpage at exogenously determined prices. The model calculates stumpage price for the target forest.

SD23 Business Applications Integrating AHP, Finance & Distance Learning

Sponsor: Social Sciences
Sponsored Session

Chair: Myron Hatcher, California State University, Dept. of IS & DS, Craig Sch. of Bus., Fresno, CA 93740-0007, myron_hatcher@csufresno.edu

1) Evaluation of Research Proposals, ***Myron Hatcher***, California State University, Dept. of IS & DS, Craig Sch. of Bus., Fresno, CA 93740-0007, myron_hatcher@csufresno.edu

We develop and test an experimental DSS for the evaluation of research proposals. A set of criteria was developed and programmed into a DSS. The AHP was used for prioritizing the criteria and proposals.

2) Application of Analytic Hierarchy Process, ***Rafael Solis***,

California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, rafael_solis@csufresno.edu

Abstract not available.

3) Distance Learning: Administrative Perspectives on Implementation, ***Gerald Jones***, California State University, Dept. of Mgmt., Craig Sch. of Bus., Fresno, CA 93740-8001, geraldj@csufresno.edu

We discuss the evolution and implementation of a distance learning management program from its initial proposal 2 years ago to the present. The discussion identifies potential obstacles confronting administrators, alternative processes for resolving them, opportunities for growth and future prospects for accredited programs.

4) Small Business Success: Does Money Matter, ***Amir A. Jassim***, California State University, Dept. of Finance & Bus. Law, Craig Sch. of Bus., Fresno, CA 93740-0007, amirj@csufresno.edu

We examine the effect of funding on the success and survivability of small business. We compare the performance and growth of small businesses with adequate funding vs. those with inadequate funding. Furthermore, we examine whether the source of funding, i.e., equity vs. debt, has any impact on the operations of small businesses.

5) Louie Ann Buono: A Case, ***Victor G. Panico***, California State University, Dept. of Mgmt., Craig School of Bus., Fresno, CA 93740, ***Gerald Jones***

This case was written for a Principles of Organizational Behavioral or Management class for the purposes of discussing differences in value systems between generations, how life experiences influence one's perceptions of self and others amd McClelland's achievement motivation theory. Teaching notes will accompany the case.

6) Integrating Analytic Hierarchy Process, Finance & Distance Learning, ***Myron Hatcher***, California State University, Dept. of IS & DS, Craig Sch. of Bus., Fresno, CA 93740-0007, myron_hatcher@csufresno.edu, ***Rafael Solis***, ***Gerald Jones***, ***Amir A. Jassim***

We will discuss the integration of these technologies. Applications in business will be presented.

SD24 Issues Related to Criteria Weights

Cluster: MCDM
Invited Session
Chair: Eng Choo, Simon Fraser University, Fac. of Bus. Admin., Burnaby, BC, V5A 1S6, Canada, choo@sfu.ca

1) Sequential Incorporation of Imprecise Information in Multiple Criteria Decision Processes, ***Justo Puerto***, Universidad de Seville, Dept. de Estadistica e IO, Sevilla, 41012, Spain, puerto@cica.es, ***A. Marmol***, ***Francisco R. Fernandez***

Tools for analyzing MCD processes are developed. We sequentially incorporate imprecise information given by means of general linear relations in the weighting coefficients. This allows us to evaluate the quality of the information supplied and to reduce the number of irrelevant alternatives to be presented based on previous preference information. Examples are presented.

2) Strength-of-Preference Based Interpretation of Criteria Weights, ***Shih-Kung Lai***, National Chung Hsing University, Dept. of Land Econ. & Admin., 67 Section 3 Min Sheng E Rd., Taipei, Taiwan ROC, lai@cc.nchulc.edu.tw

Much has been said about the relation between AHP and MAUT in terms of interpretation of criteria weights. However, the elicitation techniques for weight estimation in both AHP and MAUT imply judgments of strength of preference. We provide a strength of preference-based interpretation of criteria weights.

3) Improving the Assessment of Preferences by Narrowing the Context of the Decision, ***D. Jack Elzinga***, University of Florida, Dept. of ISE, 303 Weil Hall PO Box 116595, Gainesville, FL 32611-6595, elzinga@ise.ufl.edu

Accurately assessing decision makers' criterion weights must occur in the context of the alternatives. Linking pins and the principle of alignment in AHP are based on this fact. Yet, decision makers willingly assess the criteria importance in loose contexts. We explore how the decision making context can and must be narrowed to establish true preferences.

4) Necessary Conditions Implied by Ratio Comparisons & Additive Aggregation, ***Eng Choo***, Simon Fraser University, Fac. of Bus. Admin., Burnaby, BC, V5A 1S6, Canada, choo@sfu.ca, ***William C. Wedley***, ***Bertram Schoner***

We investigate the necessary conditions implied by statements such as "an alternative is r times preferred to another relative to all criteria" which subsume ratio scaled pairwise comparisons. Partial values are introduced to capture the evaluations of the alternatives based on individual criteria.

SD25 Logical & Number-Theoretic Approaches

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: Sebastian Ceria, Columbia University, Grad. School of Bus., Uris Hall, New York, NY 10027, sceria@research.gsb.columbia.edu

1) Logical Linear Programming, ***H. Paul Williams***, University of Southampton, Southampton, SO17 1BJ, UK, hpw@mail.soton.ac.uk

A logical linear programming is a model which involves maximizing or minimizing a linear expression over a logical combination of linear (in)equalities. LP is a special case with only a conjunction of constraints. The LLP representation is an alternative to formulating logical problems as MIPs.

2) An Algorithm for Solving a Diophantine Equation with Lower & Upper Bounds on the Variables, ***Karen Aardal***, Utrecht University, Dept. of Comp. Sci., PO Box 80089, Utrecht, 3508 TB, The Netherlands, aardal@cs.ruu.nl, ***A. K. Lenstra***, ***C. A. J. Hurkens***

We develop a basis reduction-based algorithm for solving a system of diophantine equations with lower and upper bounds on the variables. The research was motivated by the need for solving constrained diophantine equations when designing integrated circuits for video signal processing. Our algorithm is tested on real-life data.

3) The Newest Computational Results with Lift & Project, ***Gabor Pataki***, Columbia University, Dept. IE/OR, 331 SW Mudd Bldg., 500 W 120th St., New York, NY 10027, gabor@ieor.columbia.edu, ***Sebastian Ceria***

We present the newest results with our B&C algorithm using lift-and-project cuts. The code is an extremely robust and efficient general purpose MIP-solver, as extensive testing on all hard MIPLIB-instances and a collection of other combinatorial MIPs shows.

SD26 Routing & Scheduling Algorithms & Applications

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: David Simchi-Levi, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, levi@iems.nwu.edu

1) Some Problems in Mincost Integer Multicommodity Flows, ***Bruce Shepherd***, Bell Labs, 600 Mountain Ave., Murray Hill, NJ 07974, bshep@research.bell-labs.com

No abstract - the author does not want to give an abstract.

2) On Some Special Cases of the Vehicle Routing Problem with Pick-ups & Deliveries, ***Frieda Granot***, University of British Columbia, Fac. of Commerce, Vancouver, BC V6T 1Z2, Canada, fgranot@mercury.ubc.ca, ***Tali Eilam-Tzoreff***, ***Daniel Granot***

We consider the capacitated VRP with pick-ups and deliveries, in which the starting and terminal depots are either pre-determined or chosen optimally. We develop linear time algorithms when the problem is defined over a tree and efficient polynomial algorithms when it is defined over a cycle.

3) Supply Chain Management Problems: Integrating Inventory & Transportation Using Set Partitioning Approaches, ***David Simchi-Levi***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, levi@iems.nwu.edu, ***Lap Mui Ann Chan***, ***Ana Muriel***

For companies using LTL carriers for product distribution across their supply chain, the timing and routing of shipments need to be coordinated so as to minimize system-wide costs, including inventory and transportation costs. We characterize the structural properties of a set-partitioning formulation and use them to suggest an efficient algorithm.

SD28 Variational Problems & Complementarity

Cluster: Complementarity Problems
Sponsor: Optimization
Sponsored Session
Chair: Stephen M. Robinson, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706-1572, smrobins@facstaff.wisc.edu

1) Optimality & Robustness in Extended Nonlinear Programming, ***R. Tyrrell Rockafellar***, University of Washington,

Dept. of Math., Seattle, WA 98195, rtr@math.washington.edu, ***Asen Dontchev***

The strong second-order optimality condition and linear independence condition are generalized to nonlinear programming models with composite terms. A necessary and sufficient condition is thereby obtained for the robustness of a locally optimal solution.

2) Stable Local Minima in Sensitivity Analysis, ***Rene Poliquin***, University of Alberta, Dept. of Math., Edmonton, Alberta, T6G 2G1, Canada, rene.poliquin@ualberta.ca

We characterize the lipschitzian continuity of solutions to a broad class of parameterized optimization problems. The classical condition of a positive-definite Hessian in smooth problems without constraints is found to have an exact counterpart much more broadly in the positivity of a certain generalized Hessian mapping.

3) Stability in Variational Problems via Variational Analysis, ***Adam B. Levy***, Bowdoin College, Dept. of Math., College Station, Brunswick, ME 04011-8486, alevy@bowdoin.edu

Various general stability results from variational analysis will be applied to particular variational problems of wide interest. In particular, the stability of solutions to parameterized NLP problems and parameterized nonlinear complementarity problems will be characterized. Connections with existing work will be made and new characterizations will be presented.

SD29 Data Mining & Massive Data Sets

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Usama Fayyad, Microsoft Research, 1 Microsoft Way, Redmond, WA 98052-6399, fayyad@microsoft.com

1) Data Mining: Scaling Analysis to Large Databases, ***Usama Fayyad***, Microsoft Research, 1 Microsoft Way, Redmond, WA 98052-6399, fayyad@microsoft.com

We introduce data mining/knowledge discovery in databases (KDD). Scaling statistical pattern recognition techniques to massive datasets requires special data access considerations. We focus on some of the issues raised and cover possible solutions.

2) Scaling the K-Mean Algorithm to Large Databases, ***Paul S. Bradley***, University of Wisconsin, Comp. Sci. Dept., 1210 W Dayton St., Madison, WI 53706, paulb@cs.wisc.edu, ***Usama Fayyad***

The run time complexity of K-mean clustering hinders scalability to data larger than RAM as every iteration requires full data scan. Formulation of clustering as minimizing sum of minima of set of convex functions leads to equivalent minimization over polyhedral set. KKT conditions produce an argument for the scalable version, requiring one data scan.

3) Polyhedral Boundary Projection, ***Olvi L. Mangasarian***, University of Wisconsin, Comp. Sci. Dept., 1210 W Dayton St., Madison, WI 53706, olvi@cs.wisc.edu

Projecting a feasible point on a polytope boundary arises in DEA. When the polytope is a convex combination of points, projection is difficult but reducible to an almost-linear program with single nonconvex cylindrical constraint. For the 1-norm projection, 2n ordinary LPs solve the problem. Similar results hold for the largest inscribed ball.

4) Clustering & Support Vector Machines, ***Kristin P. Bennett***, RPI, Math. Sci. Dept., Troy, NY 12180-3590, bennek@rpi.edu, ***Ayhan Demiriz***

A novel method for unsupervised learning in support vector machines is proposed. A nonconvex quadratic program is solved to determine the class of unlabelled examples. The method is used for hierarchical clustering, for prediction of future points in classification problems and to discover underlying structure in data mining problems.

SD30 Heuristic Approaches to Combinatorial Problems

Cluster: Mathematical Programming & its Applications
Invited Session
Chair: Mohammad M. Amini, University of Memphis, MIS/DIS Dept., Fogelman Coll. of Bus., Memphis, TN 38152, mamini@cc.memphis.edu

1) Greedy Solutions of Selection & Ordering Problems, ***Bahram Alidaee***, University of Mississippi, Dept. of Mgmt. & Mktg., School of Bus. Admin., University, MS 38677, alidaee@bus.olemiss.edu, ***Mohammad M. Amini***, ***Gary Kochenberger***

We consider a best-in greedy algorithm for selection and ordering problems. We show there are cases for which this approach is not optimal and present a generalized best-in greedy method for the single-machine scheduling problem with sequence dependent setup times where objective is to minimize the total tardiness. An in-depth computational experimentation indicates that the new approach can significantly outperform the best-in greedy heuristic.

2) Heuristic Sensitivity Analysis in a Combinatorial Environment: An Exposition & Case Study, ***Michael J. Racer***, University of Memphis, ISE Dept., Memphis, TN 38152, mracer@cc.memphis.edu, ***Mohammad M. Amini***, ***Parviz Ghandforoush***

We develop the semantic and rationale of parametric analysis within the combinatorial environment and present as a case the design and implementation of sensitivity analysis procedures for a newly developed heuristic for solving GAP. Computational results will be discussed. The concept and methodology discussed may as well be applied to other heuristic approaches.

3) A New Evolutionary Heuristic Approach to the 0-1 Quadratic Optimization Problem: A Case Study of the Scatter Search, ***Mohammad M. Amini***, University of Memphis, MIS/DIS Dept., Fogelman Coll. of Bus., Memphis, TN 38152, mamini@cc.memphis.edu, ***Bahram Alidaee***, ***Fred Glover***, ***Gary Kochenberger***

Scatter search and its generalized form called path relinking are evolutionary methods that have recently been shown to yield promising outcomes for solving combinatorial and nonlinear optimization problems. We present a scatter search approach to the 0-1 quadratic optimization problem. Extensive computational experimentation indicates the effectiveness of this method.

SD31 The Metrics of Intersector Technology Cooperation

Tutorial Session
Chair: John E. Hebert, University of Akron, Dept. of Mgmt., Coll. of Bus. Admin., Akron, OH 44325-4801, jhebert@uakron.edu

1) Tutorial: The Metrics of Intersector Technology Cooperation, ***Eliezer Geisler***, University of Wisconsin, Coll. of Bus. & Econ., Dept. of Mgmt., Whitewater, WI 53190-1797, geisler@ix.netcom.com

Industry/university/government collaborations for technology and technology management will be discussed. Interactions between industrial research labs and academic institutions will be explored. Cases will be presented as examples of successful and unsuccessful approaches. Methods and measures used in the field will be explained...

SD32 Software Demonstrations

Chair: Michael A. Moses, NYU, 700 Tisch Hall, 40 West 4th St., New York, NY 10012, mmoses@stern.nyu.edu

1) Software Demonstration: Logical Decisions for Windows 95 - Software for Multiattribute Decision Analysis, ***Gary R. Smith***, Logical Decisions, 1014 Wood Lily Dr., Golden, CO 80401-9228, gary@logicaldecisions.com

LDW is state-of-the-art software to evaluate decisions involving preference and value judgments. Based on multiattribute utility theory, LDW helps users simultaneously consider many attributes, separate facts from values and explain their choices to others. We will demonstrate how to use LDW to structure a decision problem, how to select and use LDW's 5 different weight assessment methods...

2) Software Demonstration: Classroom Experiences with Using the HOM Software System, ***Michael A. Moses***, NYU, 700 Tisch Hall, 40 West 4th St., New York, NY 10012, mmoses@stern.nyu.edu

We shall describe the HOM software system used for teaching operations management at both the graduate and undergraduate levels. Examples drawn from classic cases will be illustrated. The software is available for downloading off the internet at http://www.stern.nyu.edu/HOM.

SD33 Unmet OR Challenges in Airline Revenue Management

Sponsor: Aviation Applications
Sponsored Session
Chair: Peter P. Belobaba, MIT, Rm. 33.215, Cambridge, MA 02139, belobaba@mit.edu

1) Forecasting Impacts on Optimization, ***Larry R. Weatherford***, University of Wyoming, PO Box 3275, Laramie, WY 82071, irw@uwyo.edu

We will study the impacts of inaccurate forecasts of demand in each fare class on the revenue generated by 2 widely-used decision rules, EMSRa, EMSRb. The study uses 2 data sets from a major US carrier, one of which is primarily a

business route, the other a leisure route.

2) Forecasting vs. Optimization in Origin - Destination Control, ***Peter P. Belobaba***, MIT, Rm. 33.215, Cambridge, MA 02139, belobaba@mit.edu

Little OR attention has been given to the forecasts required by airline revenue management optimization tools. We use Boeing's PODS to illustrate the interactions between different forecasting and optimization methods and to assess the relative importance of demand forecasting vs. optimization methods in improving network revenues.

3) The Evolution of Passenger Choice Assumptions, ***Craig A. Hopperstad***, Boeing Commercial Airplane Group, PO Box 3707, MS 75-14, Seattle, WA 98124-2207, craig.a.hopperstad@boeing.com

Over the past 20 years, the increasing sophistication of revenue management forecasting, optimization and control has not been matched with a similar evolution in the modeling of the underlying processes of passenger choice. A brief history is provided along with a proposed specification for future models.

SD34 Simulation in the Process Industries: Applications & Advances

Sponsor: Simulation
Sponsored Session

Chair: Bennett Foster, DuPont Company, DuPont Eng. Tech., 1007 Market St., N6502A, Wilmington, DE 19898, j-bennett.foster@usa.dupont.com

1) Improving the Productivity of Process Plants Using Discrete-Event Simulation with Embedded Optimization, ***Bill Lesyna***, DuPont Company, DuPont Engineering Technology, 1007 Market St., N6500A, Wilmington, DE 19898, william.r.lesyna@usa.dupont.com

DuPont has built a generalized modeling tool which uses optimization techniques embedded in a discrete-event simulation framework to perform reliability and capacity analysis of continuous and/or batch process plants. We will describe the underlying technology and how a process plant is modeled with this tool.

2) Simulation Applications in Process Design & Analysis, ***Roderick J. Reasor***, Eastman Chemical Company, Mgmt. Eng. Services Dept., PO Box 1973, Kingsport, TN 37662-5284, rjreasor@eastman.com

Simulation is a powerful tool for process design and analysis. Simulation modeling has been used to help design and analyze manufacturing, logistics, human relations, quality management and other processes at Eastman Chemical Company. We will share the diversity of ways simulation can be used in a chemical manufacturing company.

3) Modeling "Continuous Flow" Process Areas: Using Discrete Event Simulation, ***Bennett Foster***, DuPont Company, DuPont Eng. Tech., 1007 Market St., N6502A, Wilmington, DE 19898, j-bennett.foster@usa.dupont.com

DuPont has long used (continuous simulation) "process" modeling to design chemical plant processes. Recently, DuPont engineers have built (discrete event) "operations" models of entire plant areas that incorporate detailed results from continuous simulation. We will look at techniques for chemical plant modeling and an example model.

SD35 Cost & Performance Measures

Contributed Session

Chair: Aaron P. Blossom, Grand Valley State University, 6579 Gran Via Dr., Rockford, MI 49341, blossomp@river.it.gvsu.edu

1) Cost-Benefit Framework for Analyzing Socioeconomic Impact of NASA's Investment in Aeronautic Technology for Civil Aviation Transportation, ***Kofi Kissi Dompere***, Howard University, Dept. of Economics, Washington, DC 20059-0001, kdompere@fac.howard.edu

We present a comprehensive framework for social accounting of benefits and costs associated with NASA's R&D investment decisions of aeronautical technologies for civil aviation transportation and their impacts on the US economy. A cost-benefit information, aggregates and ranking index are constructed through cost-benefit identification matrices...

2) A Cost- & Operations-Based Product Variety Index, ***Carlos Ocampo y Vilas***, University of Antwerp, Prinsstraat 13, Antwerp, 2000, Belgium, carlos.ocampoyvilas@ufsia.ac.be, ***Nico J. Vandaele***

We extend the traditional product variety index towards a multi-factor index including operational characteristics, i.e., product mix, demand interarrivals, production times, setup times and their variance, etc., and product costs. Using analytic experiments, we investigate the relationship with lead times and how product costs interrelate with the factors constituting the index.

3) Evaluation of Resettlement Cost for the Gorges Project, China, ***Yiguang Zhong***, University of Waterloo, Dept. of MS, 200 University Ave. W, Waterloo, Ontario, N2L 3G1, Cananda, yzhong@engmail.uwaterloo.ca

A model is formed to evaluate the cost for resettlement of more than 1 million people for the Three Gorges Project, China. The analysis indicates that a substantial funding will be saved if the majority of resettled people relocate in the first 3 years of the construction period.

4) A Warranty Model Using a 2-Dimensional Policy, ***Amit Mitra***, Auburn University, Coll. of Bus., Office of the Dean Ste. 516, Auburn, AL 36849-5240, mitra@business.auburn.edu, ***Jay G. Patankar***

Warranty cost models have focused on a single dimension approach, where for example, time has been the attribute of a warranty policy. Warranties for certain products, however, involve more than one attribute. We consider estimation of warranty costs for a 2-dimensional warranty policy.

5) Nine Mistakes in the Use of Performance Measures to Motivate Your Organization, ***James R. Bradley***, Cornell University, 552 Malott Hall, Johnson Grad. Sch. of Mgmt., Ithaca, NY 14853-4201, jrb28@cornell.edu, ***Aaron P. Blossom***

Through a series of vignettes from our plant experiences, we illustrate some common errors that manufacturing managers can make in motivating and measuring their organizations with performance measures. We offer analysis of each vignette and prescriptions for avoiding these errors. Each vignette offers lessons for all managers.

SD36 Analytic Results in Scheduling

Contributed Session

Chair: Steven E. Butt, Western Michigan University, Eng. Mgmt. Research Lab., Dept. of IME, Kalamazoo, MI 49008, steven.butt@wmich.edu http://www.wmich.edu/ime/butt.htm

1) The Four-Machine Online Scheduling Problem, ***John F. Rudin***, University of Texas, 7135 Vinland, Dallas, TX 75227, jrudin@nortel.ca, ***R. Chandrasekaran***

Stricter limits for this problem will be presented. This will include a method for generating a finite sequence of jobs to force any competitive ratio strictly less than the square root of 3 (1.732...), as well as an algorithm that guarantees an upper limit of 1.7333...

2) withdrawn - author request of 9/21, ***Chung Piaw Teo***, National University of Singapore, 10 Kent Ridge Crescent, Singapore, 119260, Singapore, ***Jihong Ou***, ***Kok-Choon Tan***

3) Non-Approximability Results for Scheduling Problems with Minsum Criteria, ***Petra Schuurman***, Eindhoven University of Technology, Dept. of Math. & Comp. Sci., PO Box 513, Eindhoven, 5600 MB, The Netherlands, petra@win.tue.nl http://www.win.tue.nl/~petra, ***Han Hoogeveen***, ***Gerhard J. Woeginger***

We provide several non-approximability results for deterministic scheduling problems whose objective is to minimize the total job completion time. Unless P=NP, none of the problems under consideration can be approximated in polynomial time within arbitrary good precision. Most of our results are derived by max-SNP hardness proofs.

4) Determining Order Quantity & Cost Structures in a Multi-Bin Kanban Environment, ***David M. Lyth***, Western Michigan University, Eng. Mgmt. Research Lab., Dept. of IME, Kalamazoo, MI 49008, ***Steven E. Butt***

When establishing a kanban system to replenish inventory of purchased components, a variety of factors will impact that decision. Most important is management's commitment to the multi-bin kanban system and the type of relationship with the supplier - be it adversarial or cooperative. The determination of order quantity is a function of many things...

5) withdrawn - author request of 8/27, ***Philip M. Kaminsky***, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, kaminsky@ieor.berkeley.edu http://www.ieor.berkeley.edu/~kaminsky, ***Hui Lui***, ***David Simchi-Levi***

SD37 Telecommunications III

Contributed Session

Chair: Syam S. Menon, Oklahoma State University, Coll. of Bus., Rm. 329, Stillwater, OK 74078, smenon@gsbalum.uchicago.edu

1) On a Large-Scale Distributed Communication Network Design Problem with Fixed-Charged Hub Facilities, ***Moon-Gil Yoon***, Hankuk Aviation University, 2001 Hwajun-dong Koynag-shi, Kyunggi-do, 411-791, Korea, mgyoon@hanul.hangkong.ac.kr, ***Young-Ho Baek***, ***Dong-Wan Tcha***

We present a comprehensive design issue of a distributd network with hubbing topology, whose structure is typically found in a facility network of large-scale fiber optic network. For more realistic applications, we have studied a generalized distributed network design problem with no region restrictions on the local networks...

2) withdrawn - author request of 9/24, ***Ue-Pyng Wen***, National Tsing Hua University, Dept. of IE, Hsinchu, Taiwan, 30043, PRC, upwen@ie.nthu.edu.tw, ***Ching-Chir Shyur***

3) An Optimal Virtual Topology Configuration for Multicasting in ATM Nets, ***Sung-Pil Hong***, Chung-Ang University, Div. of Commerce & Bus. Admin., Dae-duk, Naeri, San 40-1, An-sung-Shi, 456-756, Korea, sphong@cau.ac.kr, ***Sung-Jin Chung***, ***Hoo-Sang Chung***

We address the problem of configuring optimal virtual paths on ATM backbones to accommodate point-to-point and point-to-multipoint communications, which involves large-scale nonlinear optimization. The proposed method renders the problem manageable by decomposing it into the shortest path and Steiner tree problems, and hence, finds a good solution in acceptable time.

4) Efficient Solution of Low-Capacity CMSTs, ***Syam S. Menon***, Oklahoma State University, Coll. of Bus., Rm. 329, Stillwater, OK 74078, smenon@gsbalum.uchicago.edu, ***Rakesh Gupta***

The design of communication networks often involves the creation of a capacitated tree topology in the local access portion of the network. This is a difficult problem to solve. We present an efficient solution procedure based on column generation to solve low-capacity CMSTs even when the networks are relatively large.

SD38 Inventory Models III

Contributed Session

Chair: Kaan Katircioglu, IBM Research, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, kaan@us.ibm.com

1) Using Symbolic Computations for the Sensitivity Analysis of an Inventory Control Problem, ***Kevin Ng***, University of Ottawa, Fac. of Admin., 136 Jean-Jacques Lussier, Ottawa, Ontario, K1N 6N5, Canada, ng@admin.uottawa.ca

The merit of symbolic computation is demonstrated by its application toward obtaining closed-form solutions for the sensitivity derivatives of the optimum variables for the (Q,r) inventory control system. The closed-form expressions greatly facilitate the study of sensitivity analysis and provide valuable insights on the (Q,r) model.

2) (s,S) Inventory System for Service Facilities, ***K. P. Sapna***, University of Toronto, Fac. of Mgmt., 105 St. George St., Toronto, Ontario, M5S 3E6, Canada, sapna@mgmt.utoronto.ca, ***Oded Berman***

We consider a facility that provides service to customers using items in inventory during the provision of service with stochastic demands, lead times and service times operating under an (s,S) policy. We determine the optimal s and S that minimizes the long-run expected cost rate.

3) Backward & Forward Recursive Algorithms for Inventory Lot-Size Models with Power-Form Demand, ***Jinn-Tsair Teng***, William Paterson University, 300 Pompton Rd., Wayne, NJ 07470, jteng@frontier.wilpaterson,edu, ***Maw-Sheng Chern***

We extend Barbosa & Friedman's inventory lot-size model for power-form demand to allow for shortages. We then prove that the total cost is a convex function of the replenishment number and propose 2 polynomial-time algorithms to find the optimal timing in both backward and forward recursive manner.

4) Economic Order Quantity - Extensions & Treatments, ***Benjamin Lev***, University of Michigan, School of Mgmt., 4901 Evergreen Rd., Dearborn, MI 48128-1491, blev@fob-f1.umd.umich.edu

The classic EOQ model has been treated in many ways over the last 3 decades. We survey the various extensions to the basic model which include finite horizon, price increase and decrease, parameter changes and inflation. We present an extensive bibliography, a review of the major developments since the sixties.

5) A Heuristic for a Poisson Demand Inventory Problem with Lost Sales, ***Kaan Katircioglu***, IBM Research, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, kaan@us.ibm.com, ***Derek Atkins***

We study a classic single echelon, single product, Poisson demand, continuous review inventory problem with lost sales. Lead time is fixed, holding costs are linear and no fixed cost per order exists. The optimal policy is unknown and an (s,s-1) policy is believed to be satisfactory due to its optimality in case of backlogging. We develop a new heuristic policy as an alternative and compare with (s,s-1).

SD39 Production Scheduling III

Contributed Session

Chair: Michael X. Weng, University of South Florida, Dept. of IMSE, 4202 E Fowler Ave., Tampa, FL 33620, weng@sunburn.eng.usf.edu

1) Object-Oriented Design for Container Loading Software, ***Eugene J. Zak***, Majiq Inc., 8343 154th Ave. NE, Redmond, WA 98052, zak@majiq.com

A CLP is to "tightly" pack discrete items into containers with space and weight limitations. The OO approach facilitates design of complex CLP software by abstracting the algorithm into geometry dependent and independent classes and establishging a common framework for any dimensional problem. Adding new shapes will not impact the main procedure.

2) Supply Chain Optimization: From Planning to Scheduling, ***Jin Yang***, PeopleSoft, Inc., 1820 Gateway Dr., Ste. 150, San Mateo, CA 94404, jin_yang@peoplesoft.com, ***John Stone***, ***Jonathan Silverman***

Optimizing the allocation of your enterprise resources at both macro and micro levels is a key competitive edge. PeopleSoft's supply chain optimization product bridges the gap between strategic/tactical planning and operational scheduling by combining traditional OR techniques and intelligent heuristic search algorithms.

3) Aspects of Operator Staffing in Semiconductor Manufacturing, ***Alexander Schomig***, Siemens AG, HLMS PR, PO Box 100944, Regensburg, D-93009, Germany, alexander.schoemig@hl.siemens.de

Operators as capacity constraints are usually neglected in static capacity planning for semiconductor manufacturing. We will discuss how discrete event simulation can help to determine capacity bottlenecks caused by the lack of operators. Examples of studies from a real semiconductor plant are givebn.

4) Intelligent Cooperating Agents in Production Scheduling, ***Michael X. Weng***, University of South Florida, Dept. of IMSE, 4202 E Fowler Ave., Tampa, FL 33620, weng@sunburn.eng.usf.edu, ***Haiying Ren***

A new agent architecture and its application in reactive online scheduling are studied. On the shop floor, each machine, job and control system has its own scheduling agent. The 3 types of agents cooperate by assigning each party a cooperating weight. Computational results indicate this architecture is promising.

Sunday 16:30-18:00

SE01 Panel: Downstream Decisions (Options) & Dynamic Modeling

Sponsor: Decision Analysis

Sponsored Session

Chair: Ronald A. Howard, Stanford University, Terman 324, Stanford, CA 94305-4025, rhoward@sdg.com

1) Panel: Downstream Decisions (Options) & Dynamic Modeling, ***Ronald A. Howard***, Stanford University, Terman 324, Stanford, CA 94305-4025, rhoward@sdg.com

For some time there has been concern that the availability of downstream decisions, or options, is often not adequately represented in many DAs. A related, but separate, issue is the appropriate representation of dynamic system effects. Panelists will present the current state of development in these areas.

SE02 Panel: Women in OR/MS

Sponsor: Women in OR/MS

Sponsored Session

Chair: Candace A. Yano, University of California, IEOR Dept., 4135 Etcheverry Hall, Berkeley, CA 94530, yano@ieor.berkeley.edu

1) Panel: Women in OR/MS

SE03 Using Commercial Software & Experiential Learning to Teach the First Management Science Course

Sponsor: Education
Tutorial Session
Chair: Glenn Dietrich, University of Texas, Div. of Acct. & IS, San Antonio, TX 78249, gdietrich@utsa.edu

1) Tutorial: Using Commercial Software & Experiential Learning to Teach the First Management Science Course, ***Matthew J. Liberatore***, Villanova University, Mgmt. Dept., 800 Lancaster Ave., Villanova, PA 19085, liberator@ucis.vill.edu, ***Robert L. Nydick***

We offer a proven alternative to spreadsheets that synthesizes management science modeling, commercial software and experiential learning. We illustrate how to apply our integrated approach to 3 modules: mathematical programming, decision analysis and simulation, using LINGO, Expert Choice and Extend, respectively...

SE04 Statistics & OR: The Interface

Sponsor: INFORMS Computing Society
Sponsored Session
Chair: Bruce L. Golden, University of Maryland, Maryland Bus. Sch., College Park, MD 20742, bgolden@umdacc.umd.edu

1) Algorithm Fine-Tuning with OptQuest, ***James P. Kelly***, University of Colorado, Coll. of Bus., Boulder, CO 80309, james.kelly@colorado.edu, ***Fred Glover***, ***Manuel Laguna***

Many algorithms require fine-tuning to optimize their performance. We discuss a technique based on scatter search and TS called OptQuest that can automate this time-consuming process. OptQuest often reveals parameter sets that are superior to those derived from manual explorations. We compare experimental design results to those obtained using OptQuest.

2) Fractional Factorial & Incomplete Block Designs for Algorithm Analysis, ***M. Coffin***, Clemson University, Math. Sci. Dept., Clemson, SC 29634-1907, mcoffin@clemson.edu, ***M. J. Saltzman***

Incomplete block and fractional factorial designs are powerful statistical tools for comparing algorithm performance under a variety of experimental conditions. Several examples are provided to demonstrate how these and other experimental design ideas can be used to efficiently compare algorithms and heuristics.

3) Using Statistical Experimental Design Principles for Empirical Comparison of Network Optimization Software, ***Mohammad M. Amini***, University of Memphis, MIS/DIS Dept., Fogelman Coll. of Bus., Memphis, TN 38152, mamini@cc.memphis.edu, ***Richard S. Barr***

The use of formal experimental designs for the empirical evaluation and comparision of algorithms and their implementations remains a rarity in the OR literature. We present a mini-tutorial and examples of these statistical techniques to assessing the relative efficiency of 5 network codes for reoptimizing pure network problems.

4) An Experimental Design-Based Method for Finding Effective Parameter Settings for Heuristic Methods, ***Steven P. Coy***, University of Maryland, Maryland Bus. Sch., College Park, MD 20742, scoy@mbs.umd.edu, ***Bruce L. Golden***, ***George C. Runger***, ***Edward A. Wasil***

We propose a procedure that uses experimental design to find high-quality heuristic parameter values. We illustrate how to apply our method in 2 experiments using 2 vehicle routing heuristics. In each experiment, we fine-tune 1 of the heuristics using experimental design on a small number of problems.

SE05 Competition in Operations

Sponsor: MSOM
Sponsored Session
Chair: Jan A. Van Mieghem, Northwestern University, Kellogg Grad. Sch. of Mgmt., Evanston, IL 60208-2009, vanmieghem@nwu.edu http://www.kellogg.nwu.edu/faculty/vanmieghem/htm

1) Cooperative & Competitive Inventory Policies in a Two-Echelon Supply Chain with Lost Sales, ***Gerard P. Cachon***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, gpc@mail.duke.edu

Inventory management is considered in a 2-echelon supply chain with stochastic demand and lost sales. Each location is an independent firm. Nash equilibria in inventories policies are investigated and compared with the supply chain optimal policies. Contracts to ensure the incentive compatability of the optimal solution are also studied.

2) Competition, Entry & Supply Chain Structure, ***Charles J. Corbett***, UCLA, Anderson Sch., 110 Westwood Plaza Box 951481, Los Angeles, CA 90095-1481, charles.corbett@anderson.ucla.edu, ***Uday S. Karmarkar***

Supply chains have varying numbers of product assemblers and parts suppliers. Fixed costs create barriers to entry at certain stages of the supply chain. We focus on the interaction between fixed costs and competition in supply chains by modeling and characterizing the relationship between cost structure and the number of entrants at each stage.

3) To Be the First or To Be The Best: Competition in New Product Quality & Timing, ***Sudhakar D. Deshmukh***, Northwestern University, Kellogg Grad. Sch. of Mgmt., 2001 Sheridan Rd., Evanston, IL 60208-2009, s-deshmukh@nwu.edu

Better products command higher market shares, but development takes longer, so competing products may appear first. In stochastic game equilibrium, firms set lower threshold qualities, stronger firms set higher thresholds, consumers prefer competition over weak monopolist, strong monopolist is socially optimal, as is competition among equal firms, yielding faster innovation.

4) Capacity Investment Under Uncertainty: Price vs. Quantity Competition, ***Jan A. Van Mieghem***, Northwestern University, Kellogg Grad. Sch. of Mgmt., Evanston, IL 60208-2009, vanmieghem@nwu.edu http://www.kellogg.nwu.edu/faculty/vanmieghem/htm, ***Maqbool Dada***

Under uncertainty, capacity investment depends on the mode of market approach and competition. When quantity is set in a monopoly, investment fundatmentally differs, is significantly less sensitive to variablility and more profitable than under price-setting. Under quantity competition, these results extend to oligopoly and perfect competition. Entry dettering investments are possible...

SE06 FMS Production Planning

Cluster: Flexible Manufacturing Systems
Invited Session
Chair: Kathryn E. Stecke, University of Michigan, Sch. of Business Admin., Tappan Rm. 5206, Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) Reserving Flexible Capacity & Real-Time Updating of Production & Supply Plans, ***Amiya K. Chakravarty***, Tulane University, Freeman Sch. of Bus., New Orleans, LA 70118-5669, amiyac@freeman.tulane.edu

An anticipatory production plan requires capacities to be reserved by both manufacturer and supplier. A real time update of a multi-product production plan has implications for reservation time-window, capacity planning and the choice of product types for update. We model a hybrid control system for capacity reservation updates and derive priority rules for competing products.

2) A Monolithic Approach to Loading & Scheduling in a Flexible Assembly System, ***Tadeusz J. Sawik***, University of Mining & Metallurgy, Dept. of Comp. Integrated Mfg., Krakow, 30-059, Poland, tsawik@wzn4.zarz.agh.edu.pl

The loading, routing and scheduling of a flexible assembly system is considered. The system consists of a set of assembly stations with limited working space and is capable of simultaneously producing a mix of product types. The objective is to select assembly plans for a mix of products and to determine an assignment of assembly tasks of all products in a minimum time...

3) Production Commitment with Demand Forecast & Production Cost Variation, ***Li Yao***, Chinese University of Hong Kong, Dept. of SE & EM, Shatin, NT, Hong Kong, lyao@se.cuhk.edu.hk, ***Houmin Yan***

We investigate the problem of production commitment and consider demand forecast improvement and increase of production cost when lead time is reduced. We demonstrate how to strike a balance of production commitment

between accuracy of demand information and production cost.

SE07 Supply Chain Management Applications

Cluster: Supply Chain Management
Invited Session

Chair: Lisa A. Ferguson, Hofstra University, Dept. of Mgmt. & General Bus., 228 Weller Hall, Hempstead, NY 11549, mgblzf@hofstra.edu

1) The Internet as an Enabling Technology for Supply Chain Management, ***Ashok Chandrashekar***, Oregon State University, Dept. Mgmt., Mktg. & Int. Bus., Coll. of Bus. 200 Bexel Hall, Corvallis, OR 97331-2603, chandras@bus.orst.edu

SCM can provide organizations with immense benefits. However, true SCM has not really been implemented due to the incompatibility of the information systems among the members of the chain. We discuss how the use of the Internet as the enabling communication technology can be a solution approach to this problem.

2) The Centralized Purchasing Decision, ***Charles L. Munson***, Washington State University, Dept. of Mgmt. & Dec. Sci., Coll. Bus. & Econ., Box 644736, Pullman, WA 99164-4736, munson@wsu.edu

We examine the important tradeoffs among 3 different purchasing centralization scenarios to help firms determine their degree of purchasing centralization. Cost drivers considered include business volume discounts, supplier lead times, transportation costs, risk pooling effects and supplier management and ordering costs.

3) The Supply Chain: Keeping Everything in Sync, ***Ir. Marc Sol***, Baan Co., Zonneoordlaan 17, PO Box 250, Ede, 670 BG, The Netherlands, msol@research.baan.nl

In the supply chain, partners who supply, transport and manufacture products collaborate to satisfy customer demand on time with minimal cost. Optimally managing this complex environment requires software integrated with ERP systems and using state-of-the-art mathematical optimization techniques. We discuss several important topics of such software.

4) Improving Global Supply Chain Management Decisions, ***Lisa A. Ferguson***, Hofstra University, Dept. of Mgmt. & General Bus., 228 Weller Hall, Hempstead, NY 11549, mgblzf@hofstra.edu

Information obtained from structured interviews in the electronics industry, along with a cohesive review of the literature, led to the development of a simulation model. The results of the simulation model are reported along with their implications for making SCM decisions.

SE08 Stochastic Models of CDMA Wireless Networks

Sponsor: Applied Probability Section
Sponsored Session

Chair: Phil Fleming, Motorola, Inc., 1501 W. Shure Dr., Arlington Heights, IL 60004, fleming@cig.mot.com

1) On Dynamic Control of CDMA Wireless Networks, ***Kimberly Wasserman***, University of Michigan, 1301 Beal Ave., EECS Dept., Ann Arbor, MI 48109-2122, wass@eecs.umich.edu

We consider an integrated services DS-CDMA network and study the effect of dynamic spreading gain control on the dynamics of multiple access interference, spectral efficiency and QOS. We provide an optimal algorithm and exploit its properties to model the network as processor sharing. We obtain explicit expressions for the stationary behavior of the network.

2) Scheduling in Multimedia DS-CDMA Wireless Networks, ***Rajeev Agrawal***, University of Wisconsin, ECE Dept., 3613 Eng. Hall, 1415 Johnson Dr., Madison, WI 53706, agrawal@engr.wisc.edu, ***Rangsan Leelahakriengkrai***

We investigate the use of power control, processing gain and/or multiple codes and scheduling in a DS-CDMA systems to accommodate quality of service requirements of error rate, throughput, loss, delay and power constraint for users whose packet stream is constrained by some prespecified traffic profile such as sigma-rho.

3) Closed-Form Expression for Other-Cell Interference in CDMA Systems, ***Burton Simon***, University of Colorado, Dept. of Math., Box 173364 CB 170, Denver, CO 80217, bsimon@math.cudenver.edu, ***Alexander Stolyar***

We present an analysis in which base sites and mobiles are each distributed according to a spatial Poisson process and arrive at closed-form expressions for reverse-link interference and capacity that are more realistic than existing numerical results derived by assuming a regular hexagonal grid of base stations.

4) Cellular Network Elements Under a Multimedia Traffic Load, ***Phil Fleming***, Motorola, Inc., 1501 W. Shure Dr., Arlington Heights, IL 60004, fleming@cig.mot.com, ***Rajesh Pazhyannur***

We investigate buffer behavior under a workload made up of variable-rate encoded voice sources and a small number of heavy-tailed on-off data sources. The aggregated voice, as well as data, sources exhibit auto-correlation which significantly affects delay and buffer occupancy.

SE10 Empirical Studies in the Logical Analysis of Data

Sponsor: College on AI
Sponsored Session

Chair: Jan C. Bioch, Erasmus University Rotterdam, Dept. of Comp. Sci., FEW H4-27, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, bioch@few.eur.nl

1) Somewhat Convex Boolean Functions, ***John Franco***, University of Cincinnati, ECECS, Cincinnati, OH 45221-0030, franco@gauss.ececs.uc.edu

A class of Boolean functions, showing promise in representing real data sets, is introduced. Motivation for consideration of this class, based primarily on experiments with real data, is given. Development of theories for use in the logical analysis of data and some experiences classifying data points by means of such theories are described.

2) Boolean Functions & Automatic Text Categorization, ***Lisa Hellerstein***, Polytechnic University, Det. of CIS, 5 Metrotech Ctr., Brooklyn, NY 11201, hstein@pucs4.poly.edu

Text categorization is the task of assigning documents to appropriate categories. The problem in automatic text categorization is to learn to automatically categorize documents by topic, given a training set of documents which have already been categorized. We explore the effectiveness of methods of learning classes of Boolean functions, as applied to the automatic text categorization problem.

3) An Experimental Study of Structure Constrained Logical Analysis of Data, ***Toshihide Ibaraki***, Kyoto University, Dept. of App. Math. & Physics, Grad. Sch. of Eng., Kyoto, 606-8501, Japan, ibaraki@kuamp.kyoto-u.ac.jp, ***Kazuhisa Makino***, ***Takashi Suda***, ***Hirotaka Ono***

Given a set of positive and negative examples of numerical data, we report some computational results to output its extensions under the structural constraints such as they should be positive and/or decomposable. For some types of data sets, these constraints help construct more accurate and robust extensions.

SE11 Issues in New Product Development

Sponsor: Technology Management
Sponsored Session

Chair: David Ellison, Pennsylvania State University, Wharton Sch., Dept. of OPIM 1300 SH-DH, Philadelphia, PA 19104, ellison@wharton.upenn.edu

1) New Product Development in the Service Sector, ***David Ellison***, Pennsylvania State University, Wharton Sch., Dept. of OPIM 1300 SH-DH, Philadelphia, PA 19104, ellison@wharton.upenn.edu

To date, little work has explored new product development in service industries. We survey the existing literature and cases and present a framework to apply lessons from product development to the service sector.

2) Managing the Learning Process During Production Ramp-up, ***Christian Terwiesch***, University of California, IRPS, 9500 Gilman Dr., La Jolla, CA 92093, cterwiesch@ucsd.edu, ***Roger Bohn***

We present a simple framework that highlights the managerial decision variables and trade-offs in achieving a fast production ramp-up. We show how these trade-offs are fundamentally influenced by the detailed mechanisms that drive learning and process improvement in the plant.

3) Is History Fate? Exploring Sources & Persistence of Incumbent Product Development Capability Deficits After Radical Technological Change, ***Neil Jones***, University of Western Ontario, Richard Ivey Sch. of Bus., London, N6A 5B8, Canada, njones@ivey.uwo.ca

We explore relative capability in product development projects after a radical, competence-destroying technological change. It shows that incumbents' development capability, measured as time and resources required to complete projects controlled for scope and quality, cannot be distinguished from entrants by the second generation of product technology.

4) Time-Cost Trade-Offs in Overlapped Product Development, ***Thomas A. Roemer***, UCLA, Anderson Sch. of Mgmt., 110

Westwood Plaza Box 951481, Los Angeles, CA 90095, troemer@anderson.ucla.edu, ***Reza Ahmadi***, ***Robert H. Wang***

To reduce product development time, many firms have adopted overlapped product design processes. While this helps to reduce development times, it typically requires additional resources because of incomplete information. We address the trade-off between product development time and costs and introduce an algorithm to determine optimal overlapping strategies under different scenarios.

SE12 Management of Technology: A European Perspective

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session

Chair: Juliana Hsuan, Helsinki School of Economics, Dept. Bus. Admin. & Logistics, Runeberginkatu 22-24, Helsinki, FIN 00100, Finland, juliana.hsuan@kyyppari.hkkk.fi

1) Why Firms Form Research Joint Ventures: Theory & Evidence, ***Mihkel M. Tombak***, Helsinki School of Economics, Pohjoinenrautatiekatu 21B, Helsinki, 00100, Finland, tombak@hkkk.fi, ***Lars-Hendrik Roller***, ***Ralph Siebert***

The literature on RJVs has emphasized internalizing spillovers and cost-sharing as motives for RJV formation. We develop 2 additional explanations: product market complementarities and firm heterogeneity. We then test these explanations for RJV formation using data through the US National Cooperative Research Act.

2) withdrawn - author request of 9/17, ***Olavi Uusitalo***, University of Jyvaskyla, Sch. of Bus. & Econ., PL 35, Jyvaskyla, 40351, Finland, ohuusita@tukki.jyu.fi

3) Can Modularization Influence Partnerships with Suppliers & Customers?, ***Juliana Hsuan***, Helsinki School of Economics, Dept. Bus. Admin. & Logistics, Runeberginkatu 22-24, Helsinki, FIN 00100, Finland, juliana.hsuan@kyyppari.hkkk.fi

Modularization in NPD has greatly influenced the nature of partnerships and collaborations that manufacturers share with their suppliers and customers. A case in automative electronics shows that modular innovation can be a potential market access factor leading to positive reward for the firm, its suppliers and customers.

SE13 Knowledge & Organizations

Sponsor: Organization Science
Sponsored Session

Chair: To be announced

1) College on Organization Science Subconference: Knowledge & Organizations

SE14 Transportation I

Contributed Session

Chair: Siriphong Lawphongpanich, Naval Postgraduate School, OR Dept., Monterey, CA 93943, slawphon@nps.navy.mil

1) Efficient Transit Service Through the Application of Intelligent Transportation Systems, ***Randolph W. Hall***, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, hall@atlas.usc.edu, ***Maged M. Dessouky***, ***Ajay Singh***, ***Lei Zhang***

Recently, bus transit service providers have begun to adopt ITS technologies. By making use of real-time information such as vehicle location, it is expected that control strategies using ITS have the potential to improve connectivity between origins and destinations while reducing passenger waiting times. We evaluate bus control strategies using ITs against those without ITS.

2) Information Integration Models for Drivers' Response to ATIS, ***Priyavardhan K. Sinha***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, psinha@andrew.cmu.edu, ***Mithilesh K. Jha***

We analyze the role of information processing, integration and learning, in making travel choice in traffic networks. Lessons from marketing research and behavioral science research are applied to develop an information integration model. The applicability of such a model is presented in the context of intelligent transportation systems.

3) An Application of Column Generation to the Transit Bus Crew Scheduling, ***Jian-hua Li***, Shanghai Transit Contrial Dept., Computer Ctr. 1 1700 Ln., Pu Dong Nan Rd., Apt. 505, Shanghai, 200120, PRC, yihua_li@sabre.com, ***YiHua Li***

We consider the problem of building bus driver duties to cover known transit runs. The duties that are added as columns dynamically to the master problem are determined using a well-known technique known as column generation by solving constrained shortest path problems. The master problem ensures that all side constraints are satisifed and a best set of duties is found.

4) Simplicial & Truncated Dantzig-Wolfe Decomposition, ***Siriphong Lawphongpanich***, Naval Postgraduate School, OR Dept., Monterey, CA 93943, slawphon@nps.navy.mil

When applied to the capacitated traffic assignment problem, the direction finding problem for simplicial decomposition reduces to a linear multicommodity flow problem. Instead of solving this problem optimally, we demonstrate that performing one iteration of Dantzig-Wolfe decomposition is generally sufficient for simplicial decomposition to efficiently converge to an optimal solution.

SE16 Network Travel Modeling I: Equilibrium & Microsimulation

Sponsor: Transportation Science
Sponsored Session

Chair: David Bernstein, Princeton University, Dept. of Stats & OR, Princeton, NJ 08544, dhb@princeton.edu

1) Route & Departure-Time Choice Equilibria with Discrete Commuters, ***David Bernstein***, Princeton University, Dept. of Stats & OR, Princeton, NJ 08544, dhb@princeton.edu

We consider route and departure-time choice equilibrium problems when commuters are discrete. We consider both methods of formulating these problems and algorithms for solving them. Specific attention is given to game-theoretic formulations and the use of mixed strategies.

2) Route Adjustment of Microscopic Simulations of Traffic in Dallas, ***Marcus Rickert***, Los Alamos National Lab., TSA-DO/SA, MS M-997, Los Alamos, NM 87545, rickert@tsasa.lanl.gov

We report the results from systematic investigations of route-adjustment, "traffic assignment," both for on-line and off-line route choice behavior. The simulations were done in the context of the TRANSIMS Dallas case study.

3) Microscopic Simulations of Traffic in the City of Duisburg Based on On-Line Data, ***Joerg Esser***, Los Alamos Ntl. Lab., MS M997, Los Alamos, NM 87545, esser@comphys.uni-duisburg.de

One of the problems of microscopic on-line simulations of traffic is how to integrate the real-time measurements into the simulation. We present 2 approaches for a simulation of the city of Duisburg, as well as results of simulation of the effects of on-line information for travelers.

4) TrafMod: A Meso-Scale Simulator for Route Guidance, ***Jack M. Keoshian***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109, keoshian@umich.edu, ***Robert L. Smith***

We discuss TrafMod, a software system implementing a meso-scale simulation of a deterministic traffic network. TrafMod was originally designed to support dynamic route guidance research, but is customizable for traffic signal control. Key system features include conceptually simple models and efficient handling of very large networks.

SE17 HIV Modeling

Sponsor: Public Programs & Processes
Sponsored Session

Chair: Gregory S. Zaric, Stanford University, IEEM Dept., Stanford, CA 94305-4024, zaric@leland.stanford.edu

1) Modeling the Spread of Protease-Inhibitor-Resistant HIV Strains in San Francisco, ***Travis C. Porco***, San Francisco Dept. of Public Health, 25 Van Ness Ave., Ste. 500, San Francisco, CA 94102, travis_porco@dph.sf.ca.us, ***Mitchell Katz***, ***Joseph Catania***, ***Sally Blower***, ***David Bangsberg***

The known range of HIV incubation period distributions, recent clinical trial data and results of surveys of the frequency of use of protease inhibitor data are combined to yield forecasts of the potential degree of spread of protease-inhibitor-resistant mutants of HIV in San Francisco.

2) Models for Implementing & Targeting HIV Prevention & Care Interventions, ***Carla Rossi***, Universita di Roma La Sapienza, Dipt. di Matematica, Via della Ricerca Scientifica, Rome, 00133, Italy, c.rossi@agora.stm.it, ***Cristina Pasqualucci***, ***Lucilla Rava***

In Western countries, HIV/AIDS has become endemic, so implementing and targeting prevention, therapy and care are critical issues for health care systems. An empirical Bayesian backcalculation model and a mover-stayer model help accomplish these tasks by providing incidence and prevalence estimates for each HIV/AIDS stage and by transmission group.

3) Modeling the Impact of Prevention in the Spread of HIV for the Purposes of Economic Evaluation, *N. L. Meagher*, University of British Columbia, Dept. Health Care/Epidemiology, Vancouver, BC, Canada, *S. A. Marion, R. A. Hanvelt, D. G. Schneider, T. T. Copley*

We use simulation modeling for the purpose of economic evaluation of HIV prevention efforts. Two deterministic simulation models are developed: one to explicitly model the social and economic process of prevention; the other to model the epidemiology of HIV/AIDS.

4) Resource Allocation for the Control of Epidemics Over Short Time Horizons, *Gregory S. Zaric*, Stanford University, IEEM Dept., Stanford, CA 94305-4024, zaric@leland.stanford.edu, *Margaret L. Brandeau*

We consider the problem of allocating a fixed budget to various intervention programs to control the spread of an epidemic over short time horizons. The approach is applicable to, but not limited to, the HIV/AIDS epidemic.

SE18 Improving Cost Performance, Outcomes & System Integration in Health Care

Sponsor: Health Applications
Sponsored Session

Chair: Liam O'Neill, University of Iowa, Div. Health Mgmt. & Policy, 2700 Steindler Bldg., Iowa City, IA 52242, loneill@mail.pmeh.uiowa.edu

1) Cost-Effectiveness of Single Donor Blood Supply for Neonates, *Peter Hilsenrath*, University of Iowa, Div. of Health Mgmt. & Policy, 2700 Steindler Bldg, Iowa City, IA 52242, Peter-Hilsenrath@uiowa.edu, *Justin Nemechek, John Widness, Ronald Strauss*

Objective: to assess use of single donor preparation of transfusions vs. multi-donor. Methods: hospital records and the literature helped identify costs and outcomes. Sensitivity analysis assessed uncertainty. Results: the single-donor approach averted $62.40 per transfusion. Savings were attributable to reduced supply costs and blood wastage. This reduced patient exposures from 3.48 to 2.06 donors.

2) Comparing Practices of Surgical Specialties Using DEA & Multiple Objective DEA, *Ron Klimberg*, St. Joseph's University, Haub Sch. of Bus., 5600 City Ave., Philadelphia, PA 19131, klimberg@sju.edu, *Martin Charns*

We present the results of a study that compares mortality and morbidity rates of 8 specialties using DEA and MODEA. MODEA extends the DEA approach such that multiple objectives can be simultaneously evaluated and their tradeoffs can be addressed.

3) Building Management & Organization Technologies to Achieve System Integration & Evidence-Based Management at the Community Level, *Joseph Tan*, University of British Columbia, Fac. of Medicine, 5804 Fairview Ave., Vancouver, BC, V6T 1Z3, Canada, *Robert E. Modrow, O. Otamere*

Recent changes with Canadian and US health services delivery systems call attention to a shift in the applications of new and advanced organization and management technologies from an intra-organizational focus to an inter-organizational focus. We address major issues of system integration and evidence-based management in the application of advancing technologies at the community level in today's changing health care environment.

4) Central Bed Scheduling at University Hospital Using a Decision Support System, *Liam O'Neill*, University of Iowa, Div. Health Mgmt. & Policy, 2700 Steindler Bldg., Iowa City, IA 52242, loneill@mail.pmeh.uiowa.edu, *Jane Prater*

Assigning patients to beds an important problem in hospital operations, with critical implications for cost, quality, outcomes and patient satisfaction. We describe the results of an ongoing interdisciplinary project at a large university hospital to develop a DSS to aid hospital staff in assigning patients to beds.

SE19 RAHMORS Contributed

Sponsor: Military Applications
Sponsored Session

Chair: Bruce W. Fowler, US Army Aviation Missile Command, ATTN: AMSAM-RD-AS, Redstone Arsenal, AL 35898-5242, fowler-bw@redstone.army.mil

1) Countering the Chemical Threat in the Next Century, *John P. Ballenger*, Raytheon Company, 353 James Record Rd., Huntsville, AL 35824, jp_ballenger@raytheon.com

This study follows earlier analysis that examined engagement ranges required for forward air defense weapons against chemical warheads. This analysis, from a broader requirements perspective, examines the early entry force in the next centrury vs. a chemical threat.

2) Coincidental Robustness in Information Age Warfare, *Donald R. Peterson*, US Army Aviation Missile Command, ATTN: AMSAM-RD-AS, Redstone Arsenal, AL 35898-5242, peterson-rd-ac@redstone.army.mil, *Lawrence S. Phillips, Bruce W. Fowler*

This presentation is a follow-on to our previous work on induced fragility in information age warfare. We consider the opposite of induced fragilities; namely, coincidental robustnesses.

3) Disorder in Organizations, *Bruce W. Fowler*, US Army Aviation Missile Command, ATTN: AMSAM-RD-AS, Redstone Arsenal, AL 35898-5242, fowler-bw@redstone.army.mil

The concepts implicit to bonder matter, especially solids, appear to have some benefit in describing organizations. These concepts are applied to different types and geometries of organizations and assessed. Speculations are made on the value of this insight into modeling organizational behavior under stressful informational situations.

SE20 The Joint Warfighting System: A Programmatic & Technical Progress Report

Sponsor: Military Applications
Sponsored Session

Chair: Dan Maxwell, OSD PA&E, JWARS Office, 1555 Wilson Blvd., Arlington, VA 22209, maxwelld@paesmtp.pae.osd.mil

1) The Joint Warfare System, *Dan Maxwell*, OSD PA&E, JWARS Office, 1555 Wilson Blvd., Arlington, VA 22209, maxwelld@paesmtp.pae.osd.mil, *Paul Warhola*

JWARS is a constructive of operational warfare being developed under the DoD Joint Analytic Model Improvement Program to provide a balanced representation of Joint Warfare that will support campaign planning, crisis response and defense policymaking. We provide an overview of the JWARS program, its software development process and a status report on the progress.

2) JWARS: Attrition, *Paul Warhola*, OSD PA&E, JWARS Office, 1555 Wilson Blvd., Arlington, VA 22209, warholap@pae.paesmtp.oad.mil

One brushstroke in the art of war is the destruction of the enemy's personnel, equipment and installations. A significant challenge to the JWARS development process is to appropriately represent attrition across all systems and environments within the specified runtime constraints. Algorithms span one-to-one engagements, such as anti-ship missile vs. aircraft carrier...

3) Representing C4ISR in JWARS: Concepts, Models & Issues, *Dan Maxwell*, OSD PA&E, JWARS Office, 1555 Wilson Blvd., Arlington, VA 22209, maxwelld@paesmtp.pae.osd.mil

JWARS is the next generation of theater level campaign model, currently being developed in the Office of the Secretary of Defense for use by the Joint Staff, Warfighting Commands and services. JWARS is an analytical model whose design requirements include the ability to provide a "balanced" representation of joint warfare...

SE21 Applications of DEA

Contributed Session

Chair: Ana Lucia Lopes, Universidade Federal de Santa Catarina, Rua do Guapuruvu, 155, Florianopolis, SC, 88062-240, Brazil, ana@eps.ufsc.br

1) Determining Academic Department Efficiency at a Land Grant University: A DEA Approach, *Abel A. Moreno*, Metropolitan State College of Denver, CB 45, PO Box 173362, Denver, CO 80217-3362, morenoa@mscd.edu, *Raghu Tadepalli*

We present the results of a study where academic departments at a land grant university were evaluated using a DEA approach. A measure of efficiency was obtained for the more than 40 academic departments housed in 7 colleges. We also identified changes needed to improve department efficiency.

2) Effiency & Productivity in Deutsche Post's Parcel Delivery Operations, *Scott A. Malcolm*, Planmatics, Inc., 6500 Rock Spring Dr. # 105, Bethesda, MD 20817, malcolm@systems.seas.upenn.edu, *John J. Rousseau*

Delivery operations are a major cost component in postal systems. Privatization of parcel delivery in Germany has increased competitive pressure. DEA is used to study the efficiency of Deutsche Post's 480 parcel delivery bases. Best practices facilities and opportunities for effiency improvements and cost savings

are identified.

3) Non-Oriented FDH Efficiency Analysis, ***Tarja Joro***, Helsinki School of Economics, Dept. of Bus. Admin., PO Box 1210, Helsinki, 00101, Finland, joro@hkkk.fi http://www.hkkk.fi/methods/joro.html, ***Timo Kuosmanen***

FDH is a method for measurement of productive efficiency based on 2 postulates: determinism and free disposability of inputs and outputs. It can be interpreted as a special case of DEA when the convexity assumption is relaxed. Earlier FDH models measured efficiency only as a potential reduction of inputs (input orientation) or potential increase in output (output orientation)...

4) Evaluating Academic Departments Performance Through a Fuzzy DEA Model, ***Ana Lucia Lopes***, Universidade Federal de Santa Catarina, Rua do Guapuruvu, 155, Florianopolis, SC, 88062-240, Brazil, ana@eps.ufsc.br, ***Edgar Augusto Lanzer***, ***Ricardo M. Barcia***

We address the issue of performance evluation, productivity and quality of Brazilian academic departments. A DEA model was applied to the indices, i.e., teaching, research, extension, quality, etc., in order to generate fuzzy measures of departmenal productivities and quality. Those measures were then integrated through an ordered weighted aggregator in order to give the department's membership in a set called excellence.

SE22 Natural Resources Management II

Cluster: **Natural Resources Management**
Invited Session

Chair: B. Bruce Bare, University of Washington, Coll. of Forest Resources, Box 352100, Seattle, WA 98195-2100, bare@u.washington.edu

Co-Chair: John Sessions, Oregon State

University, Coll. of Forestry, Corvallis, OR 97331,

sessionsj@cof.orst.edu

1) Combining Heuristic Search & Optimization Approaches when Developing Landscape Management Plans, ***B. Bruce Bare***, University of Washington, Coll. of Forest Resources, Box 352100, Seattle, WA 98195-2100, bare@u.washington.edu, ***Martin A. Mendoza Briseno***, ***Bruce R. Lippke***

Landscape management plans require the integration of many biological, economic and political factors operating at various levels of spatial and temporal resolution. We present a modeling framework which utilizes combinatorial heuristic and optimization techniques to develop management plans at different levels of the planning hierarchy in an efficient manner.

2) Spatial Planning of High Timber Yield & Habitat on a Forest with Coho Enhancement & Late Serial Stage Concerns, ***J. Douglas Brodie***, Oregon State University, Coll. of Forestry, Corvallis, OR 97331, brodiej@ccmail.orst.edu, ***Brian Sharer***

OSU's Blodgett Tract is 2400 acres of mature young-growth forest. The property encompasses critical coho habitat for the lower Columbia River. Using spatial algorithms, management strategies encompassing, coho protection, hardwood and conifer habitat balance and provision of late-seral-stage habitat and high timber yields are evaluated.

3) Adjusting Ownership Patterns to Improve Ecological Health, ***John Sessions***, Oregon State University, Coll. of Forestry, Corvallis, OR 97331, sessionsj@cof.orst.edu

A 100,000 acre, 6000 polygon, pilot project to explore opportunities to improve ecological health while maintaining or enhancing timber supply through land exchanges between public and private owners has been completed. We discuss land classification, ecological linkages at the landscape level, solution approaches and results. Extensions will be discussed.

4) Ecologically Modeling Edge Effects on Wildlife in Forest Management Linear Programs, ***Michael Bevers***, USDA Forest Service, Rocky Mt. Research Station, 240 W Prospect Rd., Ft. Collins, CO 80526, mbevers/rmrs@fs.fed.us http://www.xmission.com:80/~rmrs/, ***John G. Hof***

Wildlife habitat edge effects are captured in forest management LP scheduling models through limiting- factor constraint sets. Populations are limited both by a reaction- diffusion constraint set for population growth and dispersal and by foraging constraints applied at a cellular level with distance decay across a coupled-lattice map.

SE23 Panel: Knowledge & Technology - Making the Connection

Cluster: **Knowledge & Technology: Making the Connection**
Invited Session

Chair: Kay M. Nelson, University of Kansas, Acct. & IS, Grad. School of Bus., Lawrence, KS 66045, knelson@ukans.edu http://www.ukans.edu/home/knelson

1) Panel: Knowledge & Technology - Making the Connection, ***Rajendra P. Srivastava***, University of Kansas, Ernst & Young Ctr. for, Auditing Res. & Adv. Tech., Lawrence, KS 66045, ***Kay M. Nelson***, University of Kansas, Acct. & IS, Grad. School of Bus., Lawrence, KS 66045, knelson@ukans.edu http://www.ukans.edu/home/knelson, ***Mehdi Ghods***, The Boeing Company, PO Box 24346, Seattle, WA 98124, mehdi.ghods@boeing.com

Knowledge is the competitive advantage of the US, yet only recently have we begun to try and capture and facilitate knowledge through information technology. This panel combines knowledge engineers, practitioners, organizational researchers and AI researchers to discuss how IT can be more effectively used for knowledge creation and management. This panel uniquely combines the organizational and technical views into one perspective.

SE24 MCDM: Methods & Applications

Cluster: **MCDM**
Invited Session

Chair: Minghe Sun, University of Texas, Div. of Mgmt. Mktg., Coll. of Bus., San Antonio, TX 78249-0634, msun@lonestar.utsa.edu

1) A Linear Additive Weighted Multiple Criteria Method: An Alternative to AHP, ***Juan J. Gonzalez***, University of Texas, Div. of Mgmt. & Mktg., 6900 North Loop 1604 W, San Antonio, TX 78249, jgonzalez@utsa.edu

A procedure for ranking or selecting an element of a discrete set of alternatives is presented. It is assumed that a linear additive function of preferences is applicable. The method is compared to the popular AHP and illustrated with an example.

2) Multiple Criteria Decision Making in Information & Telecommunication Systems, ***Yong Shi***, University of Nebraska, IS/QA Dept., Coll. of IS&T, CBA 310D, Omaha, NE 68182-0392, yshi@cbafaculty.unomaha.edu

IT has not only improved the way we communicate with each other, but has also altered the way we do business throughout the world. We will sketch 6 different models that use MCDM to formulate and solve the problems of selecting datafile allocation for information systems and hub cities for telecommunications systems.

3) Alternative Risk Measures of Capital Assets & Evaluation of Investment Portfolios, ***Paul Na***, University of Georgia, 206 Brooks Hall, Athens, GA 30602-6255, pna@cba.uga.edu

Measuring risks has been an important but controversial research issue in contemporary financial economics. We review strengths and weaknesses of several risk measures which include variance, semivariance, mean absulute deviation, stochastic dominance, prospective ranking vector, etc.

4) A Multiple Objective Network Programming Solution Procedure, ***Minghe Sun***, University of Texas, Div. of Mgmt. Mktg., Coll. of Bus., San Antonio, TX 78249-0634, msun@lonestar.utsa.edu

A solution procedure for the multiple objective network programming problem is proposed. The procedure works in a way similar to that of the interactive weighted Tchebycheff procedure and takes advantage of the network structure of the problem. The objectives are treated as extra network side constraints in the derived subproblems.

SE25 Combinatorial Algorithms for Scheduling I

Cluster: **Scheduling & Integer Programming**
Sponsor: **Optimization**
Sponsored Session

Chair: Don Wagner, Office of Naval Research, Math. Sci. Division, 800 N Quincy St, Arlington, VA 22217, wagnerd@onr.navy.mil

1) Scheduling on Uniform Parallel Machines: Handling Insufficient Capacity, ***Don Wagner***, Office of Naval Research, Math. Sci. Division, 800 N Quincy St, Arlington, VA 22217,

wagnerd@onr.navy.mil

Consider scheduling N jobs on M parallel machines with preemption of jobs allowed. Determining whether a feasible schedule exists is solvable as a maximum flow problem. If a feasible schedule does not exist, then one remedy is to acquire additional machine capacity. The problem of optimally acquiring capacity is considered.

2) A Generalized Job Shop Problem, ***Han Hoogeveen***, Eindhoven University of Technology, Dept. of Math. & Comp. Sci., PO Box 513, Eindhoven, 5600 MB, The Netherlands, slam@win.tue.nl, ***Koen de Bontridder***

We will present a decomposition approach for a generalized job shop problem, where the solution method for the second phase is based on Wennink's algorithm for finding the best start times given the order of the operations.

3) Efficient Approximation Algorithms for Some Scheduling Problems, ***Chandra Chekuri***, Bell Labs., 600 Mountain Ave., Murray Hill, NJ 07974, chekuri@research.bell-labs.com, ***M. Bender***, ***R. Motwani***, ***B. Natarajan***, ***C. Stein***

Recent work has resulted in improved approximation algorithms for scheduling to minimize sum of weighted completion times under a variety of settings. Several of these algorithms are based on rouding LP relaxations. We will describe efficient combinatorial algorithms for some variants; in particular, a 2 approximation for the single machine case with precedence constraints.

SE26 Telecommunications Networks & Multicommodity Flows

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: Rich Wong, AT&T Bell Laboratories, Rm 3K-312, PO Box 3030, Holmdel, NJ 07733, rtwong@att.com

1) How to Solve Very Large Concurrent Flow Problems, ***Michael D. Grigoriadis***, Rutgers University, Dept. of Comp. Sci., New Brunswick, NJ 08903, grigoria@cs.rutgers.edu, ***Jorge Villavicencio***

We will present our recent complexity results on approximation methods using logarithmic potential reduction for min-max and max-min multicommodity flows and routing. Extensive large-scale computational results and comparisons on the performance of these methods will be given.

2) Channel-Assignment Models for Telecommunication Networks, ***Richard S. Barr***, SMU, Dept. of Comp. Sci. & Eng., PO Box 750122, Dallas, TX 75275-0122, barr@seas.smu.edu, ***Davi Betts***

The channel assignment problem is associated with TDM and WDM telecommunications networks, wherein circuits must be routed from origin to destination via discrete channels on each span traversed. Full utilization of capacity is thwarted if channels are not assigned optimally and we present models for solving this problem category.

3) Logical Network Design with Restoration Capabilities, ***Rich Wong***, AT&T Bell Laboratories, Rm 3K-312, PO Box 3030, Holmdel, NJ 07733, rtwong@att.com, ***Hanan Luss***

Logical network design with restoration capabilities involves routing multi-commodity (possibly non-integer valued) demands and determining the integer capacities of the links (which can be placed anywhere) so that all flows can be routed even when a single node or link fails. We present some novel heuristics and computational results.

SE27 Large-Scale Quadratic Programming

Cluster: Linear Programming & Related Topics
Sponsor: Optimization
Sponsored Session
Chair: Ariela Sofer, George Mason University, ORE Dept., Fairfax, VA 22030, asofer@osfl.gmu.edu

1) An Interior Point Algorithm for Linearly & Quadratically Constrained Quadratic Programming, ***Dave Shanno***, Rutgers University, RUTCOR, New Brunswick, NJ 08903-5062, shanno@rutcor.rutgers.edu

We describe the performance of the LOQO algorithm on a variety of quadratic programming problems, including standard convex quadratic programming, nonconvex quadratic programming and quadratically constrained quadratic programming. Comparative numerical testing with other codes will be given.

2) An Interior Point Method for Nonconvex Nonlinear Programming, ***Robert Vanderbei***, Princeton University, ACE-42 E-Quad, Princeton, NJ 08544, rvdb@teal.princeton.edu

We describe the performance of LOQO on a variety of nonconvex NLP problems. A large collection of AMPL models have been collected and serve as a base for comparing LOQO against other well-known algorithms such as MINOS and LANCELOT.

3) Extrapolation Matters(!), ***Ariela Sofer***, George Mason University, ORE Dept., Fairfax, VA 22030, asofer@osfl.gmu.edu

Barrier methods went out of fashion around 1970, because they were thought ill-conditioned. Now we know that (if Newton's method is used) this may not matter. But without extrapolation (alas), the Newton step may be infeasible. We show that with extrapolation, however, barrier methods are loaded with good properties.

SE28 Mathematical Programs with Equilibrium Constraints

Cluster: Complementarity Problems
Sponsor: Optimization
Sponsored Session
Chair: Jong-Shi Pang, JHU, Dept. of Math. Sci., Whitehead Hall, Baltimore, MD 21218-2682, jsp@vicp1.mts.jhu.edu

1) Approaches to Solving Nonlinear Programs with Equilibrium Constraints, ***Danny Ralph***, University of Melbourne, Dept. of Math. & Stats., Parkville, Vic, 3052, Australia, danny@mundoe.maths.mu.oz.au, ***H. Jiang***

NLPs with equilibrium constraints, whose constraints include complementarity conditions or variational inequalities, are a challenging class of optimization problems. We will present some algorithmic ideas and numerical experience for these problems, drawing from decomposition, interior-point and smoothing approaches.

2) Smoothing MPECs for Solution by Standard NLP Solvers, ***T. Munson***, University of Wisconsin, Dept. of Comp. Sci., Madison, WI 53706, munson@cs.wisc.edu, ***Michael C. Ferris***, ***C. Kanzow***

We show how to reformulate MPECs as nonlinear programs using various smoothing functions from the literature. Experimental results using interfaces between MATLAB and GAMS will be outlined for problems arising in structural optimization and economics.

3) Optimality Conditions for the Optimization Problem with Variational Constraints by Derivatives of Set-Valued Maps, ***J. Ye***, University of Victoria, Dept. of Math. & Stats., Victoria, BC, V8W 3P4, Canada, janey@math.uvic.ca

We discuss necessary and sufficient optimality conditions for optimization problems with variational inequality constraints involving various coderivatives including Mordukhovich coderivatives and the proximal coderivatives.

4) Complementarity Constraint Qualifications for MPECs, ***Jong-Shi Pang***, JHU, Dept. of Math. Sci., Whitehead Hall, Baltimore, MD 21218-2682, jsp@vicp1.mts.jhu.edu, ***M. Fukushima***

With the aid of some novel complimentarity CQs, we derive some simplified primal-dual characterizations of a B-stationary point for an MPEC. The approach is based on a locally equivalent piecewise formulation and a careful dissection of the tangent cone of the feasible region.

SE29 Multicategory Learning with Mathematical Programming

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Nick Street, University of Iowa, MS Dept., 5232 Pappajohn Bldg., Iowa City, IA 52242, nick-street@uiowa.edu

1) Oblique Multicategory Decision Trees, ***Nick Street***, University of Iowa, MS Dept., 5232 Pappajohn Bldg., Iowa City, IA 52242, nick-street@uiowa.edu

We present a new technique called oblique category separation, OC-SEP, for constructing binary multicategory decision trees using quadratic programming. This method produces robust, easily-interpretable classifiers for a wide range of problems. Computational comparisons to techniques from mathematical programming and machine learning literature will be shown.

2) Examination of a Grid-Based Procedure for the Multiple-Group Classification Problem Using Mathematical Programming, ***Robert Pavur***, University of North Texas, Coll. of Bus. Admin., Denton, TX 76203, pavur@cobaf.unt.edu, ***Constantine Loucopoulos***

We present a grid-based method for the multiple-group classification problem

that provides insights into the dimensionality representation of the discriminant space. The classificatory performance of the proposed method is compared against that of various other classification procedures using real and simulated data.

3) Local Learning via Support Vector Machines, ***Erin Bredensteiner***, University of Evansville, Math. Dept., Evansville, IN 47722, eb6@evansville.edu, ***Kristin P. Bennett***

Decision trees are constructed by optimizing a multiobjective function that minimizes a misclassification error and increases generalization. Neighboring node information is included in the construction of each decision node. This can be applied to many different error functions and to support vector machines. Computational results will be given.

4) Multicategory Classification via Linear Programming Infeasibility Analysis, ***John W. Chinneck***, Carleton University, Systems & Comp. Eng., 1125 Colonel By Dr., Ottawa, Ontario, K1S 5B6, Canada, chinneck@sce.carleton.ca

Methods derived from LP infeasibility analysis provide heuristic methods of placing linear classifier lines which tend to minimize the number of misclassified points. These methods are easily incorporated into multicategory classification. The CLIIS software incorporates these ideas. Empirical results using CLIIS are presented.

5) Mathematical Programming Formulations for Two-Group Classification with Binary Variables: A Bayes-Inspired Approach, ***Antonie Stam***, University of Georgia, Dept. of Mgmt. Brooks Hall, Terry Coll. of Bus., Athens, GA 30602, astam@uga.cc.uga.edu, ***Ognian K. Asparoukhov***

An MP formulation is introduced for the 2-group binary variable classification problem. The formulation possesses a Bayesian statistical foundation and is efficient in terms of the number of binary and deviational variables. Hence, the approach can be used to analyze large training samples, despite the presence of binary variables.

SE30 Data Warehouse & Data Mining

Cluster: **Mathematical Programming & its Applications**
Invited Session

Chair: Tarun K. Sen, Virginia Polytechnic Institute & State University, Pamplin Coll. of Bus., 3102 Pamplin Hall, Falls Church, VA 22043, tksen@vt.edu

1) Visual Data Mining, ***David Tegarden***, Virginia Polytechnic Institute & State University, Dept. of Acct., Pamplin Coll. of Bus., Blacksburg, VA 24061

With the flood of "information" that today's business decision makers must face, something must be done to support the decision maker in extracting the relevant information from the "chaff." In this presentation, we describe both practical applications of and research into the applicability of business information visualization.

2) Self-Service Decision Support Systems via Data Warehouses, ***Rumy Sen***, KPMG Peat Marwick LLP, Ste. 900, 2300 Arlington Blvd., Arlington, VA

The concept of "self-service" DSS appeals to a wide range of end users with varying degree of computer skills. We discuss methodologies, tools and pitfalls of OLAP and data warehouse development in today's climate of constantly shifting user demands.

3) Quality Assurance of Data Warehouses, ***Tarun K. Sen***, Virginia Polytechnic Institute & State University, Pamplin Coll. of Bus., 3102 Pamplin Hall, Falls Church, VA 22043, tksen@vt.edu, ***Laurence J. Moore***

We present a framework for evaluating quality of data warehouses. The model focuses on data integrity and effectiveness of data warehouses. Entities and appropriate measures related to data warehouse quality are identified.

SE31 Publishing Technology Management Research in IEEE Transactions on Engineering Management

Tutorial Session

Chair: David V. Gibson, University of Texas, IC2 Inst., 2815 San Gabriel Ave., Austin, TX 78705, davidg@icc.utexas.edu

1) Tutorial: Publishing Technology Management Research in IEEE Transactions on Engineering Management, ***Dundar F. Kocaoglu***, Portland State University, Eng. Mgmt. Program, Portland, OR 97207-0751, kocaoglu@emp.pdx.edu, ***R. Balachandra, Frederick Betz, Alok K. Chakrabarti, Burton V. Dean, George F. Farris, Cheryl Gaimon, Jeffrey K. Liker***

IEEE Transactions on Engineering Management is the refereed research journal in engineering and technology management published quarterly by IEEE since 1954. The journal covers research in the management of engineers, scientists and technical organizations; R&D and engineering projects, models and methodologies; quality, innovation, technology; manufacturing systems...

Sunday 16:30-17:15

SE32 Software Demonstrations

Chair: Irvin Lustig, ILOG CPLEX Division, 889 Alder Ave., Ste. 200, Incline Village, NV 89451

1) Software Demonstration: New Optimization Products from ILOG, ***Irvin Lustig***, ILOG CPLEX Division, 889 Alder Ave., Ste. 200, Incline Village, NV 89451

ILOG has recently introduced 2 new products for optimization. We will demonstrate one or both of these products. Come to this demonstration to hear about these new innovative optimization tools!

Sunday 16:30-18:00

SE33 What's Happening in Aviation OR?

Sponsor: **Aviation Applications**
Sponsored Session

Chair: Robert B. Rovinsky, Federal Aviation Admin., ASD-410, 800 Independence Ave. SW, Washington, DC 20591, robert.rovinsky@faa.dot.gov

1) What's Happening in Aviation OR?

This is an opportunity to discuss what is happening throughout the aviation OR world. Come prepared to speak about major problems and opportunities to apply OR as well as issues confronting you, your work group and the entire profession.

SE34 Modeling & Analysis of Semiconductor Manufacturing

Sponsor: **Simulation**
Sponsored Session

Chair: John W. Fowler, Arizona State University, Dept. of IMSE, PO Box 875906, Tempe, AZ 85287, john.fowler@asu.edu

1) Lot-to-Order Matching for a Semiconductor Assembly & Test Facility, ***Kraig Knutson***, Arizona State University, Dept. of IMSE, Tempe, AZ 85287, kraig.knutson@asu.edu, ***Karl Kempf, John W. Fowler, Matt Carlyle***

We develop a method for deciding which orders to fill and the assignment of available lots to orders on a given day. The problem can be formulated as an integer program with a nonlinear objective and nonlinear constraints. Due to the complexity of the formulation, we decompose the problem into 2 integer LPs and solve them in sequence by heuristic methods...

2) A Markov Decision Process Model for Semiconductor Fab-Level Decision Making, ***Shalabh Bhatnagar***, University of Maryland, Inst. for Systems Research, College Park, MD 20742, shalabh@isr.umd.edu, ***Michael C. Fu, Steven I. Marcus, Ying He***

We propose a finite-horizon transient MDP model that integrates product life cycle dynamics into the model. The model's goal is to provide decision support on such critical operational issues as when to add additional capacity and when to convert from one type of production to another. Technology shrink is one specific case of dynamics to be treated.

3) Evaluation of a Compound Dispatch Rule in a Semiconductor Fab, ***Scott J. Mason***, Arizona State University, Dept. of IMSE, Tempe, AZ 85287, scott.mason@asu.edu, ***Ernesto Galaz***

Manufacturing semiconductors represents one of the world's greatest fabrication challenges. As with other types of manufacturing, a desirable goal in semiconductor manufacturing is to minimize lot (product) cycle times. We present a simulation-based fractional factorial experiment to evaluate the effectiveness of a proposed composite dispatching rule in reducing overall product cycle time...

SE35 Financial Modeling & Risk Management

Contributed Session

Chair: Graydon L. Barz, Stanford University, Dept. of EES & OR, 44D Escondido Village, Stanford, CA 94305, gbarz@leland.stanford.edu

1) withdrawn - author request of 8/27, *Gerhard Wetzel*, Brooklyn College, Dept. of Comp. Sci., Brooklyn, NY 11210, gw@sci.brooklyn.cuny.edu http://www.sci.brooklyn.cuny.edu/~gw, ***Fabian Zabatta***

2) Free Flight or Flight of Fancy? The Economic Payoff of Accommodating Risk, *Art Politano*, Federal Hwy Administration, 800 Independence Ave. SW, Washington, DC 20591, arturo.politano@faa.dot.gov, ***Joe Smith***

The 21st century aviation flight calls for modernizing the nation's aviation system. Testing will show if modernization can work. Known as Flight 2000, testing will be expensive. Is testing worth it? We apply probabilistic risk assessment and economic analysis to learn that testing is beneficial and worth the cost.

3) withdrawn - author request of 9/14, *Quanshui Zhao*, City University of Hong Kong, Dept. of MS, Kowloon, Hong Kong, msqszhao@cityu.edu.hk, ***Jue Xue***

4) Consumer Behavior Analysis Using Fuzzy Utility Functions, *Dongping D. Zhu*, ZAPTRON Systems, Inc., 1055 Valencia Ave., Ste. 4, Sunnyvale, CA 94086, dan@zaptron.com http://www.zaptron.com, ***Yangzhang Wang***

We introduce a new data mining method for purchase preference analysis and trend forecast. A fuzzy set theoretical definition of consumption utility function is introduced and the computation of model parameters is discussed. Examples are given to show the efficacy of this innovative approach to data mining in business and finance.

5) Stochastic Financial Models for Electricity, *Graydon L. Barz*, Stanford University, Dept. of EES & OR, 44D Escondido Village, Stanford, CA 94305, gbarz@leland.stanford.edu

Because of their differences from equities and interest rates, commodities require a new financial modeling approach. Using electricity as an example, we analyze the unique characteristics of commodities, discuss some shortcomings of traditional models and propose an improved model, better suited for commodities.

SE36 Parallel Machine Scheduling

Contributed Session

Chair: Hamilton Emmons, Case Western Reserve University, Dept. of OR, Cleveland, OH 44106, hxw@po.cwru.edu

1) Stochastic Parallel Machine Scheduling with Non-Exponential Processing Times, *Tulug Salahifar*, University of Southern Colorado, 2200 Bonforte Blvd., Pueblo, CO 81001, sala@uscolo.edu, ***Huseyin Sarper***

Instead of the typical exponentially distributed processing times, we usenormally and uniformly distributed processing times. Two objective functions, makespan and mean flow time, are considered in testing the effects of new rules derived from the distribution parameters. Two versions of stochastic mathematical programming applications are also reported.

2) Heuristics for Unrelated Machine Scheduling, *Ameer H. Salem*, University of Central Florida, 1700 Woodbury Rd. # 907, Orlando, FL 82328, ahs04401@pegasus.cc.ucf.edu, ***Robert L. Armacost***

We examine a problem derived from real industry with an objective to minimize the makespan. Specifically, the problem is characterized by parallel unrelated machines and sequence-dependent setup times are known to be NP-hard. Several heuristics are developed to determine a quick, good solution to the unrelated machine environment.

3) Parallel Machine Earliness/Tardiness Scheduling with Cost Setup, *Surya D. Liman*, Texas Tech University, Dept. of IE, Lubbock, TX 79409, sliman@coe.ttu.edu, ***Shrikant S. Panwalkar***

We investigate the multiple parallel machine problem of minimizing the weighted sum of earliness/tardiness penalities with setup costs. A polynomicl time algorithm is proposed.

4) Parallel Machine Scheduling with Machine Eligibility Constraints & Due Dates, *Robert L. Armacost*, University of Central Florida, PO Box 162450, Orlando, FL 32816-2450, armacost@mail.ucf.edu, ***Grisselle Centeno***

We evaluate alternative scheduling rules for identical parallel machines with machine eligibility constraints, arbitrary release times and due dates. Machine eligibility constraints consider conditions where machines are almost nested or poorly nested. Computational results are included.

5) Approximation Algorithms for Selected NP-Hard Interval Scheduling Problems, *Khalid I. Bouzina*, 403 California St., Campbell, CA 95008-3401, khalidb@pacbell.net, ***Hamilton Emmons***

Jobs with fixed start and end times are to be processed on parallel machines. Machines may not be available at all times and each job can be processed on a subset of the machines. The goal is to determine a schedule maximizing the number of jobs completed. Approximation algorithms to previously established NP-hard versions of the problem are presented.

SE37 Telecommunications IV

Contributed Session

Chair: Bernard T. Han, Washington State University, Sch. of Acct., Info. Systems & Bus. Law, Pullman, WA 99164 4726, hanb@wsu.edu http://han2.cbe.wsu.edu

1) The Multi-Hour Bandwidth Packing Problem with Response Time Tradeoffs, *Ali Amiri*, Weber State University, Coll. of Bus., 3804 University Cir., Ogden, UT 84408-3804, aamiri@weber.edu

We study the multi-hour bandwidth packing problem that consists of selecting calls from a list of requests with time varying traffic conditions to be routed on an arc-capacitated network. The goal is to maximize profit while maintaining some level of response time to users. An effective heuristic solution procedure is discussed and computational results are reported.

2) A Neural-Net-Based Gaussian Machine for Solving a Generalized Capacitated Concentrator Problem, *Bernard T. Han*, Washington State University, Sch. of Acct., Info. Systems & Bus. Law, Pullman, WA 99164 4726, hanb@wsu.edu http://han2.cbe.wsu.edu, ***V. T. Raja***

We investigate the efficiency and effectiveness of a neural-net-based Gaussian machine for solving a generalized capacitated generator problem. We consider selection of an unknown number of 2-capacity constrained concentrators for meeting telecommunication traffic of a given number of LANs. A star-star topology is assumed. The computational work is compared to results of a Lagrangian-based heuristic.

3) A Modified Dual Ascent Procedure for the Multilevel Concentrator Location Problem, *Ishwar K. Murthy*, Louisiana State University, Dept. of ISDS, 3178 CEBA Bldg., Baton Rouge, LA 70803, imurthy@unix1.sncc.lsu.edu, ***Trilochan Sastry***

We first develop a standard dual ascent procedure for the multilevel concentrator locaton problem. We then idenfity 3 classes of strong valid inequalities for this problem. These inequalities are incorporated progressively entirely in the dual space as additional columns. The dual ascent procedure is modified so as to accommodate these additional colums accordingly.

4) A Robust Approach to the Capacitated Concentrator Problem, *V. T. Raja*, Western Illinois University, Info. Mgmt. & Dec. Sci. Dept., Macomb, IL 61455, t-raja@wiu.edu, ***Bernard T. Han***

A non-deterministic scenario-based approach is used to solve the conventional capacitated concentrator problem in which different traffic demands are considered from a given number of LANs. Our algorithm allows us to provide a robust facility location selection for concentrators to support the internetworking of the given networks using a star-star topology...

SE38 Queueing Systems

Contributed Session

Chair: Jose Nino-Mora, Universitat Pompeu Fabra, Dept. of Economics & Bus., UPF Ramon Trias Fargas, 25-27, Barcelona, E-08005, Spain, ninomora@upf.es http://www.econ.upf.es/~ninomora

1) Delay Asymptotics for Tandem & Split & Match Queues with Heavy Tailed Service, *Tao Huang*, Columbia University, Dept. of IE/OR, Mudd Bldg., New York, NY 10027, huang@ieor.cloumbia.edu http://www.ieor.columbia.edu/~huang, ***Karl Sigman***

We derive the steady-state delay asymptotics for tandem queues when the service times have a subexponential distribution. For split and match (fork-join) queues, we derive the steady-state asymptotics for both the sojourn time and the queue length.

2) Analytical Approximation of Performance Measures in Open Queueing Networks with State-Dependent Routing Probabilities, *Nastaran S. Coleman*, TRW, 12900 Federal Systems Park Dr., Fairfax, VA 22033, nastaran.coleman@trw.com, ***Carl M. Harris***

Many telecommunications and transportation networks that alter their routing functions in response to congestion dynamically are best modeled as queueing

networks with state-dependent routing probabilities. These models' mean flow rates, blocking probabilities and other performance measures are approximated. Error bounds on these approximations are identified and all results are evaluated by simulation.

3) On Queueing Models with Job Type Restricted Machines, ***Jeremy Visschers***, University of Technology, PO Box 513, Eindhoven, 5600 MB, The Netherlands, jeremy@win.tue.nl www.win.tue.nl/math/bs/stock_opt/jeremy/index.html, ***Ivo Adan***, ***Jaap Wessels***

Some recent results are presented for queueing models with job type restricted machines and machine dependent exponentially distributed processing times. It is shown that some special models have a solution to the equilibrium equations that is a sum of product forms.

4) Optimal Admission Policies for a Nonstationary Two-Class Queueing System, ***Mark E. Lewis***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, ***Hayriye Ayhan***, ***Robert D. Foley***

We consider a finite capacity queueing system and 2 arriving customer classes. When a customer arrives, the server must decide if the customer is important enough to be served. This decision is based on the amount of space available in the system and the reward the arriving customer offers. We examine optimal admission strategies for this queueing system...

5) Throughput WIP Optimization in Queueing Systems: A Linear Programming Characterization, ***Jose Nino-Mora***, Universitat Pompeu Fabra, Dept. of Economics & Bus., UPF Ramon Trias Fargas, 25-27, Barcelona, E-08005, Spain, ninomora@upf.es http://www.econ.upf.es/~ninomora

We characterize the region of achievable throughput-WIP performance in a general queueing system under the threshold property, introduced here. This leads to new LP formulations of throughput-WIP optimization problems and new insights on threshold optimality. An application of the framework is given.

SE39 Production Scheduling IV

Contributed Session

Chair: M. Hamdy Elwany, 678 El-Horreya Ave., Genaklis, Alexandria, 21411, Egypt, elwany@dataxpres.com.eg

1) Scheduling Rules to Keep Balances of WIP in Semiconductor Fabrication, ***Younghoon Lee***, Yonsei University, ISE Dept., Sudaemoon-Gu Shichon-Dong 134, Seoul, Korea, youngh@bubble.yonsei.ac.kr http://ise.yonsei.ac.kr, ***Hanmin Cho***, ***Sooyoung Kim***

Keeping the balance of WIP in the semiconductor fabrication line is important to achieve high throughput and short cycle time. Cyclic movement of wafers makes the fabrication line management complex. Several scheduling rules at the bottleneck machines are developed and tested on the simulator. Scheduling policies with good performances are suggested.

2) Problems - Models - Complexity, ***Wolfgang Brueggemann***, Universitaet Hamburg, Inst. Logistik & Transport, Von-Melle-Park 5, Hamburg, 20146, Germany, na.brueggemann@na-net.ornl.gov, ***Kathrin Fischer***, ***Hermann Jahnke***

The computational complexity of a problem is usually examined through a certain model. This relationship is analyzed from a formal point of view of defining an equivalence relation on the set of models. The resulting equivalence class can be idenfied with the problem itself. The concept is applied to 2 examples.

3) Short-Term Network Organizations: Emergence & Institutionalization of Flexible Production Structures in the US Movie Industry, 1930-1950, ***Andreas Schwab***, University of Wisconsin, 975 University Ave. 2261, Madison, WI 53706, aschwab@students.wisc.edu

We investigate management challenges of short-term network organizations'(disbanded after completing single projects of short duration) applying TCE and institutional theory. Performance hypotheses are tested based on strenthening psychological contracts, establishing shadow of the future, and standardization of practices using archival data from the Hollywood movie industry (1930-1950).

4) Due Date Lead Time Sensitivity to Dispatching Rules & Scheduling Variables, ***M. Hamdy Elwany***, 678 El-Horreya Ave., Genaklis, Alexandria, 21411, Egypt, elwany@dataxpres.com.eg, ***Amr El-Badan***

We present a simulation procedure to calculate the sensitivity of the due-date lead-time. Simulation experiments have been conducted to evaluate the effect of rpocessing time distribution parameters. The processing time is the major factor in controlling DOLT. A 15% reduction in the processing time outperforms the use of SPT.

Monday 08:00-09:30

MA01 Topics in Behavioral Decision Making

Sponsor: Decision Analysis
Sponsored Session

Chair: George Wu, University of Chicago, Grad. School of Bus., 1101 E 58th St., Chicago, IL 60637, george.wu@gsb.uchicago.edu

1) Axiomatic Analysis of Quality Adjusted Life Years Models Under Cumulative Prospect Theory, ***John Miyamoto***, University of Washington, Dept. of Psychology, Box 351525, Seattle, WA 98195-1525, jmiyamot@u.washington.edu, ***Hans Bleichrodt***

Preference axioms will be presented that generalize the QALY utility model to cumulative prospect theory. An attempt will be made to characterize loss aversion and risk aversion in the QALY domain.

2) Source Preference in Decision Under Uncertainty, ***George Wu***, University of Chicago, Grad. School of Bus., 1101 E 58th St., Chicago, IL 60637, george.wu@gsb.uchicago.edu, ***Richard Gonzalez***

The psychological weight attached to an event, the decision weight, usually differs from the probability of that event. We study how decision weights depend on the source of the uncertainty. In particular, we examine how source preference affects elevation and curvature of the decision weighting function.

3) withdrawn - author request of 9/1, ***Craig Fox***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, cfox@mail.duke.edu

4) Disentangling Sources of Decision Bias in NVP Problem: Role Anchoring Insufficient Adjustment Preferences Minimizing Expost Inventory Error, ***Maurice E. Schweitzer***, University of Miami, Dept. of Mgmt., Sch. of Bus., 414 Jenkins Bldg., Coral Gables, FL 33124-9145, mschweit@umiami.ir.miami.edu, ***Gerard P. Cachon***

We describe an experiment designed to disentangle explanations of observed decision bias in the newsvendor problem. Consistent with a preference for minimizing the ex-post inventory error, order quantities in this experiment were closer to the median when the demand distribution was large, under both high and low profit margin conditions.

MA02 Simulation Modeling of Multiple Railroad Assets

Sponsor: Railroad Applications
Sponsored Session

Chair: Todd McClain, Burlington Northern Santa Fe Railway, 3017 Lou Menk Dr., Ft. Worth, TX 76102, todd.mcclain@bnsf.com

1) Modeling the Interaction Between Railroad Freight Schedule Adherence & Asset Utilization, ***Yan Dong***, Transport Dynamics, Carnegie Ctr., Bldg. 103, Ste. 317, Princeton, NJ 08540, ydon@transdynamics.com, ***Joseph M. Sussman***, ***Carl D. Martland***

In recent years, railroads have debated the extent to which schedule adherence affects asset utilization. A simulation model was used to examine network performance under 3 operating strategies: schedule adherence, flexible short-run scheduling and flexible operations. No strategy was best in terms of all the major measures of cost, capacity and service...

2) MultiRail's Asset Management Capabilities, ***Marc S. Meketon***, MultiModal Applied Systems, Inc., 125 Village Blvd., Ste. 270, Princeton, NJ 08540, marc@multimodalinc.com

MultiRail is an advanced railway operations planning and control system used by service designers. Add-ons are being developed to provide visibility into the downstream operations of the railway. This allows the service designers to understand the impact of the operating plan on the crew and capital assets...

3) Network Simulation of Railroad Assets, ***Todd McClain***, Burlington Northern Santa Fe Railway, 3017 Lou Menk Dr., Ft. Worth, TX 76102, todd.mcclain@bnsf.com

Railroads have traditionally addressed network-wide policy questions by analyzing each major asset individually. A high level simulation model of the railroad, including all major assets, reveals the interaction between the assets. The model allows better strategic planning and quantification of network decision policies.

MA03 Innovative Teaching Applications of Microsoft Excel

Sponsor: Education
Sponsored Session
Chair: Michael R. Middleton, University of San Francisco, McLaren Sch. of Bus., 2130 Fulton St., San Francisco, CA 94117-1080, middleton@usfca.edu

1) Dynamic Excel Graphs in Operations Management, ***Lawrence W. Robinson***, Cornell University, Johnson Grad. School of Mgmt., Ithaca, NY 14853, lwr2@cornell.edu

Linking spinners and sliders to graphs helps students quickly visualize complex relationships. Applications include collapsing cumulative flow plots against either axis, i.e., Little's Law, showing the effects of loosening bottlenecks on inventory buildups, i.e., the National Cranberry case and changing the feasible region and objective function coefficients, i.e., LP.

2) Developing Classroom Simulation Models in Excel - Pros, Cons & Experiences, ***Daning Sun***, University College of the Cariboo, 900 McGill Rd., Box 3010, Kamloops, BC, V2C 5N3, Canada, dsun@cariboo.bc.ca, ***Bernie Warren***

Using a general-purpose spreadsheet such as Excel for simulation has its own unique difficulties compared with dedicated packages. We present our experience using Excel simulation models in the classroom and various techniques of converting the logical relationshops into spreadsheet format. We also identify the advantages of Excel over dedicated packages.

3) Excel Add-Ins for MBA Decision Modeling, ***Michael R. Middleton***, University of San Francisco, McLaren Sch. of Bus., 2130 Fulton St., San Francisco, CA 94117-1080, middleton@usfca.edu

Design of a down-sized MBA core course in MS requires careful selection of relevant topics and software tools. Our course has DA techniques as the focus, with easy-to-use Excel add-ins for sensitivity analysis (spider and tornado charts), Monte Carlo simulation and decision trees.

MA04 Tutorial: Linear Programs, Integer Programs & Constraint Programming

Sponsor: INFORMS Computing Society
Sponsored Session
Chair: Irvin J. Lustig, 99 Braeburn Dr., Princeton, NJ 08540, irv@dizzy.cplex.com

1) Tutorial: Linear Programs, Integer Programs & Constraint Programming, ***Irvin J. Lustig***, 99 Braeburn Dr., Princeton, NJ 08540, irv@dizzy.cplex.com

The recent acquisition of CPLEX Optimization, Inc. by ILOG presents opportunities for users of LP, IP and constraint programming to take advantage of new products and tools that will assist users in modeling and application development. One confusion that often arises is due to the use of the word "program" by each community...

MA05 New Developments in Supply Chain Models

Sponsor: MSOM
Sponsored Session
Chair: Jeannette Song, Columbia University, IEOR Dept., New York, NY 10027, song@ieor.columbia.edu

1) Modified Take or Pay Capacity Commitments, ***Eran Liron***, Stanford University, Grad. School of Bus., Stanford, CA 94305-5015, liron@gsb-pound.stanford.edu, ***Evan Porteus***

We propose a simple modification to the "take Or pay" contract, often found in supply chains, that obtains Pareto superior performance in the case of uncertain customer demand for the buyer's product and superior buyer information. The buyer pays a discounted price on any reserved, but unused, capacity.

2) Lot Sizes in Production Lines with Nonstationary Demand & Random Yield, ***Matthew J. Sobel***, NYU, Stern School Ste. 7-01A, 40 West 4th St., New York, NY 10012-1118, msobel@stern.nyu.edu

A dynamic model of a make-to-stock production line process facing nonstationary demand and with random yields at work stations is shown to have an easily computed optimal lot size policy. Assumptions include full backlogging and restrictions on the yield distributions. Both discounted and average cost models are considered.

3) The Effect of Product Rationing on the Supply Chain, ***Tava Lennon Olsen***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, tlennon@engin.umich.edu, ***Roman Kapuscinski***

One supplier will usually service a number of diverse customers. Different customers will have different requirements for lead times and percentage of on-time delivery. Therefore, it may be advantageous to assign priorities to customers and ration product based on a customer's priority. We investigate the strategic implications of product rationing.

4) Optimal Policies for Multi-Echelon Inventory Problems with Nonstationary Demand, ***Fangruo Chen***, Columbia University, Grad. Sch. of Bus., New York, NY 10027, fc26@pop.columbia.edu, ***Jeannette Song***

We study a multi-stage inventory system in which the demand uncertainty is driven by an underlying Markov chain. The ordering costs are linear. An echelon, base-stock policy with state-dependent order-up-to levels is shown to be optimal under the average cost criterion. An efficient alorithm is also provided.

MA06 Flexible Manufacturing Systems

Contributed Session
Chair: Themis Genadis, AC & E Services SA, 259 Mesogion Ave., Athens, N. Psichiko, 15451, Greece, tgenadis@ace-hellas.gr

1) Solution Approaches for the FMS Scheduling Problem with Joint Setup, ***Wun-Hwa Chen***, National Taiwan University, 50 Ln 144, Keelung Rd. Sec. 4, Taipei, 106, Taiwan, ROC, andychen@ccms.ntu.edu.tw achen.ba.ntu.edu.tw

The problem of allocating workloads on parallel unrelated machines with joint setups and tool constraints is a typical FMS scheduling problem. We propose a Lagrangean relaxation-based algorithm and several intelligent search heuristics for solving the problem. An extensive computational test is conducted to compare the performance of the algorithms proposed.

2) A Flexible Shop Floor Control Architecture for Flexible Manufacturing Systems, ***Baskar Krishnamoorthy***, Oklahoma State University, Ctr. for CIM, Sch. of IE&M, 322 Engineering N, Stillwater, OK 74078, bask@okstate.edu http://www.okstate.edu/cocim/members/baskar, ***Manjunath Kamath***

In an FMS, the control system is often designed for a specific installation, and hence, cannot easily accommodate system changes and reconfigurations. A new flexible control architecture for generic FMSs is proposed where the shop-floor controllers are designed based on discrete-event modeling concepts.

3) A Production Planning Problem in FMS

We review current models and approaches to the loading problem in FMS and identify the key limitations arising from MHS and other secondary resources that have not been adequately addressed before. The loading problem is formulated as an MIP and incorporates some of the key constraints not included before. A Lagrangian heuristic is developed to solve the problem.

4) Design & Analysis of Agent-Based Manufacturing/ Production Planning, ***Chin-Yin Huang***, Purdue University, Sch. of IE, W Lafayette, IN 47907-1287, chinyin@ecn.purdue.edu, ***Shimon Y. Nof***

Computer and communication technologies have revolutionarily changed the behavior of distributed manufacturing systems. Under such an impact, a manufacturing system is becoming more agent-oriented and can be known as an agent-based manufacturing system. An enterprise is defined as a group of inter-organizational and intra-organizational agents...

5) Impact of Time Uncertainty on the Economic Planning of Programmable Automation Under Uncertainty about Future Product Mix Requirements, ***Themis Genadis***, AC & E Services SA, 259 Mesogion Ave., Athens, N. Psichiko, 15451, Greece, tgenadis@ace-hellas.gr

We discuss the development and analysis of a mathematical programming model for economic evaluation of new manufacturing technology, which integrates theoretical advances with economically significant characteristics of programmably-automated technology. The impact of time uncertainty of anticipating future technical advance upon the adoption of new equipment embodying technological improvements upon the scrapping of old equipment...

MA07 Analytical Approaches for Supply Chain Management

Cluster: Supply Chain Management
Invited Session
Chair: Vedat Verter, McGill University & CRT, Faculty of Mgmt., 1001 Sherbrooke St. W, Montreal, Quebec, H3A 1G5, Canada, verter@management.mcgill.ca

1) Mode Selection in Supply Chain Design, ***Jarrod D. Goentzel***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, goentzel@isye.gatech.edu, ***Paul Griffin***, ***H.***

Donald Ratliff

We show how to incorporate road network structure in effectively selecting customers for multi-stop routes. Actual LTL rates are used as the alternative costs for comparison.

2) Modeling the Mammographic Screening Centers Location Problem, ***Sophie D. Lapierre***, Ecole Polytechnique, CRT, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3A7, Canada, sophiel@crt.umontreal.ca, ***Vedat Verter***

We present the problem of locating breast cancer screening centers in the Montreal area. We present implications of using different location strategies based on analytical models. We also assess the current policy which lets the existing health care providers decide whether or not to open screening centers.

3) Integrated Models for Production-Distribution System Design, ***Vedat Verter***, McGill University & CRT, Faculty of Mgmt., 1001 Sherbrooke St. W, Montreal, Quebec, H3A 1G5, Canada, verter@management.mcgill.ca, ***Abdullah Dasci***

We present analytical models for simultaneous optimization of the facility location, capacity acquisition and technology selection decisions in a production-distribution network. The proposed solution procedure is based on piecewise progressive linear underestimation. Our computational results are encouraging.

4) Proxying Demand by Sales Information: Inaccuracies Encountered, ***Ricardo Ernst***, Georgetown University, Sch. of Bus. - G-4 Old North, 38th & O Sts NW, Washington, DC 20057, ernstr@gunet.geroretgown.edu

Future demand is possibly the most important piece of information in every business. Traditionally, the main source of information for the estimation of future demand has been historical sales. We develop an analytical model to quantify the impact of using sales as a proxy for future demand instead of more rigorous methods of estimation.

MA08 Statistical Issues in Inventory Control

Sponsor: Applied Probability Section
Sponsored Session

Chair: Martin L. Puterman, University of British Columbia, Fac. of Commerce, 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada

1) withdrawn - author request of 9/25, ***Jeff I. McGill***, Queen's University, Sch. of Bus., Kingston, Ontario, K7L 3N6, Canada, ***A. J. Taylor***

2) Estimating Lost Sales in a Retail Chain From Comparable Sales Data, ***Stephen A. Smith***, Santa Clara University, Kenna Hall 200, 500 El Camino Real, Santa Clara, CA 95053-0382, ssmith@scu.edu

In general, when item stocks during certain time periods are out at some stores in a retail chain, there are no backorders and lost sales are not observable. Taking seasonal demand fluctuations into account, we develop a method for estimating lost sales using sales data from other stores and from other time periods.

3) The Benefits of Postponement - Revisited, ***Yossi Aviv***, Washington University, CB 1133, One Brookings Dr., St. Louis, MO 63130-4899, aviv@wuolin.wustl.edu http://www.olin.wustl.edu/faculty/aviv/, ***Awi Federgrun***

We characterize the benefits of postponement or delayed differentiation strategies in a setting where the parameters of future demand distributions become known progressively with increased precision on the basis of observed sales data. We show how the benefits extend beyond those explained in earlier studies.

4) Optimal Order Quantities When Lost Sales Are Unobservable, ***Xiaomei Ding***, University of British Columbia, Fac. of Commerce, 2053 Main Mall, Vancouver, BC V6T 1Z2, Canada, ***Martin L. Puterman***

We show how unobservable lost sales affects estimation and optimal policies in inventory control models through analysis of the newsvendor model. Through a Bayesian MDP formulation, we show that unobservable lost sales lead to higher optimal order levels than when the demand is fully observable...

MA09 Valuation in Auctions

Cluster: Competitive Bidding
Invited Session

Chair: Donald B. Hausch, University of Wisconsin, Sch. of Bus., 975 Univ. Ave., Madison, WI 53706

1) Auctions with Almost Common Values: The "Wallet Game" & its Applications, ***Paul Klemperer***, Oxford University, England, UK

We use a classroom game, the "wallet game," to show that slight asymmetrics between bidders can have very large effects on prices in standard ascending auctions of common-values objects. The effects are greatly exacerbated by entry costs or bidding costs. We discuss applications to airwaves auctions and takeover bids.

2) Auctions with Financially-Constrained Bidders & Default, ***Ian L. Gale***, Georgetown University, Dept. of Eco., Washington, DC 20057-1045, ***Donald B. Hausch***

Financially-constrained bidders who are offered deferred payment terms bid more aggressively as their wealth increases. Thus, the bidder with the lowest wealth is more likely to win, and most likely to eventually default. Despite this default risk, sellers prefer bidders with no initial wealth to bidders without financial constraints.

3) Information Biases When Sellers Set Reserves in Independent Private Value Auctions: An Experimental Study, ***Eric Greenleaf***, New York University, Stern Sch. of Bus., 44 W 4th St., Rm. 8-94, New York, NY 10012-1126, egreenle@stern.nyu.edu

We hypothesize that sellers setting reserves rely too much on frequency information concerning how often property sells, and too little on magnitude information regarding the highest auction bid. This behavior leads sellers to set reserves differently from predictions of normative models. Results of an auction experiment support the hypotheses.

MA10 Stochastic Aspects of the Logical Analysis of Data

Sponsor: College on AI
Sponsored Session

Chair: Endre Boros, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, boros@rutcor.rutgers.edu

1) Probabilistic Analysis of Algorithms for the Logical Analysis of Data, ***Martin Anthony***, London School of Economics, Dept. of Mathematics, Houghton St., London, WC2A 2AE, UK, m.anthony@lse.ac.uk

I apply some of the techniques of computational learning theory to quantify the expected performance of standard techniques for the logical analysis of data.

2) Stochastic Patterns, ***Andrzej Ruszczynski***, Rutgers University, Dept. of MS/IS, Piscataway, NJ 08854, rusz@rutcor.rutgers.edu

We consider the following: given a large collection of Boolean data equipped with some probability distribution, identify monomials that predict the value of a certain Boolean function with a high reliability. We show this is a special case of a stochastic IP problem and present a stochastic B&B method for its solution. We consider the problem of constructing a stochastic theory...

MA11 Efficient Product Development

Sponsor: Technology Management
Sponsored Session

Chair: Steven D. Eppinger, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02139, eppinger@mit.edu

1) Changing with the Times: Proactive Product Positioning for Rapidly Evolving Environments, ***Sanjay Jain***, George Washington University, Washington, DC 20052, sjain@gwis2.circ.gwu.edu, ***Kamalini Ramdas***

When designing products in rapidly changing environments, firms often respond to new information reactively through expensive repositioning. An alternative is to proactively consider anticipated changes in the marketplace or technologies along with the cost of repositioning. We propose a conceptual framework and a stochastic dynamic programming model for proactive product positioning.

2) Sourcing by Design: Product Architecture & the Supply Chain, ***Sharon Novak***, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02139, snovak@mit.edu

We argue that the "make/buy" product development decision is strategically linked to product architecture. We propose a framework for analyzing product architecture, from modular to integral, in the context of deployment of the firm's productive assets. Our model is based on extensive data collection and econometric analysis from automakers worldwide.

3) Toyota's New Conventional Wisdom for Integrated Product Development, ***Durward K. Sobek, II***, Montana State University, Dept. of MIE, Bozeman, MT 59717-3800, dsobek@ie.montana.edu

We describe how basic coordinating mechanisms from organization theory form the foundation of Toyota's world-class product development system. Toyota

integrates them into a highly optimized system by cleverly designing key "twists" to the classic mechanisms so they work together seamlessly.

4) Coupled Analysis of Development Cost, Schedule & Performance, ***Tyson R. Browning***, MIT, 77 Massachusetts Ave., Rm. 33-407, Cambridge, MA 02139, tyson@mit.edu, ***Steven D. Eppinger***

Product development cost, project schedule and product performance can be traded off by carefully choosing which activities to do and when, and whether additional design iterations should be undertaken. We use the design structure matrix to build an activity-based model which facilitates this analysis.

MA12 Intrastructure to Mutual Adaptation: Knowledge & Knowledge Mgmt. from Different Perspectives

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session
Chair: Kathy Wohlert, University of Texas, Div. of Mgmt. & Mkt., 6900 North Loop 1604 West, San Antonio, TX 78249, kwohlert@utsa.edu

1) War Dance for the Battle of the Pipes: Competitive Analysis of the Telecommunications Infrastructure Industry to Support Global Knowledg, ***Judi Feltenberger***, Science Applications Intl. Corp., 4242 Woodcock Dr., Ste. 150, San Antonio, TX 78228

Telecommunications provides the infrastructure for global knowledge management in transnational and multinational corporations. The global telecommunications industry, which supports this infrastructure, is one that has been born out of deregulation, technology, and customer demand. We provide an industry and competitive analysis and reviews the strategic aspects of this industry.

2) Using Lessons from the Past to Inform the Future: From First Generation to Spiral Development Project Management, ***Christopher Ellis***, US Air Force

We review the traditional, linear techniques of project management and product development and present a case for the adoption of the spiral development model. It examines key factors of velocity-based acquisition, communications flow, requirements analysis and proper prototyping essential to developing products in a timely, cost-effective manner.

3) A Framework for Managing Information Technology Innovation: Life as it Really is in Organizations, ***Bobby Moore***, MITRE Corporation, 1202 Reawick Dr., San Antonio, TX 78253, bmoore@texas.net

The introduction and implementation of IT offers one of the greatest management challenges for today's turbulent organizations. We offer a systems approach to managing technological innovation and change - in practice as well as in theory - through the lens of mutual adaptation.

4) Making Sense of the Knowledge Environment Puzzle, ***Kathy Wohlert***, University of Texas, Div. of Mgmt. & Mkt., 6900 North Loop 1604 West, San Antonio, TX 78249, kwohlert@utsa.edu

The previous presentations in this session provide different pieces of the knowledge environment puzzle. This presentation is an effort at sensemaking or interpreting and understanding the relationship among these pieces.

MA13 Knowledge & Organizations

Sponsor: Organization Science
Sponsored Session
Chair: To be announced

1) College on Organization Science Subconference: Knowledge & Organizations

MA14 Transportation II

Contributed Session
Chair: Jim E. Everett, University of Western Australia, Dept. of Info. Mgmt. & Mktg., Nedlands, WA, 6009, Australia, jeverett@ecel.uwa.edu.au

1) Tactical & Operational Planning of a Transportation Network, ***Matthieu C. van der Heijden***, University of Twente, PO Box 217, Enschede, 7500 AE, The Netherlands, m.c. vanderheijden@sms.utwente.nl, ***Mark Ebben***, ***Noud Gademann***

Consider a network for freight transport between multiple nodes by AGVs. We discuss several options for the tactical and operational planning of such a network, including workload forecast, empty car positioning and job scheduling. These options vary by the amount of information used and the hierarchical decision level. Numerical results show the value of information and central decision making.

2) An Object-Oriented Simulation Model for the Design & Control of an Underground Transportation System, ***Mark Ebben***, University of Twente, PO Box 217, Enschede, 7500 AE, The Netherlands, m.j.r.ebben@sms.utwente.nl, ***Matthieu C. van der Heijden***, ***Aart van Harten***

As an alternative to freight transportation by road, an underground tube system for transport between various locations in the Netherlands is being designed. We construct an object-oriented simulation model to establish capacity requirements and the efficiency of logistic control procedures in such a system. We discuss the model structure, control issues, simulation results and their implications.

3) New Models for Hub Location, ***James F. Campbell***, Univ. of Missouri-St. Louis, Sch. of Bus. Admin., 8001 Natural Bridge Rd., St. Louis, MO 63121-4499, campbell@jinx.umsl.edu, ***Mohan Krishnamoorthy***, ***Andreas Ernst***

Models for hub location research include hub facilities, hub arcs with reduced unit flow costs to reflect economies of scale and access arcs. We present several new models and results for problems with isolated and connected hubs and various restrictions on the hub arc topology.

4) Optimizing the Distribution Cost for a Cooking Oil Company by Balancing Direct/Indirect Truck Deliveries, ***Toshiyuki Hama***, Tokyo Research Lab. IBM Japan Ltd., 1623-14 Shimotsuruma, Yamato-shi, Kanagawa-ken, 242, Japan, hama@jp.ibm.com

We have reduced the distribution cost of a cooking oil company by balancing direct/indirect truck deliveries, which have different cost structures. We have modeled the problem as an extended bin-packing problem and solved it by stochastic local search, sequencing GA and grouping GA. Experimental results and comparisons are shown.

5) Simulation of a Distribution System in Indonesia, ***Jim E. Everett***, University of Western Australia, Dept. of Info. Mgmt. & Mktg., Nedlands, WA, 6009, Australia, jeverett@ecel.uwa.edu.au

The model aids an Indonesian manufacturer plan distribution from a warehouse to retailers, along routes requiring different types of transport vehicles. Customer opening hours, travel times and varying demand patterns are included in an animated simulation of delivery schedules. Resource skimming identifies surplus transport capacity and stock levels.

MA15 Semidefinite Programming: Applications, Duality & Interior-Point Methods

Tutorial Session
Chair: Paul Tseng, University of Washington, Dept. of Math., Box 354350, Seattle, WA 98195-3200, tseng@math.washington.edu

1) Tutorial: Semidefinite Programming - Applications, Duality & Interior-Point Methods, ***Michael J. Todd***, Cornell University, Sch. of OR/IE, Rhodes Hall, Ithaca, NY 14853-3801, miketodd@orie.cornell.edu

During the past 8 years, there has been a substantial increase in research in semidefinite programming, which is concerned with optimizing a linear function of a symmetric matrix subject to linear equality constraints and the requirement that the matrix be positive semidefinite. This interest has been due partly to the modeling power of this class of problems...

MA16 Vehicle Routing & Scheduling

Sponsor: Transportation Science
Sponsored Session
Chair: Amelia Regan, University of California, Dept. of Civil & Environ. Eng., Engineering Gateway E4151, Irvine, CA 92697, aregan@uci.edu
http://www.its.uci.edu/~aregan/

1) Pickup & Delivery of Indistinguishable Items: The Electric Car Case, ***Moshe Dror***, University of Arizona, Coll. of Bus. & Public Admin., Dept. of MIS, Tucson, AZ 85721, mdror@bpa.arizona.edu, ***Dominique Fortin***, ***Catherine Roucairol***

We examine efficient redistribution of indistinguishable items on a given graph of pickup and delivery nodes. The solution requires generating distribution paths which are not necessarily simple. We present a graph transformation approach and construct exact solutions based on problem decomposition. We also test heuristic solution methodology for this problem...

2) A 5/3 Approximation Algorithm for the Clustered Traveling Salesman Tour & Path Problems, ***Julien D. Bramel***, Columbia University, 406 Uris Hall, New York, NY 10027, jdb8@columbia.

edu, *Shoshana Anily*, *Alain Hertz*

We consider the ordered cluster TSP. A vehicle starting and ending at a given depot must visit a set of n points. Points are partitioned into K, K<=n, prespecified clusters. The vehicle must first visit points in cluster 1, then points in cluster 2, ..., and finally points in cluster K so the distance traveled is minimized. We present a 5/3-approximation algorithm for this problem which runs in O(n*3) time.

3) Can We Find Container Shipping Routes Fast Enough?, ***Matt Brown***, OOCL USA Inc., 2841 Junction Ave., Ste. 200, San Jose, CA 95134, brownma@oocl.com, ***Dave Chang***, ***Karl Dickson***

We present the performance and quality results of an optimal shortest path search algorithm and 2 heuristics used to find container shipping routes for a global transportation network. Because this search is part of an on-line booking system, we need to provide sub-second performance.

MA17 Location Models I

Sponsor: Location Analysis
Sponsored Session

Chair: Oded Berman, University of Toronto, Fac. of Mgmt., 105 St. George St., Toronto, Ontario, M5S 3E6, Canada, berman@mgmt.utoronto.ca

1) A Genetic Algorithm for Solving Strategic Scenario-Based Facility Location Problems, ***Susan M. Hesse***, Northwestern University, 2225 N Campus Dr., Dept. of IE/MS, Evanston, IL 60208, hesse@iems.nwu.edu, ***Mark Daskin***

A GA capable of solving a range of scenario-based facility location problems is outlined. The underlying model endogenously determines the scenarios against which planning should be done and the facility locations. Computational results comparing the GA to optimal solutions are presented.

2) Different Objectives in Competitive Location Models, ***H. A. Eiselt***, University of New Brunswick, Fac. of Administration, PO Box 4400, Fredericton, NB, E3B 5A3, Canada, haeiselt@unb.ca

Consider a competitive location model in which competing facilities choose their locations in a given space. Contrary to the standard scenarios, this model does not assume that all facilities follow the same objective. A variety of combinations of objectives are considered in the context of Stackelberg solutions and Nash equilibria.

3) A Dynamic Continuous Location Model with Time Dependent Demands, ***Mohammed Badr***, SUNY, Dept. of IE, 342 Bell Hall, Box 602050, Buffalo, NY 14260-0250, badr@buffalo.edu, ***Rajan Batta***, ***Joyendu Bhadury***

We investigate a dynamic continuous location model for a service vehicle traveling with fixed finite velocity on a graph where each of the nodes has a time dependent demand. The model is formulated, solution techniques are proposed and computational experience is reported.

4) The Generalized Maximal Cover Weight Problem, ***Oded Berman***, University of Toronto, Fac. of Mgmt., 105 St. George St., Toronto, Ontario, M5S 3E6, Canada, berman@mgmt.utoronto.ca, ***Dmitry Krass***

In the maximal weight cover problem, customers within a critical distance of a facility are considered "covered"; each customer is either covered completely or not at all. We allow for partial coverage of customers, with the degree of coverage a non-increasing step function of the distance to the nearest facility.

MA18 Health Management Applications

Sponsor: Health Applications
Sponsored Session

Chair: Timothy W. Butler, Wayne State University, Sch. of Bus. Admin., Detroit, MI 48202, timothy.butler@wayne.edu

1) Population Classification for Health Management, ***Douglas N. Fuller***, University of Virginia, Dept. of Systems Eng., Thornton Hall, Charlotesville, VA 22903, dnf8h@watt.seas.virginia.edu, ***William T. Scherer***

Synthesizing work done in several areas, this study seeks to develop an improved method of population classification. The objective of the classification problem is to create groupings for which unique, optimal (or near optimal) policies can be created for a combination of maintenance, detection and/or treatment protocols as appropriate.

2) Comparing DEA & AHP in the Analysis of Different Health Care Systems, ***Zhongxian Wang***, Montclair State University, Dept. of Info. & Dec. Sci., Upper Montclair, NJ 07043, wangj@saturn.montclair.edu, ***Qiyang Chen***

Comparison in international health care systems has involved many complicated issues. By using AHP and DEA, we have disentangled the relationship between the health expenditures and the actual benefits.

3) Patient-Based Guidelines for Antibiotic Prophylaxis for Surgical Procedures, ***Amy R. Wilson***, University of California, Dept. of IE/OR, 4172 Etcheverry Hall, Berkeley, CA 94720, amy@ieor.berkeley.edu

Some authors have proposed that guidelines for antibiotic prophylaxis for surgery patients take into account patient and hospital characteristics. We propose a model to assess whether the inclusion of such characteristics in the drug selection process would yield better outcomes. Intersting outcomes include patient status, cost and antibiotic spectrum.

4) Critical Factors of Quality in Health Care Settings, ***Subhash Lonial***, University of Louisville, Coll. of Bus. & Public Admin., Louisville, KY 40292, scloni01@ulkyvm.louisville.edu, ***P. S. Raju***, ***Yash Gupta***, ***Craig Ziegler***

Many health care institutions/hospitals collect quality-related data of various types. However, this fragmented approach to quality is not the measure of organization-wide quality management. We used the instrument developed by Saraph, et al. and modified it to meet the criteria for health care organizations.

5) The Influence of Technology on Health Care Performance Measures, ***Timothy W. Butler***, Wayne State University, Sch. of Bus. Admin., Detroit, MI 48202, timothy.butler@wayne.edu, ***G. Keong Leong***

We investigate the influence of technology on hospital performance and on the competitive capabilities of cost containment, flexibility, service delivery and quality. The performance outcome includes financial, operational and clinical dimensions.

MA19 Turning Crowds into Teams by Design: Problem Solving Using the Value Methodology

Tutorial Session

Chair: Marlo Stebner, Boeing CAG, PO Box 3707, MS 6H-TE, Seattle, WA 98124-2207, w.stebner@pss.boeing.com

1) Tutorial: Turning Crowds into Teams by Design - Problem Solving Using the Value Methodology, ***Henry Ball***, Boeing ISDS, PO Box 3999, MS 87-92, Seattle, WA 98124-2499, henry.a.ball@boeing.com

Solving complex problems using VM is a proven practice. We will introduce the history and theory of VM, the sequential steps used in the VM "job plan," the selection of the VM team and identify several of the commonly used "tools" employed in value studies.

MA20 Modeling Methodologies & Challenges in Sensor Fuzed Munitions

Sponsor: Military Applications
Sponsored Session

Chair: Steve Pearcy, TACOM ARDEC

Co-Chair: Dean Risseeuw, Textron Systems, 201 Lowell St., Wilmington, MA 01887, drisseeu@systems.textron.com

1) A Closed Form Solution to a Ballistic Trajectory Problem, ***Walt O'Connor***, TEXTRON Systems, 201 Lowell St., Wilmington, MA 01887, woconnor@systems.textron.com

Closed-form WAM sublet trajectory equations form the basis of an efficient Monte Carlo simulation model for evaluating overall system performance metrics. Newton's iteration method drives the sublet-to-target geometry that unfolds during flyout towards the desired intercept solution without requiring a time-consuming "virtual fly-out" in the simulation.

2) Evaluating Many-on-Many Engagements (While We're Still Young), ***Gary Grant***, TEXTRON Systems, 201 Lowell St., Wilmington, MA 01887, ggrant@systems.textron.com

The textron munitions effectiveness model is a user-friendly simulation of engagements using smart submunition weapons. The principal features of MEM, including its GUI, are described. The methodology used to evaluate results of engagements is explained; it dramatically reduces the time required to perform Monte Carlo trials.

3) Connecting Models to the High Level Architecture, ***Richard Strand***, TACOM-ARDEC, USARDEC, Attn: AMSTA-AR-FSS, Picatinny Arsenal, NJ 07806-5000, rstrand@pica.army.mil

We give an example of a reusable object-oriented infrastructure that provides the basis for constructing a focused and flexible distributed simulation federate for the wide area munition product improvement development program.

4) Towards the Virtual Proving Ground: Smart Munition Sensor Simulation with TOPATTACK, ***Bruce M. Sabol***, US Army Engineer Waterways Experiment Station, EN-C, 3909 Halls Ferry Rd., Vicksburg, MS 39180, sabolb@mailwes.army.mil

The high cost of physical testing of smart munition sensor systems has motivated development and use of detailed sensor system performance models. The use of the TOPATTACK model for predicting performance of the wide area munition sublet sensor is described and long-term efforts to develop an entirely synthetic testing environment are discussed.

MA21 DEA as an Applied Tool

Cluster: DEA
Invited Session

Chair: Timothy R. Anderson, Portland State University, Eng. Mgmt. Program, PO Box 751, Portland, OR 97207-0751, tima@emp.pdx.edu

1) DEA as a Benchmarking Tool, ***Joe Zhu***, Worcester Polytechnic Institute, Dept. of Mgmt., Worcester, MA 01609, jzhu@ecs.umass.edu, ***Lawrence M. Seiford***

In industry today, a popular quality management tool is benchmarking - the process of defining valid measures of performance comparison among peer units, using them to determine the relative positions of the peer units and ultimately establishing a standard of excellence. We discuss different categories of benchmarking with examples given to illustrate how DEA fits into each.

2) DEA as a Simulation Post-Processing Tool, ***Timothy R. Anderson***, Portland State University, Eng. Mgmt. Program, PO Box 751, Portland, OR 97207-0751, tima@emp.pdx.edu, ***Keith B. Hollingsworth, Peter K. Ghavami, Song Ji, Lane Inman***

Just as DEA can be used to compare different units relative to peers, it can also be used to compare different scenarios in simulation post-processing. We discuss how DEA has been used to examine simulation results, present new numerical results and describe remaining challenges.

3) Price Ratio Limits in DEA: Implementaton & Interpretation, ***Agha Iqbal Ali***, University of Massachusetts, Sch. of Mgmt., Finance & Op. Mgmt., Amherst, MA 01003, aiali@som.umass.edu

Constraints on the values that price ratios can take on in a DEA application have been thought of as a construct to "sharpen" efficiency scores. We discuss the implementation of price ratio limits in oriented DEA models and their interpretation as a construct that enables a relative-value-based substitution or as a construct for focusing on a sub-envelopment.

MA22 Natural Resources Management III

Cluster: Natural Resources Management
Invited Session

Chair: B. Bruce Bare, University of Washington, Coll. of Forest Resources, Box 352100, Seattle, WA 98195-2100, bare@u.washington.edu

Co-Chair: Lawrence S. Davis, University of California, 305 North St., Anderson, SC 29621, larrysd@ix.netcom.com

1) Conceptual & Practical Limits to Analysis of Ecosystem Management Problems, ***Lawrence S. Davis***, University of California, 305 North St., Anderson, SC 29621, larrysd@ix.netcom.com

Traditional optimization strategies are challenged by quantitative complexity of ecological goals, multiple decision maker context, and a politically rich and data poor analytical environment. Rising administrative, political and legal use of scientific experts willing to make the requisite value judgments and factual generalizations now seriously competes with systematic, empirical analysis.

2) Optimization of Ecosystem Management, ***Weihuan Xu***, Texas A&M University System, TX Forest Service, JB Connally Bldg., 3rd Fl., College Station, TX 77843-2136, whx@tfs.tamu.edu

An optimization procedure is developed to maximize the total output values of a forest ecosystem, which include environmental, social, and financial values from such an ecosystem. The results from the simulation of the optimization procedure demonstrate significant policy implications for improving both efficiency and equity of forest ecosystem management.

3) Operational Costs Involved in Environmental Protection, ***Andres F. Weintraub***, University of Chile, Dept. of IE, Republica 701, PO Box 2777, Santiago, Chile, aweintra@dii.uchile.cl, ***Rafael Epstein***

Chile's timber industry is basically pine plantations. The issue of environmental protection has become important. The use of models for short and medium term harvesting and for machine scheduling can be used to assess the impact of some measures. Some preliminary results based on data of forest firms are shown.

MA23 Ethics & Environmentally Sustainable Business Practices

Cluster: Ecologically Sustainable Business Practices
Invited Session

Chair: Patricia Werhane, University of Virginia, Darden School, PO Box 6550, Charlottesville, VA 22906, phw2m@virginia.edu

1) Pascal's Wager for the Environment, ***R. Edward Freeman***, University of Virginia, Darden Sch., PO Box 6550, Charlottesville, VA 22906, ref8d@virginia.edu

We apply an old argument by Blaise Pascal that is connected to much of modern decision theory to our understanding of what a reasonable person is to believe regarding environmental health. We end with speculations on the theory of rational choice and its (mis)use in environmental policy debates.

2) Integrating Business Strategy in the Analysis of "Best" Practices of Environmental Management: The Role of Firm Resources & Capabilities, ***Petra Christmann***, University of Virginia, Darden Sch., PO Box 6550, Charlottesville, VA 22906, christmannp@darden.gbus.virginia.edu

We suggest that existing firm resources and capabilities affect its ability to implement and gain competitive advantage from environmental "best practices." Findings suggest that environmental strategies cannot be analyzed in a vacuum, but rather, that attention needs to be paid to the resources and capabilities required in implementing environmental practices.

3) An Integrated Approach to Life Cycle Design, ***Matthew M. Mehalik***, University of Virginia, Systems Eng. & Applied Ethics, Sch. of Eng. & Applied Sci., Charlottesville, VA 22902, mmm2F2virginia.edu

We describe the design of a product system intended to reduce the environmental burdens of its operation and products. The systems-oriented tools of a design protocol, a modified LCA, an environmental management system and ecological cost accounting are evaluated through a case study of a compostable office furniture fabric.

4) Ishmael Enters the Boardroom, ***Richard Brownlee***, University of Virginia, Darden School, PO Box 6550, Charlottesville, VA 22906, brownleer@darden.gbus.virginia.edu

Using the example of the transformation of a major global manufacturing firm, we argue that environmentally sustainable business practices will be a significant source of competitive advantage in the next century. Part of the problem, and solution, lies with both generally accepted accounting standards and corporate cost accounting systems.

MA24 Optimization in the Pipeline Industry

Cluster: Energy
Invited Session

Chair: Richard G. Carter, Stoner Associates Inc., 5177 Richmond Ave., Ste. 900, Houston, TX 77056-6736, carter@stoner.com

1) Implementation of Mathematical Optimization Models to Increase Effectiveness & Safety of the Pipelines, ***Guennady S. Klichine***, JSC SPE VNIIEF-Volgogaz, 26 Alekseevskaya str., Nizhny Novgorod, 603005, Russia, ***Vadim Seleznev, Eugene Yu Samsonov, Sergey S. Peretrykhine***

The Russian gas pipeline network is a huge structure making transport optimization an urgent issue. Reduction of the costs even by 1% will save millions of dollars. JSC SPE VNIIEF-Volgogaz applies mathematical optimization simulation for cost reduction and failure prevention at all levels of management from compressor facilities to interregional gas networks.

2) Fuel Minimization, Flow Maximization & Design Optimization, ***Rick Brown***, Pacific Gas & Electric Company, MC B16A, PO Box 770000, San Franciso, CA 94177, rcb3@pge.com

PG&E has developed customized, gas pipeline models used to optimize operations. The programs are used by pipeline operators and engineers to minimize compressor fuel, maximize flow capacity and optimize system design.

We review the use and benefits of these programs.

3) Mixed Integer Optimization for Gas Transmission & Distribution Systems, ***Erwin Sekirnjak***, Krafft Ebinggasse 16A, Vienna, A-1140, Austria, erwin.sekirnjak@magnet.at

Operations of complex gas networks can be optimized using a general purpose LP-package, solving the nonlinear MIP problem by sequential LP. Questions such as approximation errors, risk of losing global optimality, performance and tuning of the SLP process, etc., will be discussed from an operational point of view.

4) Using Genetic Algorithms for Optimized Design & Planning of Gas Transmission Pipelines, ***S. Orero***, Hatch Associates Ltd., 2800 Speakman Dr., Mississauga, Ontario, L5K 2R7, Canada, sorero@hatch.ca, ***S. Badruddoza, M. Peco***

GAs can be used in a user-friendly environment to aid in the optimal design of gas transmission networks. We show how a GA can provide a number of optimal candidate designs from which the planner can choose the desired solution; hence, cutting the design time considerably.

MA25 Combinatorial Algorithms for Scheduling II

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: Leslie Hall, JHU, Math. Sci. Dept., Baltimore, MD 21218, leslie@noether.mts.jhu.edu

1) A Half-Integral Linear Programming Relaxation for Scheduling Precedence-Constrained Jobs on a Single Machine, ***Fabian Chudak***, Cornell University, Sch. of OR/IE, Ithaca, NY 14853, chudak@orie.cornell.edu, ***Dorit S. Hochbaum***

We present a new LP relaxation for the problem of minimizing the sum of weighted completion times of precedence-constrained jobs on a single machine. The new relaxation is simple and compact, has exactly 2 variables per inequality and half-integral extreme points. An optimal solution can be found via a minimum cut computation...

2) On-Line Minimizing the Total Completion Time on a Single Machine, ***Gerhard J. Woeginger***, Institute fuer Mathematik, Steyrergasse 30, Graz, A-8010, Austria, gwoegi@opt.math.tu-graz.ac.at, ***Amos Fiat***

We discuss on-line minimizing the sum of job completion times of n jobs on a single machine, where the jobs arrive over a list. We prove that there exists an f(n)-competitive on-line algorithm if and only if a related infinite summation converges.

3) On the Relationship Between Combinatorial & LP-Based Approaches to NP-Hard Scheduling Problems, ***R. N. Uma***, Polytechnic University, CIS Dept., 5 Metrotech Ctr., Brooklyn, NY 11201, ruma@tiger.poly.edu http://ebbets.poly.edu~/ruma, ***Martin Savelsbergh, Joel Wein***

From a theoretical and practical perspective, we discuss the relationship between LP-based and combinatorial lower bounds for some scheduling problems. We evaluate the performance of heuristics based on these lower bounds and on local search. We discuss implications for real-life scheduling problems based on experiments with actual application data.

MA26 Flows & Cuts

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: S. Thomas McCormick, University of British Columbia, Fac. of Comm., Vancouver, BC, V6T 1Z2, Canada, stmv@adk.commerce.ubc.ca

1) A Fast Algorithm for Minimum Separable Convex Cost Submodular Flows, ***S. Thomas McCormick***, University of British Columbia, Fac. of Comm., Vancouver, BC, V6T 1Z2, Canada, stmv@adk.commerce.ubc.ca, ***Satoru Iwata, Maiko Shigeno***

Our cycle-canceling algorithm uses relaxed optimality and scales linearized costs relative to the relaxation parameter. The optimal solution to an assignment problem identifies most negative vertex-disjoint cycles in an auxiliary network. A lexicographic numbering chooses these cycles to maintain feasibility and cancels only a polynomial number of cycles per scaling phase.

2) A Study of Preconditioners for Network Interior Point Methods, ***Mauricio G.C. Resende***, AT&T Labs Research, Algorithms & Opt. Dept., 180 Park Ave., Florham Park, NJ 07932-0971, mgcr@research.att.com, ***L. F. Portugal, G. Veiga, J. J. Judice***

We study and compare preconditioners available in the literature for network interior point methods. Upper bounds for the condition numbers of the preconditioned matrices are derived. The preconditioners are tested using PDNET, an interior point code for minimum cost network flow. Experimental results are presented.

3) On Quadratic Unconstrained Binary Optimization, ***Peter L. Hammer***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu, ***Endre Boros, Xiaorong Sun***

Numerous problems in combinatorial optimization, i.e., MAX-CUT, MAX-2-SAT, graph balancing, Ising model, etc., require the minimization of a quadratic function in binary variables. A new B&B method which uses a network flow formulation of roof-duality for bounding is developed. Reported applications include the solution of a 5000 variable problem.

MA27 Using Surrogates in Optimization

Cluster: Nonlinear Programming
Sponsor: Optimization
Sponsored Session
Chair: Virginia Torczon, College of William & Mary, Dept. of Comp. Sci., PO Box 8795, Williamsburg, VA 23187-8795, va@cs.wm.edu

1) Derivative Free Optimization with Constraints, ***Katya Scheinberg***, IBM, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598-0218, katyas@watson.ibm.com

We will consider nonlinear constrained optimization problems for which evaluations of the objective function and, possibly, constraints, are expensive. A class of methods based on a trust region framework and polynomial interpolation of the objective function will be presented. We will discuss theoretical properties and present numerical results.

2) Optimization Using Surrogate Objectives on a Helicopter Test Example, ***John Dennis***, Rice University, Dept. of Comp. & Appl. Math., 6100 Main St., Houston, TX 77005-1892, dennis@caam.rice.edu, ***Andrew J. Booker, Paul D. Frank, David B. Serafini, Virginia Torczon, Michael W. Trosset***

We present results for a 31 variable helicopter rotor design example. We give results for several numerical methods. This briefly describes a portion of a Boeing/IBM/Rice University collaboration whose purpose is to develop effective numerical methods for managing the use of approximation concepts or response surface methodology in design optimization.

3) Merit Functions for Optimizing with Surrogates, ***Michael W. Trosset***, College of William & Mary, Dept. of Math, PO Box 8795, Williamsburg, VA 23187-8795, trosset@math.wm.edu, ***Virginia Torczon***

The set of evaluation sites produced by traditional algorithms for numerical optimization is usually a poor experimental design. We propose a strategy for selecting evaluation sites that dynamically balances the goals of locally minimizing the current approximation to the objective function and constructing designs that are locally space-filling.

4) A First-Order Method for Managing Surrogates in Nonlinear Programming, ***Natalia M. Alexandrov***, NASA Langley Research Center, Multi. Design Opt. Branch, MS 159, Hampton, VA 23681-0001, natalia@larc.nasa.gov, ***Robert M. Lewis***

Using high-accuracy models in optimization is prohibitively expensive. Improvements in design with lower-accuracy surrogates do not guarantee improvements in high-accuracy design. We propose a general method for managing the use of high and low-accuracy surrogates in constrained optimization that assures convergence to high-accuracy solutions.

MA28 Nonlinear Programming, Complementarity & Modeling

Cluster: Complementarity Problems
Sponsor: Optimization
Sponsored Session
Chair: Michael C. Ferris, University of Wisconsin, Comp. Sci. Dept., 1210 W Dayton St., Madison, WI 53706, ferris@cs.wisc.edu

1) New AMPL Notation for Complementarity Problems, ***David M. Gay***, Bell Labs, 600 Mountain Ave., Murray Hill, NJ 07974, dmg@research.bell-labs.com, ***Michael C. Ferris, Robert Fourer***

Some problems involve complementarity constraints: pairs of inequalities, at least one of which must be tight. New, flexible AMPL syntax provides a

convenient way to state such constraints, which are turned into a canonical form for solvers. This extends AMPL to (non)linear complementarity problems and optimization problems with equilibrium constraints.

2) Solution Environments for MPEC & NLP Models, ***Steven P. Dirkse***, GAMS Development Corp., 1217 Potomac St. NW, Washington, DC 20007, steve@gams.com

We have developed a machine-independent interface to the GAMS MPEC model that allows access from within MATLAB, and have generalized this to other classes of models, i.e., CNS, NLP, LP, etc., and to other computational environments. This provides a wealth of source problems for the algorithm developer and visualization/analysis tools for the modeler.

3) Combining Nonlinear Programming & Nonlinear Complementarity Solvers, ***Arne Stolbjerg Drud***, ARKI Consulting & Development, A/S, 246 A, Bagsvaerd, DK-2880, Denmark, adrud@arki.dk

A model defined in GAMS belongs to a model class such as NLP or MCP. However, some NLP models are better solved as MCP and vice versa. We explore the translation of models from one class to another and report on performance on practical models.

4) A Predictor-Corrector Method for Nonlinear Complementarity Problems, ***Danny Ralph***, University of Melbourne, Dept. of Math. & Stats., Parkville, Vic, 3052, Australia, danny@mundoe.maths.mu.oz.au, ***Michael C. Ferris***

NCPs are often solved as nondifferentiable equations. We investigate a class of algorithms for solving equations called homotopy or continuation methods. Specifically, we look at a piecewise smooth formulation of NCPs called the normal equation and apply a predictor-corrector method that uses piecewise linear subproblems.

MA29 Neural Networks & Forecasting

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Ramesh Sharda, Oklahoma State University, Coll. of Bus. Admin., Stillwater, OK 74078, sharda@okstate.edu

1) Automatic Neural Network Modeling for Univariate Time Series, ***Sandy D. Balkin***, Pennsylvania State University, Dept. of MS & IS, 303 BAB Bldg., University Park, PA 16802, sxb31@psu.edu, ***J. Keith Ord***

The International Institute of Forecasters sponsored a study known as the M3 Competition to compare the forecasts of 3,003 univariate series produced by a variety of extrapolative forecasting methods. We present our experiences and results from developing a neural network paradigm for the competition.

2) Forecasting Gate Receipts for Motion Pictures, ***Ramesh Sharda***, Oklahoma State University, Coll. of Bus. Admin., Stillwater, OK 74078, sharda@okstate.edu, ***Edith Meany***

We present an application of the neural networks in forecasting gate receipts for new movie releases. The forecast is based on a number of movie characteristics. Successes and failures of using neural networks for this difficult problem are described.

3) Optimizing Topology of Neural Networks with a Limited Number of Trials, ***Jinhwa Kim***, University of Wisconsin, 1238 Grainger Hall, 975 University Ave., Madison, WI 53706, jikim@bus.wisc.edu, ***Scott T. Webster***

We suggest a method for optimizing topology of neural networks with a limited number of trials. The method simulates the processes of human learning and problem solving for combinatorial optimization problems. Its advantage lies in the application to problems where only a small number of examples are available.

MA30 Stochastic Integer Programming

Cluster: Stochastic Integer Programming
Invited Session
Chair: Nick Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 S Mathews Ave., Urbana, IL 61801, nikos@uiuc.edu http://archimedes.scs.uiuc.edu

1) Parametric Cutting Planes for Stochastic Mixed Integer (0,1) Programming with Second Stage Integrality, ***Suvrajeet Sen***, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu, ***Julia L. Higle***

We derive parametric disjunctive cutting planes that can be used to tighten linear relaxations associated with a number of scenarios of a mixed-integer stochastic program. These cuts can be incorporated within deterministic as well as stochastic decomposition methods.

2) An Asymptotically Optimal Heuristic for a Multi-Stage Stochastic Integer Program, ***Shabbir Ahmed***, University of Illinois, Dept. of MIE, 1206 W Green St., Urbana, IL 61801, s-ahmed1@uiuc.edu http://www.ews.uiuc.edu/~s-ahmed1, ***Nick Sahinidis***

We present a multi-stage stochastic integer programming formulation for chemical process capacity expansion and operation. We prove that the deterministic version of the problem is NP-hard and we develop an asymptotically optimal heuristic. This serves as the basis for an asymptotically optimal heuristic for the multi-stage stochastic integer program.

3) Crew Scheduling Under Random Delays, ***Joyce W. Yen***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, jyen@engin.umich.edu, ***John R. Birge***

While airline crew scheduling has been well studied, little research has been done on crew scheduling under uncertainty. We examine the structure of and deterministic bounds for this problem. Modeled as a stochastic program, we use stochastic programming techniques to find bounds on the optimal solution for the stochastic problem.

4) Experiences with Modeling the Stochastic Unit Commitment Problem, ***Samar Takriti***, IBM, TJ Watson Res. Ctr., PO Box 218, Yorktown Heights, NY 10598, takriti@watson.ibm.com

The unit commitment problem is a large-scale MIP. We discuss incorporating uncertainty in demand and supply into the problem. The stochastic model is solved using Lagrangian relaxation and Bender's decomposition. Numerical results indicate the effectiveness of the suggested solution method.

MA32 Software Demonstrations

Chair: Gyana R. Parija, IBM Corporation, 522 South Rd., Poughkeepsie, NY 12601, parija@us.ibm.com

1) Software Demonstration: INSIGHT.xla Business Analysis Software, ***Sam Savage***, Stanford University, 417 Terman Eng., Stanford, CA 94305, savage@stanford.edu

INSIGHT.xla is a suite of software add-ins for Microsoft Excel that provides Monte Carlo simulation, queueing, decision trees, Markov chains, forecasting and numerous optimization models. This allows multiple analytical tools to be applied to MS problems in the familiar spreadsheet interface. The accompanying tutorials provide applications and demonstrations of basic theoretical concepts...

2) Software Demonstration: Stochastic Programming with IBM Stochastic Extensions, ***Gyana R. Parija***, IBM Corporation, 522 South Rd., Poughkeepsie, NY 12601, parija@us.ibm.com

This demonstration will use a new IBM Optimization Solutions capability, a Java-based GUI, to illustrate programming techniques for the IBM stochastic extensions product. The GUI allows the user to read input files from a pulldown menu, analyze the stochastic decision tree, store models in SPL format, specify solver to be used - Benders/nested and view solutions and distributions of optimal solutions...

MA33 ATM System Performance I

Sponsor: Aviation Applications
Sponsored Session
Chair: Robert W. Schwab, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, robert.w.schwab@boeing.com

1) NAS Performance Metrics: System Delay & Capacity, ***Daniel Citrenbaum***, FAA, ASD-430 OR & Analysis, 800 Independent Ave. SW, Washington, DC 20591, daniel.citrenbaum@faa.dot.gov

We highlight work that the FAA's OR & Analysis Branch has done to measure the impact of proposed future acquisitions, procedures and runway improvements on the NAS. Metrics are presented that reflect changes (1997-2015) in system capacity, system delay (operational and passenger) and fuelburn.

2) Setting Up the European Performance Review System, ***Philippe Enaud***, EUROCONTROL, Performance Review Unit, Rue de la fusee 96, Brussels, B-1130, Belgium, philippe.enaud@eurocontrol.be

A strong, transparent and independent performance review system is being established to ensure the effective management of ATM in Europe. We present the role and mission of the newly created Performance Review Commission and report the progress made to date.

3) Performance Metrics & Airline Economics, ***Monica Alcabin***, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK,

Seattle, WA 98124-2207, monica.s.alcabin@boeing.com, ***Russ Chew***

Airlines and ATS service providers are collecting a variety of metrics, either for monitoring ATM system performance or for conducting specific studies. The ATS performance focus group of the CNS/ATM focus team has been compiling this information to help build global airline consensus on the validity and relative importance of these metrics from the perspective of airline operating economics...

MA34 State-of-the-Art Tutorial: Review of Confidence Interval Methods for Monte Carlo Simulation Experiments

Sponsor: Simulation
Sponsored Session

Chair: David Goldsman, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu

1) State-of-the-Art Tutorial: Review of Confidence Interval Methods for Monte Carlo Simulation Experiments, ***David Goldsman***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu

A state-of-the-art tutorial and review of confidence interval methods for Monte Carlo simulation experiments will be presented.

MA35 Options & Financial Models

Contributed Session

Chair: June Dong, SUNY, Sch. of Bus., Oswego, NY 13126, dong@oswego.edu

1) Optimal Bounds on Option Prices, ***Ioana Popescu***, MIT, OR Ctr., Bldg. E40-130, Cambridge, MA 02139, ioana@mit.edu, ***Dimitris Bertsimas***

We present an optimization approach to derive sharp bounds on options prices and on the mean and variance of the underlying stock, given prices of other options on that stock. Conversely, given means and covariances of different stocks, we derive bounds on option prices.

2) Strategic Exercise of Options: An Option-Pricing & Game-Theoretic Approach, ***Kevin X. Zhu***, Stanford University, 70-C Escondido Village, Stanford, CA 94305-7192, zhu@stanford.edu, ***John P. Weyant***

Financial options and real options are similar, yet different in terms of tradability, replication and competition. The exercise of a real option gets complicated by the presence of uncertainty and competition. We model the option exercise strategies by integrating option-pricing and game-theoretic tools, e.g., Cournet, Betrand & Stackelberg.

3) Beating the Dow with Neural Networks, ***Zaiyong Tang***, University of Arkansas, 1200 N University Dr., Pine Bluff, AR 71611, tang_z@vx4500.uapb.edu, ***Satish V. Vadlamani***, ***Subramanian Sivaramakrishnan***

Beating the Dow is one of the Dow dividend approaches that are simple, yet successful long-term strategies. We developed an even better strategy investing in the Dow stocks. Our approach uses periodical switching based on neural network forecasting. Empirical tests show that this approach is promising.

4) Multicriteria Financial Equilibrium with Policy Interventions, ***June Dong***, SUNY, Sch. of Bus., Oswego, NY 13126, dong@oswego.edu

We present a multicriteria financial equilibrium model with policy interventions in terms of taxes and price controls. The construction of the value functions will be discussed and some qualitative results presented.

MA36 Flow Shop Scheduling

Contributed Session

Chair: Jeffrey E. Schaller, Eastern Connecticut State University, Dept. of Bus. Admin., 83 Windham St., Willimantic, CT 06226-2295, schallerj@ecsu.ctstateu.edu

1) A No-Wait Flowshop with Sequence Dependent Changeover Times, ***Ali Allahverdi***, Kuwait University, Dept. of MIE, PO Box 5969, Safat, 13060, Kuwait, allahverdi@kuc01.kuniv.edu.kw, ***Tariq Aldowaisan***

A 2-machine no-wait flowshop is addressed in order to minimize mean flowtime where setup times are sequence dependent and additive. Optimal solutions are obtained for special cases and an elimination relation is developed. After developing a lower bound, a B&B algorithm and a heuristic are established.

2) Multiprocessor Task Scheduling with Precedence Constraints, ***Ceyda Oguz***, Hong Kong Polytechnic University, Dept. of Mgmt., Hong Kong SAR, China, msceyda@polyu.edu.hk

We consider the multiprocessor task scheduling problem in a flowshop environment to minimize makespan. We assume that there are precedence relations among jobs. We present a heuristic algorithm for this problem and discuss its average performance.

3) Minimizing Makespan in Permutation Flowshops by a Hybrid Metaheuristic, ***Joao V. Moccellin***, University of Sao Paulo, EESC, Av. Dr. Carlos Botelho 1465, Sao Carlos SP, 13560-250, Brazil,jvmoccel@prod.eesc.sc.usp.brhttp://athenas.prod.eesc.sc.usp.br/, ***Maristela Santos***, ***Renato V. Belhot***

We present a hybrid TS-SA heuristic for the minimum makespan flow shop sequencing problem. In order to evaluate the performance of the hybrid metaheuristic, we compare it with pure TS and SA heuristics. The results from computational experience are discussed.

4) Application of Genetic Algorithms for Scheduling Batch-Discrete Production Systems, ***Bokang Kim***, Pohang University of Science, Dept. of IE, Pohang Kyungbuk, 790-784, Korea, bokang@postech.ac.kr, ***Sooyoung Kim***

We consider 2-machine flow shop scheduling with a batch processor. The objective is to find optimal sequencing and batching for minimizing total completion time. The performance of GAs is compared to a heuristic approach for the NP-complete problem that has been shown to be effective. Computational experience also shows that the GA can be a good alternative for solving the scheduling problem.

5) A New Lower Bound for the Group Scheduling Problem, ***Jeffrey E. Schaller***, Eastern Connecticut State University, Dept. of Bus. Admin., 83 Windham St., Willimantic, CT 06226-2295, schallerj@ecsu.ctstateu.edu

We present a new lower bound for group scheduling in a flow shop. A B&B procedure which uses this lower bound is developed; this B&B procedure is compared to Hitomi & Ham's procedure and computational results for randomly generated problems are presented.

MA37 Marketing I

Contributed Session

Chair: Noah F. Gans, University of Pennsylvania, OPIM Dept., The Wharton Sch., Philadelphia, PA 19104-6366, gans@wharton.upenn.edu

1) Competitive Upgrade Pricing in Software Sales, ***David C. Croson***, University of Pennsylvania, The Wharton Sch., 3620 Locust Walk # 1300, Philadelphia, PA 19104, crosond@wharton.upenn.edu, ***Il-Horn Hann***

A competitive upgrade offer from a software manufacturer offers price-discounted, fully-functional software to consumers who already own competing products. Using a game theoretic model, we ask: why might a software manufacturer pursue that strategy? what does such a strategy imply for competition and for the performance of firms?

2) Consumer-Based Tradeoffs in the Design of Queueing Systems, ***Piyush Kumar***, Rice University, 311 Herring Hall, 6100 Main St., Houston, TX 77005, kumarp@rice.edu, ***Maqbool Dada***

Computer-based experiments are used to examine the impact of the design of queueing systems on customers' waiting experiences. Data from these experiments are used to evaluate the operations-marketing tradeoff in the design of queues. An interdisciplinary approach toward the management of customers' waiting experiences is proposed.

3) Consumer Demand with Stock-Out-Based Substitution: Estimation & Empirical Application, ***Sachin Gupta***, Northwestern University, Mktg. Dept., 2001 Sheridan Rd., Evanston, IL 60208, s-gupta7@nwu.edu, ***Ravi Anupindi***, ***Maqbool Dada***

We develop a model of customer arrivals and choice between goods that allows for possible product substitution and lost sales when a customer faces a stock-out at retail. We derive methods of estimating the demand parameters given the types of inventory tracking systems used in retail vending and show application to experimental and real data.

4) Compensation Plans for Multi-Product Salesforces with Dependent Products, ***Vinayak V. Deshpande***, University of Pennsylvania, Wharton School, 1300 SH-DH, Philadelphia, PA 19104, vinayak@wharton.upenn.edu

We analyze the effect of product dependencies on compensation plans for multi-product salesforces. Two types of dependencies are described: direct dependency and correlated uncertainties. A principal agent framework is used to evaluae the conditions under which different products should be offered a higher or lower commission rate.

5) Customer Learning & Loyalty for Quality, *Noah F. Gans*, University of Pennsylvania, OPIM Dept., The Wharton Sch., Philadelphia, PA 19104-6366, gans@wharton.upenn.edu

What is the cost of a backorder or stockout? Of making a customer wait in a queue? Of lowering quality standards? These costs are typically exogenous factors in operational models. To better understand their nature, we develop and analyze a model of customer learning and loyalty for quality.

MA38 Queueing & Inventory

Contributed Session

Chair: Keith Willoughby, University of Saskatchewan, 2517 Preston Ave., Saskatoon SK, S7J 2G3, Canada, willoughby@commerce.usask.ca

1) An Analytical Model for a Generalized, Request-Based Job Shop, *John S. Hollywood*, MIT, 77 Massachusetts Ave., Rm. E40-130, Cambridge, MA 02139, jshollyw@mit.edu, ***Stephen C. Graves***

We develop a discrete-time model of a generalized, request-based job shop where job completion at an upstream station determines the workload arriving downstream. A job completion is converted into a random number of requests, which are then converted into a random amount of work. We derive the first 2 moments for station workloads under 2 different control rules...

2) Modeling the Impact of Steady Customer Orders, *Apurva Jain*, Purdue University, Krannert Grad. Sch., 1310 Krannert Bldg., West Lafayette, IN 47907, apurva_jain@mgmt.purdue.edu, ***Ananth V. Iyer***

Many manufacturers catering to the retailing industry are employing strategies such as Continuous Product Replenishment, CPR. As retailers begin to join the CPR initiative, the manufacturer starts to experience a mixture of very different order streams. We combine queueing and inventory models to evaluate their impact on the retailers and the manufacturer.

3) Purchase Contracts & Demand Information Updates, *Hongyan Huang*, Renmin University of China, Coll. of Information, Beijing, China, ***Houmin Yan***

We study purchase contracts with demand information updates. We formulate it as a dynamic, multiple period optimization problem. Solutions reveal the conditions of using purchase contracts, the value of contracts and insights of better supply chain management.

4) Reducing Delay in Preemptive Repeat Priority Queues, *Steve Drekic*, University of Western Ontario, Dept. Stat. & Acutuarial Sci., London, Ontario, N6A 5B7, Canada, drekic@fisher.stats.uwo.ca, ***David A. Stanford***

The classic preemptive repeat priority queue requires the same distribution for service times regardless of how often a customer has been preempted. We present 3 alternatives to improve service: changing the service distribution, preventing further preemptions and promoting customers to the next higher priority class. Flow times under these examples are compared thorugh numerical examples.

5) Excess Stock Disposal with Increasing Salvage Values, *Keith Willoughby*, University of Saskatchewan, 2517 Preston Ave., Saskatoon SK, S7J 2G3, Canada, willoughby@commerce.usask.ca

In some situations, per unit salvage values may rise (up to a point) as additional units are disposed. A firm desiring to purchase surplus units may pay a higher unit price to a supplier who can deliver the quantity required. We determine optimal disposal decisions given increasing salvage values.

MA39 Sequencing Mixed Model Assembly Lines

Contributed Session

Chair: John Mittenthal, University of Alabama, Dept. of MS & Stats., Box 870226, Tuscaloosa, AL 35487-0226, jmittent@cba.ua.edu

1) Goal Programming Models for Sequencing Mixed Model Assembly Lines, *Kiseog Kim*, Pusan National University, Coll. of Bus., San 30 Changjon-dong Kumjong-g, Pusan, 609-735, Korea, mgtkkim@hyowon.pusan.ac.kr

The problem of sequencing mixed models on the assembly line has 2 major objectives: to minimize the line length and to minimize the throughput time. We present goal programming models that seek both objectives at the same time while existing models miminize either 1 or 2 objectives.

2) Sequencing Mixed-Model Assembly Lines to Achieve Efficiency through Weight Assignment, *Fong-Yuen Ding*, North Dakota State University, Dept. of IME, Fargo, ND 58105-5285, fding@plains.nodak.edu, ***Jin Zhu***

The efficiency of a mixed-model assembly line regarding part usage and workload balance is considered through weight assignment. Various approaches of assigning weights to individual models, parts and assembly stations are applied to different objective functions. Simulation experiments show the effectiveness of these approaches using direct shop floor measures.

3) Revealing & Reconciling Multiple Objectives in Mixed-Model Sequencing, *Robin H. Lovgren*, University of Memphis, ISE Dept., Memphis, TN 38152, rlovgren@memphis.edu

We consider job sequencing within a mixed-model, build-to-order, manufacturing scenario. These objectives reveal the complexity of the tradeoffs between lateness and part utilization. Computational results are provided, modeling a 5-day production environment of 100 items. Results show substantial improvements in balancing part utilization.

4) Sequencing to Minimize Makespan for a Paced, Mixed Model Assembly Line Under an Andon System, *Timothy J. Flynn*, University of Alabama, 6036 Crowne Falls Pkwy., Hoover, AL 35244, flynnt@proctr.cba.ua.edu, ***John Mittenthal***

A paced assembly line operated under an Andon system differs from the permutation flow shop due to additional precedence relationships. This scheduling problem is introduced. Mathematical insights to minimizing makespan are developed. Makespan equations and bounds for simple problems are developed. Computational results are briefly discussed.

Monday 09:45-10:45

ORS40 ORS Plenary: Operations Research Trajectories: The Anglo-American Experience, 1940-70

Plenary Session

Chair: Carl M. Harris, George Mason University, Dept. of ORE, Sch. of IT & Eng., Fairfax, VA 22030-4444, charris@gmu.edu http://www.mason.gmu.edu/~charris

1) ORS Plenary: OR Trajectories - The Anglo-American Experience, 1940-70, *Maurice Kirby*, University of Lancaster, The Management School, Dept. of Economics, Lancaster, LA1 4YX, UK

Derived from the author's commissioned history of OR in the UK, this presentation highlights the interrelationships between the development of OR in the UK and the US in the period to 1970. In focusing on the area bombing campaigns in WWII, we compare and contrast the wartime origins of OR in both countries with particular reference to the strategic capabilities of the USAAF and RAF Bomber Command. This serves as a precursor to analysis of the peacetime diffusion of OR, focusing on educational and methodological developments and the take-up of OR in the corporate and public sectors. In thse respects, there were major points of contrast between the 2 countries which can only be explained satisfactorily by reference to socio-economic developments reaching back into the 19th century.

Monday 11:45-12:45

MP40 Invited Plenary: Partnering for Global Technology Management

Plenary Session

Chair: Marisa Altschul, The Boeing Company, PO Box 3707, MS 2T-20, Seattle, WA 98115, marisa.altschul@boeing.com

Co-Chair: Al Maimon, The Boeing Company, PO Box 3707, MS 74-11, Seattle, WA 98124-0346, albert.maimon@pss.boeing.com

1) Plenary: Partnering for Global Technology Management, *James W. Evatt*, Boeing Information, Sp & Defense Systems, PO Box 3999, MC 8A-15, Seattle, WA 98124-2499

This presentation will cover the revolution in information technology and its galvanizing influence on global partnering issues. We discuss the expanding importance of commercial-off-the-shelf information and communication systems for government and international use. In addition, we will discuss key technology opportunities and challenges to be faced in the next millennium.

Monday 13:00-14:30

MC01 Value-Focused Thinking

Sponsor: Decision Analysis
Sponsored Session

Chair: Ralph L. Keeney, University of Southern California, 101 Lombard St., Ste 704W, San Francisco, CA 94111

1) Value-Focused Thinking in Two Difficult Contexts, ***Tim McDaniels***, University of British Columbia, Inst. of Res. & Environ., Sch. of Comm. & Regional Plan., Vancouver, BC, V6T 1Z2, Canada, timmcd@unixg.ubc.ca

Value-focused thinking provides insight for decision making in adverse circumstances, such as a preexisting commitment to one alternative, close political scrutiny and controversy. This is illustrated in 2 applications: tourism planning in a developing country and designing and implementing an environmental referendum in Victoria, Canada.

2) Value-Focused Thinking for Effective Stakeholder Consultation, ***Robin Gregory***, University of British Columbia, 1124 W 19th St., North Vancouver, BC V7P 1Z9, Canada, rgregory@unixg.ubc.ca

Consultation with stakeholders is required for many government and private-sector initiatives. We discuss 2 applications of value-focused thinking in consultations, one involving risks of airport operations and the other cleanup of a coastal estuary. Both led to improvements in conceptualization of the decision and fostered agreement among stakeholders.

3) The Value of Internet Commerce to the Customer, ***Ralph L. Keeney***, University of Southern California, 101 Lombard St., Ste 704W, San Francisco, CA 94111

Pros and cons to prospective customers of purchasing over the Internet are investigated. Over 100 individual's values for Internet commerce were assessed via discussions. The results were combined objectives and organized using a mean-ends objectives network to indicate their interrelationships.

MC02 Capacity Planning in the Railroad Industry

Sponsor: Railroad Applications
Sponsored Session

Chair: Carl D. Martland, MIT, Dept. of Civil & Environ. Eng., Cambridge, MA 02139, martlan@mitvma.mit.edu

1) Locomotive Resource Planning Using a Non-Linear Programming Approach for Network Simulation, ***John Trever***, A&L Associates, Inc., 101 Rogers St., Ste. 403, Cambridge, MA, jtrever@ibm.net, ***Andreas Aeppli***, ***Carl D. Martland***, ***Jason Kuehn***, ***John R. Fallis***

Working for a major Canadian railroad, we developed an approach for determining the number of locomotives that would be required under different operating schedules in a planned operating environment. The model generates key network results, i.e., locomotive utilization by class of power, light moves and expected train delay. Various parameters in the model can be adjusted...

2) Coal Movement by Railroads, ***Gilles Reinhardt***, University of Alberta, Fac. of Bus., Edmonton, Alberta, T6G 2R6, Canada, gilles.reinhardt@ualberta.ca

This is the largest activity conducted by US railroads. We model the Orin Line, an area producing 1/3 of domestic coal. We tackle current congestion problems on 2 levels: analytically for issues of capacity, pricing and cost allocation; and with discrete simulation for dispatching and variability management.

3) Locomotive Assignment Using a Branch-First, Cut-Second Approach, ***Koorush Ziarati***, GERAD, Ecole Polytech., 3000 ch. Cote-Ste-Catherine, Montreal, Quebec, H3T 2A7, Canada, ***Francois Soumis***, ***Jacques Desrosiers***, ***Marius M. Solomon***

We propose a B&C approach for assigning locomotives to trains. The branching decisions define facets of a restricted constraint set polyhedron. The approach improved the best known solution for an almost 2000-leg weekly problem faced by Canadian National, generating potential savings of more than $30,000,000 per year.

MC03 New Technologies for OR/MS Education

Sponsor: Education
Sponsored Session

Chair: Sam Savage, Stanford University, 417 Terman Eng., Stanford, CA 94305, savage@stanford.edu

1) A MATLAB-Based Package for Teaching OR Concepts, ***J. Scott Provan***, University of North Carolina, Dept. of OR, Chapel Hill, NC 27599-3180, scott_provan@unc.edu, ***Doug R. Shier***

We describe the development and use of a MATLAB-based package for teaching OR modeling and decision making in LP, networks and stochastics. The standardized platform provides an interactive graphical interface for students, encourages active participation and facilitates exploration. It is designed so that instructors can easily incorporate additional models.

2) Using a Hypermedia Learning Environment for Operations Research, ***Leena Suhl***, University of Paderborn, Dept. of Bus. Comp., Warburger Strasse 100, Paderborn, D-33098, Germany, lsuhl@notes.uni-paderborn.de

ORWelt, a modular hypermedia system supporting business students in learning OR, was started in response to the significant need for educational software expressed by OR teachers as well as students. We report on the ORWelt project and present first results of using flexible educational software environments for OR.

3) Distribution Distribution, ***Sam Savage***, Stanford University, 417 Terman Eng., Stanford, CA 94305, savage@stanford.edu

Users of Monte Carlo simulation consume distributions of uncertainties. Statisticians produce distributions of uncertainties. The Internet has suddenly provided the opportunity to distribute the distributions from the producers to the consumers. The opportunities to provide education on this subject within academia and industry are enormous.

MC04 Optimization Modeling Languages & Systems

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Robert Fourer, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.nwu.edu

Co-Chair: Sanjay Saigal, Ilog Inc., 1005 Terminal Way, Ste. 100, Reno, NV 89502, sanjay_saigal@modeling.com

1) Nonlinear Programming for the Rest of Us, ***John W. Chinneck***, Carleton University, Systems & Comp. Eng., 1125 Colonel By Dr., Ottawa, Ontario, K1S 5B6, Canada, chinneck@sce.carleton.ca

Does nonlinear programming seem too difficult to even attempt? Here is a simplified overview of how to make NLP work in practice: basic concepts, computer tools and tips on how to be successful.

2) Beyond Prototypes: Using Modeling Languages in Customized Application Software, ***Sanjay Saigal***, ILOG Inc., 1005 Terminal Way, Ste. 100, Reno, NV 89502, sanjay_saigal@modeling.com

Modeling languages are great prototyping tools, but how do they help modelers build production systems for end users? We describe modeling language features that help developers shorten the implementation cycle by embedding algebraic models inside customized user-interfaces.

3) New Directions in Algebraic Modeling Languages, ***Robert Fourer***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, 4er@iems.nwu.edu, ***David M. Gay***

Modeling systems for optimization can be enhanced by extending the design of their input (a modeling language) or of their output (a problem representation for solvers). Often, extensions to both are required. We discuss a variety of extensions and their interactions, with examples from recent and forthcoming features in AMPL.

MC05 Supply Chain Management

Sponsor: MSOM
Sponsored Session

Chair: Ravi Anupindi, Northwestern University, Mktg. Dept., 2001 Sheridan Rd., Evanston, IL 60208, r-anupindi@nwu.edu

1) Manufacturing Strategies in Quantity-Flexible Environments, ***Colin Kessinger***, Stanford University, Dept. of IE & EM, Stanford, CA 94305, ckess@leland.sanford.edu, ***Warren Hausman***

We investigate supplier mechanisms that enable increased risk sharing and coordination within the supply chain. We analyze supplier behavior under various technological and contractual constraints and explore conditions under which these mechanisms benefit the entire supply chain.

2) Accurate Testing of Retail Merchandise: Methodology & Applications, ***Marshall Fisher***, University of Pennsylvania, The Wharton Sch., OPIM Dept., Philadelphia, PA 19104-6366, fisher@opim.wharton.upenn.edu, ***Kumar Rajaram***, ***Ananth Raman***, ***Anna McClelland***

In a merchandise test, a retailer introduces a new product at a few stores prior to the primary season to see how well it will sell. We describe a method for choosing test stores and forecasting from test store sales. We report results from application at several retailers.

3) On Process Location within a Supply Chain, ***Gerard P. Cachon***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, gpc@mail.duke.edu

Where should a process be located within a supply chain? A central location takes advantage of scale economies, but generally requires a long lead time to customers. Disperse locations takes advantage of proximity to consumers, but suffers from lower scale. Results from a model are discussed in addition to several examples from industry.

4) Short- vs. Long-Term Contracts, ***Ravi Anupindi***, Northwestern University, Mktg. Dept., 2001 Sheridan Rd., Evanston, IL 60208, r-anupindi@nwu.edu, ***K. Anand***, ***Y. Bassok***

We present a game theoretic model to compare the performance of short- and long-term contracts and their effect on individual and channel performance.

MC06 FMS Control

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: Houmin Yan, The Chinese University of Hong Kong, Dept. of SE & EM, Shatin NT, Hong Kong, PR China, yan@se.cuhk.edu.hk https://www.se.cuhk.edu.hk

1) A Generalized Production Authorization Card System & its Optimization Using Simulation, ***Sherman Bai***, University of Florida, ISE Dept., 303 Weil Hall, Gainesville, FL 32611, bai@ise.ufl.edu

We extend the production authorization card system by Buzacott & Shanthikumar to include the hedging control policy. Such a system is optimized using simulation.

2) Dynamic Regulation of Quality Diffusion in Rapid Manufacturing with Time-Variant Customer Perceived Targets, ***John Liu***, University of Wisconsin, School of Bus. Admin., Milwaukee, WI 53201, jjl@csd.uwm.edu, ***Seong-Hyun Nam***

The process of manufacturing quality regulation is characterized as stochastic diffusion with a time-variant target designed to reflect the changing market needs. We show that such diffusion entails a well-recognized law of diminishing rate of return. We obtain the optimality of a surge-discharge control for the regulation of quality innovation and improvement.

3) Exact Evaluation of Order Fulfillment in Multi-Item Inventory Systems, ***Frank Y. Chen***, National University of Singapore, Dept. of Dec. Sci., 10 Kent Ridge Crescent, Singapore, 119260, Singapore, fbachenf@nus.edu.sg, ***Youyi Feng***, ***David Simchi-Levi***

We discuss the evaluation of the order fulfillment rate in a multi-item, continuous review inventory system. In such a system, the differentiation of products may be postponed at a distribution center. Assuming compound Poisson order arrivals with inter-item dependence and lot-size reorder policy, we obtain exact, closed form expressions for both order and item fill rates.

4) Optimal Production Control in a Discrete Manufacturing System with Unreliable Machines & Random Demands, ***Youyi Feng***, National University of Singapore, Dept. of ISCS, Singapore, 119260, Singapore, fengyy@iscs.nus.edu.sg, ***Houmin Yan***

We consider a production control problem in a manufacturing system with a failure prone machine and stochastic demand. The optimal production control of continuous, stochastic manufacturing systems with a failure prone machine and constant demand has been considered in Akella & Kumar (1986).

MC07 Success Stories in Supply Chain Management

Cluster: Supply Chain Management
Invited Session

Chair: Yasemin Aksoy, Tulane Univiversity, Cnsrtm. for Supply Chain Mgmt., Freeman Sch. of Bus., New Orleans, LA 70118, yaksoy@freeman.tulane.edu

1) What Savings Can be Found in Your Supply Chain?, ***David Watson***, InterTrans Logistics Solutions, Business Development, Western Region 9628 8th Av NE, Seattle, WA 98115, david.watson@itls.com

Businesses who have invested millions of dollars in supply chain software have literally seen billions of dollars of savings taken out of their supply chains. We break out areas of the traditional supply chain and help the audience understand how other businesses have saved money by making changes to their supply chain. Specific software solutions can be discussed off-line only.

2) Electric Commerce Enabled Partnering for Supply Chain Management, ***Alex Bangash***, Bell Labs., Lucent Technologies, 101 Crawfords Corner Rd., Rm. 2L-518, Holmdel, NJ 07733, abangash@lucent.com

New paradigms for web-based collaborative planning are offering numerous challenges and opportunities for OR methods for optimizing the extended supply chain. We will describe one such application where EC-enabled OR tools synchronize manufacturing and logistics processes and balance resources with demand priorities across the extended supply chain.

3) Supply Chain Management Success Stories, ***Yasemin Aksoy***, Tulane Univiversity, Cnsrtm. for Supply Chain Mgmt., Freeman Sch. of Bus., New Orleans, LA 70118, yaksoy@freeman.tulane.edu

We present a review of successful implementations of SCM principles from the academic and the business community.

MC08 Queueing Models: Performance Evaluation & Control

Sponsor: Applied Probability Section
Sponsored Session

Chair: Hong Chen, HKUST, Dept. of IE, Clear Water Bay, Kowloon, Hong Kong, PRC, hongchen@uxmail.ust.hk

1) Some Results for Networks of Inventory-Queues, ***Xiaoming Liu***, HKUST, Dept. of IE, Clear Water Bay, Kowloon, Hong Kong, China, ielxm@uxmail.ust.hk, ***Liming Liu***, ***David D. Yao***

A multiple-stage inventory queueing network with planned inventory at each stage is considered. Using decomposition method, we estimate the network performance and determine the optimal planned inventory levels at each stocking point. Several numerical examples are given.

2) Sample-Path Arguments in Optimal Control of Queues: A Comparison of Methods & Results, ***Tuell Green***, University of North Carolina, Dept. of OR, CB # 3180, Smith Bldg., Chapel Hill, NC 27599-3180, ***Shaler Stidham, Jr.***

For some problems in the optimal control of queues a certain policy, e.g., the c-mu rule, can be shown to minimize costs on every sample path. Standard methods for proving such properties involve pairwise interchange and forward or backward induction. We compare these approaches to an achievable-region approach.

3) C/D/1 Queue - A New Queueing Model for Aircraft Landing Process, ***Hong Chen***, HKUST, Dept. of IE, Clear Water Bay, Kowloon, Hong Kong, PRC, hongchen@uxmail.ust.hk, ***Yiyuan Zhao***

We present a new queueing model which arises in modeling aircraft landing processes. The arrival process is a coordinated (random) counting process, and service process is deterministic. It is shown that this queueing model is stable as long as the traffic intensity is less than or equal to 1, in contrast to a GI/GI/1 model or a Markov modulated queue.

4) Optimal Replenishment & Rework with Multiple Unreliable Supply Sources, ***David D. Yao***, Columbia University, Dept. of IEOR, New York, NY 10027-6699, yao@ieor.columbia.edu, ***Shaohui Zheng***

Faced with a set of unreliable supply sources, a production-inventory system can apply rework to improve the quality of the units received. We study the optimal replenishment and rework decisions and show these can be generated by a greedy algorithm. We also show that dual sourcing is optimal under linear costs.

MC09 Multiunit Auctions

Cluster: Competitive Bidding
Invited Session

Chair: Michael H. Rothkopf, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu http://rutcor.rutgers.edu/~rothkopf/

1) A Combinatorial Auction with Multiple Winners for Universal Service, ***Frank Kelly***, University of Cambridge, Judge Inst., 16 Mill Ln, Cambridge, CB2 1SB, UK, ***Richard Steinberg***

We present a discrete-time auction procedure, progressive adaptive user selection environment, PAUSE, for use in assigning carrier or last resort responsibility for universal telephone service. The auction incorporates synergies by permitting all combinatorial bids, allows for multiple winners and minimizes the possibility of bidder collusion.

2) Combinatorial Auctions with Synergies, ***Ronald M. Harstad***, Rutgers University, RUTCOR & FOM, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, harstad@rutcor.rutgers.edu, ***Michael H. Rothkopf***

We consider competition of local bidders with global bidders who also submit

single bids for combinations of assets. For specified second-price rules, equilibrium truthfully reveals values in local and combinational bids. Unlike sequential or simultaneous bidding, combinational bidding is allocatively efficient, ex post individually rational and robust to risk aversion.

3) An Incentive Compatible Power Auction for Nonconvex Cost & Value Functions, ***Benjamin F. Hobbs***, JHU, DOGEE, 313 Ames Hall, 3400 N Charles, Baltimore, MD 21218, bhobbs@jhu.edu, ***Michael H. Rothkopf, Richard P. O'Neill, Stephen Stoft***

Many proposed power auctions have simplified bid formats that omit information on cost/value functions; thus, fail to maximize economic surplus. We describe an auction that motivates generators, (users) to reveal their true cost (value) functions, even when nonconvex (nonconcave) and we point out some disadvantages.

MC10 Applied Logic

Sponsor: College on AI
Sponsored Session
Chair: Alexander Kogan, Rutgers University, Fac. of Mgmt., 180 University Ave., Newark, NJ 07102, kogan@rutcor.rutgers.edu

1) Process Modeling: An Analysis Perspective, ***Andrew Kusiak***, University of Iowa, Dept. of IE, 4132 Engineering Bldg., Iowa City, IA 52242-1527, ankusiak@icaen.uiowa.edu http://www.icaen.uiowa.edu/~ankusiak

Methodologies and tools for modeling business, product development and manufacturing processes are presented. The benefits of modeling of processes are outlined. To develop an improved process model, analysis tools are required. Formal and informal tools for analysis of process models are discussed.

2) Connectionist Analysis of Defeasible Logic, ***R. Ramesh***, University of Buffalo, Sch. of Mgmt., Buffalo, NY 14260, rramesh@acsu.buffalo.edu, ***Ai-Mei Chang, T. S. Raghu, Andrew B. Whinston***

We develop a connectionist framework for the analysis of defeasible logic in arguments. Structuring arguments using a network formalism, we map them onto a connectionist model. Models of connectionist computation are proposed with asymptotic convergence analyses. An approach to extending the analyses to different forms of logic will be outlined.

3) Convex Programming Models for Solving Placement Problems, ***Anthony Vannelli***, University of Waterloo, Dept. of Elect. & Comp. Eng., Waterloo, Ontario, N2L 3G1, Canada, vannelli@cheetah.vlsi.uwaterloo.ca, ***Hussein Etawil***

The need to obtain better layouts is becoming critical as the number of components on chips increases circuit layout. We introduce different convex programming models that aggressively separate modules and reduce overlap between pairs of modules. An interior point approach is used to solve the convex programming model...

MC11 Information Exchange in Product Development Processes

Sponsor: Technology Management
Sponsored Session
Chair: Christoph H. Loch, INSEAD, Boulevard de Constance, Fontainebleau, 77305, France, christoph.loch@insead.fr

1) Product Definition Under Technological Uncertainty, ***Viswanthan Krishnan***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu, ***Shantanu Bhattacharya***

Product definition has been recognized as a critical factor for success in product development. We address the question of how to define a product under technological uncertainty. We discuss when a promising new technology must be considered in product development and how to accommodate uncertainty without slowing down the process.

2) Platform Development in the World Automotive Industry, ***Andreas Cornet***, McKinsey & Company, Duesseldorf, Germany, andreas_cornet@mckinsey.com, ***Arnd H. Huchzermeier***

We present a tradeoff model and an empirical study on how product modularity and platform design strategies impact the firm's time-to-market advantage and cost competitiveness. Moreover, we consider the issue of real price and demand uncertainty and the joint coordination of both in the firm's product development and manufacturing processes.

3) Exploration vs. Exploitation: A Model of Innovation in the Multinational Enterprise, ***Michael T. Pich***, INSEAD, Boulevard de Constance, Fontainebleau Cedex, 77305, France, michael.pich@insead.fr.

The geographic dispersion of facilities in the MNE gives it a unique position to explore for innovative ideas. However, the MNE must exploit innovations on a global scale. The MNE faces a natural tension between exploration and exploitation. We present a descriptive model that explicates this tension.

4) Managing the Process of Engineering Change Orders: The Case of the Climate Control System in Automobile Development, ***Christian Terwiesch***, University of California, IRPS, 9500 Gilman Dr., La Jolla, CA 92093, cterwiesch@ucsd.edu, ***Christoph H. Loch***

ECOs are part of almost every development process, consuming a significant part of engineering capacity and development costs. Many companies use a support process to administer ECOs, which determines ECO-related costs and delays. We analyze common problems in such ECO processes and outline ways of improvement.

MC12 Inequality & Economic Development: Understanding Challenges & Opportunities for Global Tech-Based Growth

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session
Chair: Pedro Conceicao, University of Texas, IC2 Inst., 2815 San Gabriel Ave., Austin, TX 78705, pedroc@uts.cc.utexas.edu

1) Strategy & Power: Firms & Governments in Industrial Development, ***Francisco Veloso***, MIT, Rm. E40-242, Cambridge, MA 02139, fveloso@mit.edu

We present a game theoretical framework to understand policy decisions and market outcomes in late industrializing countries. Evidence from the automotive industry in Taiwan, Mexico and Thailand will be discussed to illustrate its application.

2) Measuring Income Inequality Within & Across Countries: A Way to Assess Unevenness in Development, ***Pedro Conceicao***, University of Texas, IC2 Inst., 2815 San Gabriel Ave., Austin, TX 78705, pedroc@uts.cc.utexas.edu

We present several quantitative measures to account for differences in levels of development. The focus is on the Theil index, which is computed for several countries at different years. With the panel data achieved this way, we try to establish relationships with several macroeconomic variables, particularly with economic growth.

3) Grading the Performance of Latin American Regimes, ***Vidal Garza Cantu***, University of Texas, CONACYT, 10430 Morado Cr. Apt. 1724, Austin, TX 78705, vidalg@uts.cc.utexas.edu

A study of wage structure inequality and economic growth of 9 Latin American countries finds evidence that sustains the Kuznets Hypothesis. The relationship between economic growth and wage inequality is analyzed with empirical evidence to reveal the pattern of industrialization and development required to equalize their wage structures.

4) Successes & Failures: Methods for Global Technology-Based Growth Employed in US, France, Germany, England & Portugal, ***Jeffrey W. Amos***, University of Texas, IC2 Inst., 2815 San Gabriel, Austin, TX 78705, jeff@icc.utexas.edu, ***Frederic Frery, Ralf Huber, Pedro Conceicao***

Belief in the importance of sustained economic growth through technology is far removed from the accomplishment of successful sustainable growth. This research provides a comparative analysis of methodologies employed across key European nations that increasingly look to commercialization processes for future sustainable growth.

MC13 Knowledge & Organization

Sponsor: Organization Science
Sponsored Session
Chair: To be announced

1) College on Organization Science Subconference: Knowledge & Organizations

MC14 Logistics I

Contributed Session
Chair: Chrissoleon Papadopoulos, University of the Aegean, Dept. of Business Admin., Chios Island, 821 00, Greece, hpap@aegean.gr

1) A Simulation Model for Replacement Parts Inventory Management, ***Henry N. Amato***, University of Nevada, Dept. of Managerial Sci., MS 028, Reno, NV 89557, hna@unr.edu, ***Ronald S. Tibben-Lembke***

We propose a simulation model to determine the inventory level needed to satisfy replacement parts demand at a given fill rate for a known sales distribution of items using the part. Parts fail according to a known failure distribution due to wear and not due to misuse or accident.

2) Just in Time, ***Syed Shahabuddin***, Central Michigan University, 1306 East Preston, Mt. Pleasant, MI 48858-3929, 3m3eplg@cmich.edu

JIT seems to have taken hold in American businesses. They are convinced that JIT exists and is appropriate for American businesses. In my previous published article, I had challenged the appropriateness of JIT for American businesses. I present an updated challenge to the JIT concept.

3) Justification of Postponement & Centralization Strategies, ***Aimo J. Inkilainen***, Helsinki School of Economics, Runeberginkatu 14-16, Helsinki, SF-00100, Finland, inkilain@hkkk.fi, ***Ari P. Vepsalainen***

Centralization and postponement are pervasive trends in most bueinesses. How is management to justify such drastic changes in their own company? We study the applicability of postponement and centralization as co-existing or separate strategies with heuristics and simulation models.

4) A Logistics Decision Support System: An Inventory & a Field Service Support System, ***Chrissoleon Papadopoulos***, University of the Aegean, Dept. of Business Admin., Chios Island, 821 00, Greece, hpap@aegean.gr

Two DSSs are integrated into a single unified logistics DSS. The first is an inventory DSS and the second is a support system for field service which utilizes a queueing network model developed by Waller and a simulation model. Both models are useful tools for strategic allocation of resources by a field service manager to improve customer service.

MC15 Some Applications of Semidefinite Programming to Combinatorial Optimization

Tutorial Session

Chair: Robert M. Freund, MIT, OR Ctr. Bldg. E40-149A, 77 Massachusetts Ave., Cambridge, MA 02139-4307, rfreund@mit.edu

1) Tutorial: Some Applications of Semidefinite Programming to Combinatorial Optimization, ***David P. Williamson***, IBM, TJ Watson Research Lab., Yorktown Heights, NY 10598, dpw@watson.ibm.com

I review applications of semidefinite programming to problems in combinatorial optimization, including some of the first uses of semidefinite programming in combinatorial optimization, such as Lovasz's theta function, then turn to recent uses in approximation algorithms. An approximation algorithm is an algorithm which runs in polynomial time...

MC16 Network Travel Modeling II: Optimization & Modeling

Sponsor: Transportation Science
Sponsored Session

Chair: Kyriacos C. Mouskos, NJIT, Civil Engineering, Newark Heights, Newark, NJ 07102, mouskos@megahertz.njit.edu

1) Heuristic Techniques for Optimizing Transportation Networks, ***Kyriacos C. Mouskos***, NJIT, Civil Engineering, Newark Heights, Newark, NJ 07102, mouskos@megahertz.njit.edu, ***Qifeng Zeng***

The use of heuristics in solving single class and 2 classes of users transportation network design problems is presented. The main techniques used are SA, TS and a combination of the 2. The application of these techniques on small- and medium-sized networks is discussed as well as the use of heuristic evaluation functions.

2) Modeling of Trip Distributions Among Competing Transportation Modes in a Regional Corridor, ***I. J. Chang***, University of Maryland, Dept. of Civil Eng., College Park, MD 20742, ***Gang-Len Chang***

We present a method based on the game theory for projection of the demand distribution among air transport, high-speed rail, freeway and regional rail systems in a regional corridor.

3) The Effect of Model Assumptions on Braess' Paradox & Its Implications on Traffic Control, ***Wei-Hua Lin***, Virginia Polytech. Inst. & State University, Dept. of Civil Eng., 200 Patton Hall, Blacksburg, VA 24061, whlin@ctr.vt.edu

Most research adopts link performance function in which travel cost or travel time is a non-decreasing function of flow. It is well-known that Braess' paradox will arise when networks are congested. Link performance functions, however, are known to be deficient in representing congestion phenomena. We reexamine Braess' paradox in the context of a network with physical queues...

4) Real-Time Dynamic Origin-Destination Flow Estimation & Prediction in Large Networks, ***Ying Kang***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, yingkang@mail.utexas.edu, ***Hani S. Mahmassani***

A real-time Kalman filter model is used to formulate the time-dependent O-D estimation and prediction problem with a polynomial transformation. Numerical experiments are presented.

MC17 Continuous Location Problems

Sponsor: Location Analysis
Sponsored Session

Chair: Zvi Drezner, California State University, Dept. of MS/IS, Fullerton, CA 92834, zdrezner@fullerton.edu

1) On Facility Location Problems on the Sphere, ***Atsuo Suzuki***, Nanzan University, Dept. of IS/QS, 18 Yamazato-Cho Showa-Ku, Nagoya, Aichi, 466, Japan, atsuo@iq.nanzan-u.ac.jp

We present the results of the facility location problems on the sphere which are formulated by the Voronoi diagram. The problems are the p-median problem, the p-center problem and the competitive location problem. We assume that the demand is spread continuously on the sphere and solve the problems by the iterative method using the Voronoi diagram.

2) Comparing Individually & Socially Optimal Location Strategies, ***Y. Wang***, SUNY, Dept. of IE, Buffalo, NY 14260-2050, ***Joyendu Bhadury***

We address the issue of comparisons between voting based and classic minisum based approaches to locating a single facility. Background literature is discussed and new work is presented that extends the previous results on networks to the planar case.

3) Location Models with Groups of Demand Points, ***Zvi Drezner***, California State University, Dept. of MS/IS, Fullerton, CA 92834, zdrezner@fullerton.edu, ***George O. Wesolowsky***

We investigate the location of a new facility where demand is generated by groups of demand points. The distance between the facility and a group of demand points is determined in 3 ways: the closest point in the group, the farthest and the average distance to all members in the group. We also consider minisum, minimax and maximin.

4) Location on a Network with Groups of Demand Points, ***Oded Berman***, University of Toronto, Fac. of Mgmt., 105 St. George St., Toronto, Ontario, M5S 3E6, Canada, berman@mgmt.utoronto.ca, ***Zvi Drezner, George O. Wesolowsky***

We analyze 9 different location models when demand points are partitioned into groups and each group defines an individual term in the definition of the objective function. We find the set of all possible optimal locations for these problems. The best location is then found by evaluating the value of the objective function at each possible locations.

MC18 OR 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) Sample Planning Using Integer Programming, ***John T. Blake***, DalTech, Dept. of IE, PO Box 1000, Halifax, Nova Scotia, B3J 2X4, Canada, blakejt@tuns.ca

A common problem in cross-sectional health care research is selecting sites, i.e., hospitals, nursing facilities, etc., for in-depth review. Random selection of facilities, while theoretically sound, may produce a sampling plan logistically or administratively difficult to complete. Stratified random sampling, the technique most commonly used in practice, can become unwieldy when the number of strata is large...

2) Supporting Case Manager Decision Making in Behavioral Health Care, ***Sandra Potthoff***, University of Minnesota, Carlson Sch. of Mgmt. Rm 3-140, 321 19th Ave. South, Minneapolis, MN

55455, potth001@tc.umn.edu

Case managers in behavioral health care are beginning to have access to structured clinical data when conducting telephonic case management. We present how regression and ROC models can be used to support their decision making.

3) Managing Home Care Therapy Patient Waiting Lists, ***Michael W. Carter***, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, carter@mie.utoronto.ca, ***Michel Gendreau***, ***Patrick Soriano***

In Ontario, home care services are delivered by regional centres called Community Care Access Centres. All requests for home care are funneled through a single agency. With bed closures and the emphasis on shorter length of stay, there has been a rapid increase in the pressure on home care delivery. We discuss work we are currently doing to help one CCAC manage waiting lists.

MC19 An Introduction to the Theory of Constraints

Cluster: **Partnering Value Methodology, Theory of Constraints & DA**
Tutorial Session

Chair: Steven Dightman, 5946 S. Sheridan, Tacoma, WA 98408, steven.d.dightman@boeing.com

1) Tutorial: An Introduction to the Theory of Constraints, ***Chuck Gauthier***, 3917 NE 35th Cir., Vancouver, WA 98661, gaut@worldaccessnet.com charles.gauthier@boeing.com

The theory of constraints, a systems approach to continuous improvement to make more money now and in the future - WHAT to change, what to change TO and HOW to change, consists of logical thinking, 5 focusing steps, thinking processes, logistics, drum-buffer-rope, critical chain, performance measurements: throughput, inventory, operating expense.

MC20 Econometric, Genetic Algorithms & Decision Modeling

Sponsor: **Military Applications**
Sponsored Session

Chair: Norman Keith Womer, University of Mississippi, 220A North, Holman Hall, University, MS 38677

1) Logistics Planning for the Expeditionary Air Force, ***Lionel Galway***, RAND Corporation, ***Robert Tripp***

We introduce and outline research being undertaken in support of emerging Air Force employment strategies associated with EAF. EAF concepts turn on the premise that rapidly deployable force packages substitute for permanent forward presence. We argue that support effectiveness comes from planning and decisions made for longer time horizons...

2) Retention & Non-Pecuniary Incentives, ***Tanja Blackstone***, Naval Personnel R&D Center

We review previous research that has examined the relationship between non-pecuniary incentives, job tenure and military retention. We will propose an alternative econometric model and estimation methodology, the use of a GA, to assess the relationship between non-pecuniary benefits and retention.

3) Estimating Models of Decision Makers' Behavior, ***Norman Keith Womer***, University of Mississippi, 220A North, Holman Hall, University, MS 38677

We model decision making behavior in a dynamic, uncertain environment. We then derive consistent estimating procedures that model observed data from the decisions. These are used to test hypotheses about the bounds on "rationality" exhibited by the decision maker. These results are illustrated in an environment of systems acquisition.

MC21 DEA Refinements & Extensions

Cluster: **DEA**
Invited Session

Chair: Joe Zhu, Worcester Polytechnic Institute, Dept. of Mgmt., Worcester, MA 01609, jzhu@ecs.umass.edu

1) An Extended Facet DEA Application on Agriculture, ***Niels C. Petersen***, Odense University, Dept. of Mgmt., Campusvej 55, Odense, DK-5230, Denmark, ncp@busieco.ou.dk, ***Ole B. Olesen***

The facetial structure of the DEA production possibility set is determined and analyzed. The DEA, the extended facet and the full dimensional facet production possibility sets and efficiency scores are estimated and compared. A subset of facets is used for a comparison of 2 cone ratio approaches.

2) Efficiency Analysis with Repeated Measurements by Recourse Model, ***Hiroshi Morita***, Kobe University, Dept. of Comp. & Systems Eng., Nada, Kobe, 657, Japan, morita@seg.kobe-u.ac.jp, ***Hideo Michida***, ***Susumu Fujii***

We discuss a stochastic DEA model to evaluate the efficiency with repeated measurements by solving a stochastic LP with recourse. The efficiency score and the recourse cost are used to evaluate the efficiency. We show that the DMU with large data variation has lower efficiency rather than with small one.

3) Warehouse Benchmarking Using DEA, ***Timothy R. Anderson***, Portland State University, Eng. Mgmt. Program, PO Box 751, Portland, OR 97207-0751, tima@emp.pdx.edu, ***Michael Cole***, ***Keith B. Hollingsworth***, ***Paul Gilbarg***

We review past work on warehouse benching using DEA. Refinements to DEA are applied to provide additional perspectives and information.

MC22 Natural Resources Management IV

Cluster: **Natural Resources Management**
Invited Session

Chair: John Sessions, Oregon State University, Coll. of Forestry, Corvallis, OR 97331, sessionsj@cof.orst.edu

Co-Chair: Joseph P. Roise, North Carolina State University, Dept. of Forestry, Box 8008, Raleigh, NC 27695-8008, roise@cfr.cfr.ncsu.edu

1) Medium Term Tactical Forest Planning in New Zealand, ***Bruce Manley***, New Zealand Forest Research Inst., Private Bag 3020, Rotorua, New Zealand, manleyb@fri.cri.nz

Medium term tactical planning involves scheduling forest stands for harvest over the next 5 years. We describe the application of OR techniques to this problem. Models are developed to maximise present net worth while meeting market, financial, environmental and strategic constraints.

2) withdrawn - author request of 9/17, ***Mikael Ronnqvist***, Linkoping University, Div. of Optimization, Linkoping, Sweden

3) A Tactical Level Approach for Lumber Manufacturing Decision Making, ***Joseph P. Roise***, North Carolina State University, Dept. of Forestry, Box 8008, Raleigh, NC 27695-8008, roise@cfr.cfr.ncsu.edu

A computer aided sawing pattern design program has found wide use in the lumber industry because it is a simple method to evaluate a wide variety of milling decisions. We present a brief introduction to the program CASP and case histories showing some of the variety of application.

MC23 Green Design

Cluster: **Ecologically Sustainable Business Practices**
Invited Session

Chair: Lester Lave, Carnegie Mellon University, Grad. Sch. of Ind. Admin., Rm. 254, Tech & Frew, Pittsburgh, PA 15213, ll01+@andrew.cmu.edu

1) Management Tools of Environmental Quality & Sustainability, ***Lester Lave***, Carnegie Mellon University, Grad. Sch. of Ind. Admin., Rm. 254, Tech & Frew, Pittsburgh, PA 15213, ll01+@andrew.cmu.edu

To be useful for managers, tools must be quick, cheap and reliable. I discuss a number of tools for improving environmental quality and sustainability, emphasizing life cycle analysis. This presentation serves as an introduction to the other papers in the session.

2) Product Life Cycle Assessment Using Economic Input Output Techniques: A Case Study of Automobile Fuel Tanks, ***Satish Joshi***, Carnegie Mellon University, Heinz Sch. Public Policy/Mgmt., Pittsburgh, PA 15213-3890, sjlv+@andrew.cmu.edu

I present analytical models, databases and software to conduct quick yet comprehensive LCAs using economic input-output techniques. A case study comparing environmental performance of steel and plastic automobile fuel tanks is presented.

3) Application of Full Cost Pricing in the Electronics Industry Techniques: Modeling, Pricing, ***H. Scott Matthews***, Carnegie Mellon University, Grad. Sch. of Ind. Admin., Tech & Frew, Pittsburgh, PA 15213-3890, hsm+@andrew.cmu.edu

Using input-output data, we construct the environmental impacts of producing electronic products such as computers and peripheral equipment. We then attach social damage estimates to these impacts to derive social costs. Policy recommendations are made to improve environmental quality cost-effectively.

4) Life Cycle Analysis of Consumer Products: Resource Use &

Environmental Discharges, ***Heather Maclean***, Carnegie Mellon University, Dept. of Eng. & Public Policy, 118B Porter Hall, Pittsburgh, PA 15213-3890, maclean+@andrew.cmu.edu

We present an LCA of an automobile. We corroborate the results of 2 previous studies that used conventional LCA methods. Our analysis demonstrates the practicality of the economic input-output model in quantifying the full range of implications of decisions concerning the automobile life cycle.

MC24 Capacity Management Issues at a Marketing Company

Cluster: Energy
Invited Session
Chair: Rudy Elizondo, PROS Energy Technologies, 3223 Smith, Ste. 100, Houston, TX 77006, elizondo@prosenergy.com

1) Portfolio Evaluation, ***Steve Reins***, MidCon Gas Services Corp., PO Box 283, Houston, TX 77001-0283, steven_reins@oxy.com

The ability to accurately and quickly analyze portfolios in a systematic manner is critical to bidding competitive prices for new businesses/assets. Bids of tens of millions can be required in short time frames. We highlight approaches and techniques for evaluation of portfolio opportunities in the natural gas business.

2) Forecasting Issues at a Pipeline, ***Byron Wright***, Tennessee Gas Pipeline & El Paso Energy Co., 1001 Louisiana, Ste. N23B, Houston, TX 77002, wrightb@epenergy.com

Rapidly changing market conditions and pressure to maximize revenues increase the need for timely, accurate information for decisions related to capacity optimization, pricing, operational planning and revenue forecasting. This discussion covers the task of developing a forecasting method for throughput at different points along a natural gas pipeline.

3) Optimization of a Gas Nomination Process, ***Viroj Buraparate***, PROS Strategic Solutions, 2800 Buffalo Speedway, Ste. 350, Houston, TX 77098, vburaparate@prosx.com, ***Nicola Secomandi***

We demonstrate the use of a network formulation to solve the gas nomination process in a natural gas marketing company. Definition of the nomination process and conceptual design of this optimization model are highlighted.

4) Solving the Capacity Management Problem at a Marketing Company, ***Rudy Elizondo***, PROS Energy Technologies, 3223 Smith, Ste. 100, Houston, TX 77006, elizondo@prosenergy.com

We focus on the capacity management problem faced by a large natural gas marketing company. The issues involved include their ability to gain incremental revenues by using the capacity bought on a pipeline in a more optimal fashion, as well as the ability to solve the problem quickly.

MC25 Cutting Plane Algorithms

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: John Mitchell, RPI, Dept. of Math. Sci., Troy, NY 12180, mitchj@rpi.edu

1) withdrawn - chair request of 9/16, ***Volker Kaibel***, Universitaet zu Koeln, Inst. fuer Informatik, Pohligstr. 1, Koeln, 50969, Germany, kaibel@informatik.uni-koeln.de

2) Combining Simplex & Interior Point Methods in a Cutting Plane Algorithm, ***Brian Borchers***, New Mexico Tech, Dept. of Math., Socorro, NM 87801, borchers@nmt.edu, ***John Mitchell***

We describe a combined simplex/interior point cutting plane code for the linear ordering problem in which an interior point method is used to solve the LP relaxations in early stages of the cutting plane process, while the dual simplex method is used in later stages.

3) Solving Large Sparse MaxCut Problems Using an Interior Point Cutting Plane Algorithm, ***John Mitchell***, RPI, Dept. of Math. Sci., Troy, NY 12180, mitchj@rpi.edu

We investigate an interior point cutting plane algorithm for MAXCUT problems with as many as 10000 vertices and 20000 edges. The algorithm significantly outperforms a simplex cutting plane algorithm, at least on certain classes of instances. Restarting the algorithm and primal heuristics are discussed.

4) Solving Large Linear Programs Using Interior Point Cutting Planes, ***Srinivasan Ramaswamy***, United Airlines Corporate R&D, 1200 E Algonquin Rd., Elk Grove Village, IL 60173, srini.ramaswamy@ual.com

We discuss solving the LP relaxations of large crew scheduling problems. These problems are typically very large in 1 dimension and defined not explicitly, but through an "imperfect" oracle. We focus less on interior point algorithms themselves but more on how to use them in cutting plane strategies. Computational results will be discussed.

MC26 Network Designs

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: Pamela H. Vance, Auburn University, Dept. of IE, 1364 Nerine Cir., Auburn, AL 30338, pvance@eng.auburn.edu

1) Network Design for Real-Time Freight Routing & Consolidation, ***Rina Schneur***, SABRE Technology Solutions, 22 Third Ave., Burlington, MA 01803, rina_schneur@sdt-boston.com, ***Thomas L. Magnanti, Louise Totten***

A major challenge in LTL trucking is determining a real-time load plan that simultaneously specifies the movement and timing of shipments and resources (trailers) to carry them. The problem is a large-scale network design model with hundreds of thousands of integer variables. We describe modeling approaches and algorithmic challenges.

2) Minimum Cost Multi-Level Network Design, ***Sunil Chopra***, Northwestern University, Kellogg Grad. Sch. of Mgmt., 2001 Sheridan Rd., Evanston, IL 60208, s-chopra@nwu.edu, ***Chih Yang Tsai***

We consider a network-design problem with multiple facility types, where higher grade interconnections are required between certain node-pairs, modeled on an undirected graph whose nodes are partitioned into L levels. We transform the problem to a Steiner tree problem and show it to be stronger than earlier formulations.

3) A Branch & Price Algorithm for the Capacitated Minimum Spanning Tree Problem, ***I-Chi Chang***, Auburn University, Dept. of ISE, Auburn, AL 36849, changic@eng.auburn.edu, ***Pamela H. Vance***

We present a column generation approach to the capacitated minimum spanning tree problem. The problem is formulated as a set partitioning problem and solved using a B&P algorithm. Cutting planes are also added to strengthen the formulation. Computational experience on a set of randomly generated problems is reported.

MC27 Optimization in Support of Design

Cluster: Nonlinear Programming
Sponsor: Optimization
Sponsored Session
Chair: Robert M. Lewis, NASA Langley Research Center, ICASE, MS 403, Hampton, VA 23691-0001, buckaroo@icase.edu

1) Problem Formulation & Optimization Issues for Aerodynamic Shape Design, ***William P. Huffman***, The Boeing Company, PO Box 24346, M/S 7L-21, Seattle, WA 98124-2207, william.p.huffman@boeing.com, ***D. P. Young, R. G. Melvin, F. T. Johnson, C. L. Hilmes***

Capturing the requirements of many disciplines during the early stages of wing design leads to NLP problems of substantial size. We describe the complexities of formulating aerodynamic design as an optimization problem and the efficient integration of an NLP code with a computational fluid dynamics flow solver.

2) The Use of Approximation Modeling Methods in Aircraft Design, ***Anthony A. Giunta***, NASA Langley Research Center, National Res. Council, MS 139, Hampton, VA 23681, a.a.giunta@larc.nasa.gov

Approximation models are often used in place of expensive computational simulations in design optimization. We will discuss quadratic polynomial models, interpolatory kriging models and first-order Taylor-series models about a high-fidelity simulation and their application in design optimization studies of a high-speed civil transport aircraft.

3) High-Speed Civil Transport Design Optimization Using Response Surface Models of CFD Predictions, ***Duane L. Knill***, University of Washington, Dept. of Aero. & Astronautics, Guggenheim Bldg., Seattle, WA 98195-2400, knill@aoe.vt.edu knill@aa.washington.edu, ***Bernard Grossman, William H. Mason, Layne T. Watson, Raphael T. Haftka***

Aerodynamic predictions from computational fluid dynamics analyses are efficiently implemented in a highly constrained, multidisciplinary design optimization of an HSCT. Response surface approximation methods,

variable-complexity modeling techniques and parallel computing are employed in the procedure, which is tested on problems of up to 20 design variables.

4) Improving Approximation Models for Design Optimization, ***Robert M. Lewis***, NASA Langley Research Center, ICASE, MS 403, Hampton, VA 23691-0001, buckaroo@icase.edu

We will discuss possible ways to improve approximation models for optimization and design. The approaches include the use of sensitivity information in kriging models and quantitative, a posteriori bounds for approximations based on varying degrees of discretization in the solution of differential equations.

MC28 Global Optimization: Theory & Applications

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: Hanif D. Sherali, Virginia Polytech. Inst. & State Univ., Dept. of ISE, Blacksburg, VA 24061-0118, hanifs@vt.edu

1) An Extended Reformulation-Linearization Technique Based Approach for Solving Nonconvex Factorable Programs, ***Hanif D. Sherali***, Virginia Polytech. Inst. & State Univ., Dept. of ISE, Blacksburg, VA 24061-0118, hanifs@vt.edu, ***Hongjie Wang***

We develop an extension of the RLT for solving nonconvex factorable programming problems. A globally convergent B&B approach is proposed that is based on linear/convex programming relaxations generated through approximations derived by using the mean value theorem and Chebyshev interpolation polynomials coordinated with the RLT.

2) Molecular Potential Function Parameter Estimation by Global Optimization, ***A. T. Phillips***, US Naval Academy, Comp. Sci. Dept., Annapolis, MD 21402, phillips@scs.usna.navy.mil, ***J. B. Rosen***, ***K. A. Dill***

We present an algorithm which can adjust a small set of energy function parameters so that the energy function attains its global minimum value simultaneously for all members of a selected set of target conformations. This is an important property required for any computational protein folding method.

3) Simulated Annealing: Analysis of Accepting Non-Improving Points, ***Birna P. Kristinsdottir***, University of Washington, IE Dept., Box 352650, Seattle, WA 98195, birna@u.washington.edu, ***Zelda B. Zabinsky***

An analysis for SA with constant temperature is described. The analysis uses an embedded Markov chain model that provides an exact expression and a bound for the expected number of iterations to find the optimum. Improving hit-and-run with hyperspherical and coordinate direction generators is analyzed for discrete global optimization.

4) Convexification in Integer & Nonlinear Programming, ***Mohit Tawarmalani***, University of Illinois, Dept. of MIE, 1206 W Green St., Urbana, IL 61801, tawarmal@uiuc.edu, ***Nick Sahinidis***

Hierarchical relaxations based on convexification have been found to be useful in the context of integer programs. We explore the use of convexification as a tool to enhance the performance of B&B on global optimization problems. Geometrical insights are developed and highlight the intimate relationship between convexification and hierarchical relaxations.

MC29 Reinforcement Learning

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Wei Zhang, Boeing Applied Research & Technology, PO Box 3707, M/S 7L-66, Seattle, WA 98124-2207, zhangw@redwood.rt.cs.boeing.com

1) Rollout Algorithms & Neuro-Dynamic Programming, ***Dimitri Bertsekas***, MIT, Lab. for Info. & Dec. Systems, 77 Massachusetts Ave., Cambridge, MA 02139, dimitrib@mit.edu

We consider the approximate solution of optimization problems using a neuro-dynamic programming/reinforcement learning methodology. We discuss the computation and application of rollout policies, obtained by a single policy iteration starting from a known heuristic policy.

2) Learning from Animal Learning: Reinforcement Learning as an Engineering Tool, ***Andrew G. Barto***, University of Massachusetts, Dept. of Comp. Sci., Amherst, MA 01003, barto@cs.umass.edu

Reinforcement learning refers to improving performance through trial-and-error experience. Current research is providing striking examples of its capabilities. We chronicle reinforcement learning as it developed from principles of animal learning into efficient methods for finding useful approximate solutions to very large-scale dynamic optimization problems.

3) Near-Optimal Performance for Reinforcement Learning in Polynomial Time, ***Satinder Singh***, University of Colorado, Dept. of Comp. Sci., Boulder, CO 80309-0430, satinder.baveja@colorado.edu, ***Michael Kearns***

We present new algorithms for reinforcement learning and prove that they have polynomial bounds on the resources required to achieve near-optimal return in general discounted and undiscounted Markov decision processes.

4) Solving Combinatorial Optimization by Reinforcement Learning: A General Methodology Applied to Scheduling, ***Wei Zhang***, Boeing Applied Research & Technology, PO Box 3707, M/S 7L-66, Seattle, WA 98124-2207, zhangw@redwood.rt.cs.boeing.com

The key idea of this general reinforcement learning methodology is to analyze a set of "training" problem instances and learn a search control policy for solving new instances. We present how this methodology is applied to a NASA scheduling problem to produce a very efficient scheduling program.

MC30 Engineering Systems Optimization Using Simulation & AI Techniques

Cluster: Engineering Optimization
Invited Session
Chair: Adedeji B. Badiru, University of Oklahoma, Sch. of Eng., 202 W Boyd St., Ste. 124, Norman, OK 73019, abadiru@ou.edu

1) A Product Design Simulation-Based Process Control Engine, ***David B. Sieger***, University of Illinois, Mech. Eng. Dept., MC 251, 842 W Taylor St., Chicago, IL 60607-7022, dsieger@uic.edu

A discrete event modeling formalism is presented to provide a decision making structure for the product design process. Systematic design process and AI development tools are used to respond to specification and planning needs.

2) Process Simulation & Optimization Using Variation Reduction Techniques, ***Anuradha Chinta***, 15524 NE 17th St., #O-318, Bellevue Pointe, WA 98007, uradhc@index.com

We present a simulation-based analysis and validation of the 2-level orthogonal array of Taguchi technique and full-factorial approach of Shainin technique for variation reduction in manufacturing processes.

3) Project Network Complexity Measure Using Regression Neural Networks Approach, ***Milan Milatovic***, University of Oklahoma, Sch. of IE, 202 W Boyd St., Ste. 124, Norman, OK 73019, milan@ou.edu

We present regression neural networks as a tool for complexity and duration prediction of resource constrained project networks. A special configuration of regression neural networks is presented to quantify and interpret network complexity and duration.

MC31 Tabu Search Applications

Cluster: Tabu Search
Invited Session
Chair: Steve Y. Chiu, GTE Laboratories Inc., 40 Sylvan Rd., Waltham, MA 02254, schiu@gte.com

1) A Tabu Search Algorithm for the Crew Rerouting Problem, ***Mihnea Stan***, Delta Technology, Inc., 1001 International Blvd., Atlanta, GA 30354, mihnea.stan@transquest.com

The crew re-routing problem arises during airline irregular operations when external events, i.e., weather, air traffic control, etc., disrupt the planned crew schedule. The objective is to minimize the costs associated with reassigning the crews to the scheduled flights. We present a TS algorithm and report preliminary computational results.

2) Tabu Search for a Class of Scheduling Problems, ***Balu Rangaswamy***, US WEST Advanced Technologies, Inc., 4001 Discovery Dr., Boulder, CO 80303

We describe a TS approach for precedence and resource-constrained scheduling problems with total weighted early/tardy minimization objectives. The approach makes use of the successive filtration strategy implemented by means of a bookkeeping scheme that guides the selection of the members for the various candidate lists.

3) Tabu Search for Set Partitioning: A Vehicle Routing Problem Application, ***Jeifeng Xu***, Delta Technology Inc., 1001 International Blvd., Atlanta, GA 30354, jiefeng.xu@transquest.com, ***James P.***

Kelly

We develop a generic TS heuristic for solving the well-known VRP. This algorithm explores the advantages of simple local search and improvement heuristics as well as a complex metaheuristic. Computational experience on standard benchmark problems is discussed and comparisons with other up-to-date heuristic methods are provided.

4) Finding Near-Optimal STP Locations Using Tabu Search, ***Xiaorong Sun***, Lucent Technologies, 101 Crawfords Corner Rd., Holmdel, NJ 07733, xsun@lucent.com, ***P. Wang***

We present heuristic methods based on TS to solve the problem of building a minimum cost common channel signaling network given the locations of signaling points and traffic matrix. The method has been compared with a modified exchange algorithm for the facility location problem. Computational results show that TS takes less CPU time than exchange algorithm...

MC32 Software Demonstrations

Chair: Tyler Phillips, AutoSimulations, Inc., 655 Medical Dr., Bountiful, UT 84010, info@autosim.com

1) Software Demonstration: Optimization Modeling with LINDO, LINGO & What'sBest, ***Mark Wiley***, LINDO Systems, Inc., 1415 N Dayton St., Chicago, IL 60622, mwiley@lindo.com

LINDO Systems will highlight the enhancements in our new, faster LP solver as well as demonstrate our line of popular optimization modeling packages including: LINDO, our powerful linear and integer programming engine; LINGO, our integrated modeling language with linear/nonlinear solvers; and What'sBest, our large scale linear/nonlinear spreadsheet solver.

2) Software Demonstration: Rule-Based Scheduling - It Works!, ***Tyler Phillips***, AutoSimulations, Inc., 655 Medical Dr., Bountiful, UT 84010, info@autosim.com

AutoSched AP is a finite capacity planning and scheduling tool that helps you increase throughput, reduce in-process inventory and increase equipment and personnel utilization. AutoSched efficiently schedules all of the constraints in your factory, such as shift schedules, work setup rules, batching, preventative maintenance, machine efficiency and operator skill classes.

MC33 ATM System Performance II

Sponsor: Aviation Applications
Sponsored Session

Chair: Robert W. Schwab, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, robert.w.schwab@boeing.com

1) Modeling Capabilities & Performance Metrics, ***Amedeo R. Odoni***, MIT, Rm. 33-218, Cambridge, MA, odoni@mit.edu

We review existing fast-time modeling capabilities and assess their adequacy for estimating proposed ATM system performance metrics. We identify areas of strength and of gaps requiring further research on fundamental principles and/or additional model development. Opportunities for model integration are presented.

2) ATM Performance Enhancements & Potential Benefits of the Advanced Air Transportation Technologies Project ATM Tools, ***Phillip T. Snyder***, NASA AATT Project, NASA Ames Research Ctr., M/S 262-5, Moffett Field, CA 94035-1000, ptsnyder@mail.arc.nasa.gov, ***Chris Scofield***

NASA's AATT Project is currently developing a suite of air traffic management tools to enhance the performance of the national airspace system in the areas of capacity, flexibility, predictability and efficiency. Preliminary results of early performance and potential benefit assessments are presented, emphasizing surface and terminal airspace enhancements.

3) Collaborative Decision Making: Paradigm for a Future NAS, ***Mike Wambsganss***, Metron, Inc., 11911 Freedom Dr. Ste. 800, Reston, VA 20190, wambsganss@metsci.com

CDM's collaborative air traffic management technologies allow NAS users and service providers 2-way exchange of real-time data and direct access to important NAS information. By viewing the same picture of demand and increasing user participation in FAA traffic decisions, CDM represents a potential $8.9 billion savings to the industry by 2015.

MC34 Simulation Methodology: Batch Means & Variance Reduction

Sponsor: Simulation
Sponsored Session

Chair: Christos Alexopoulos, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205

1) Using Semi-Markov & Semi-Stationary Models to Speed-Up Rare Event Simulations, ***Bruce C. Shultes***, Naval Postgraduate School, Dept. Comp. Sci., Code CS/Sb, 833 Dyer Rd., Monterey, CA 93943-5118, shultesb@cs.nps.navy.mil www.caps.cs.nps.navy.mil/people/shultesb/, ***Christos Alexopoulos***

Importance sampling methods for the estimation of a rare event probability induce problems when long paths to the rare event within a regenerative cycle are highly likely. We propose 2 methods that address this problem. Benefits, properties and application guidelines will be covered. These will be shown to complement existing importance sampling methods for highly reliable systems.

2) Dynamic Batch Means in Simulation Output Analysis, ***Bruce W. Schmeiser***, Purdue University, Sch. of IE, 1287 Grissom Hall, W Lafayette, IN 47907-1287, bruce@purdue.edu http://www.ecn.purdue.edu/~bruce/, ***Ying-Chieh Yeh***

We investigate non-overlapping batch means, implemented in fixed memory to dynamically change both batch size and number of batches as the simulation runs. Statistical properties of 2 associated estimators are discussed.

3) Variance Reduction for Simulation of Interest Rate Derivative Securities, ***Thanos Avramidis***, Cornell University, Sch. of OR/IE, Rhodes Hall 238, Ithaca, NY 14853, avramidis@orie.cornell.edu http://www.orie.cornell.edu/~avramidi

Monte Carlo simulation is a commonly used method for the valuation of interest rate derivative securities. We discuss variance reduction techniques to increase the efficiency of estimation based on stratified sampling, importance sampling, correlation induction and quasi-random numbers. We present results of our computational experience.

MC35 Finance

Contributed Session

Chair: Harold J. Schleef, Lewis & Clark College, 0615 SW Palatine Hill Rd., Portland, OR 97219, schleef@lclark.edu

1) Pricing International Equity Investments Using Proxy Indices, ***Kian Esteghamat***, Stanford University, Dept. of EES/OR, PO Box 8319, Stanford, CA 94309, tgtbatu@leland.stanford.edu

International investments, especially those in emerging economies, are exposed to political, regulatory and various other regional uncertainties. Assessing the contribution of every risk can be difficult. We describe an approach for valuing such investments based on construction of a proxy index process that reflects regional and sectoral risks of operations.

2) Privitization by Going Public: The Austrian Experience, ***Michaela-Maria Linzatti***, University of Vienna, Brunnerstrabe 72, Vienna, 1210, Austria, linzatti@finance2.bwl.univie.ac.at

Initial public offerings can be seen as a new technology of selling nationalized enterprises in Austria. The empirical study analyzes underpricing and long-term performance of privatized firms that went public between 1985-95. Results are compared with the findings of private IPOs and international surveys.

3) Estimating with Length-Biased Accounting Data, ***Paul P. Hoppe***, Golden Gate University, 536 Mission St., San Francisco, CA 94105, phoppe@ggu.edu

In statistical auditing, certain audit evidence can become available which is not from the random sample. This arrival is modeled as a length-biased process. Building on the work of Vardi, using superpopulations, we extend the results to finite populations. Several estimation strategies are developed and tested using simulations of several superpopulation models.

4) Correcting IRA Distribution Errors, ***Harold J. Schleef***, Lewis & Clark College, 0615 SW Palatine Hill Rd., Portland, OR 97219, schleef@lclark.edu

Upon the demise of the owner, IRAs pass into the owner's estate. Mistakes, such as lost beneficiary designation, may lead to a taxable disposition of the IRA. Upon discovery of the error, the beneficiary must be made whole. LP may be used to determine fair settlements.

MC36 Real Applications of Scheduling

Contributed Session

Chair: Stuart J. Allen, Pennsylvania State University, Sch. of Bus., Station Rd., Erie, PA 16563

1) Scheduling Military Aircraft Using the Column Generation Approach, ***YiHua Li***, SABRE Decision Technologies, MD 302, PO Box 619615, DFW Airport, TX 75261-9615, yihua_li@sabre.com, ***Yanwen Wang***

We describe the application of column generation in solving a military aircraft scheduling problem. A number of constraints, including time windows, landing

restrictions and duty hours are imposed when generating schedules. We outline the solution strategy and report preliminary results.

2) Line Balancing in an Overnight Express Mail Hub, ***Michael J. Racer***, University of Memphis, ISE Dept., Memphis, TN 38152, mracer@cc.memphis.edu, ***Robin H. Lovgren***

The demand on an express mail hub to process quickly requires that the flow of packages within the system be as balanced as possible throughout the period. We focus on the clustering of destination points within the system in order to achieve this balance.

3) Course Timetabling for an Academic Department on Multiple Campuses, ***Steven E. Butt***, Western Michigan University, Eng. Mgmt. Research Lab., Dept. of IME, Kalamazoo, MI 49008, steven.butt@wmich.edu http://www.wmich.edu/ime/butt.htm, ***Jennifer Hower***

We consider the problem of assigning rooms, times and instructors to courses after the number and size of the course streams have been determined. In addition to the typical conflicts that must be avoided, our model includes course information from 6 different campuses and considers the conflicts associated with instructors and students moving from one campus to another throughout the day...

4) Capacitated Scheduling of Multiple Products on a Single Processor with Sequence Dependencies, ***Stuart J. Allen***, Pennsylvania State University, Sch. of Bus., Station Rd., Erie, PA 16563, ***Michael P. D'Itri, Edmund W. Schuster***

We describe a system developed at Welch's, a major food manufacturer, which provides cost-based lot sizes and sequences for sequence-dependent set-up times and costs. Lot sizing uses a modification of the Dixon-Silver method for 0 set-up time and sequencing uses nearest-neighbor with variable origin.

MC37 Marketing II

Contributed Session

Chair: Tailan Chi, University of Wisconsin, Sch. of Bus., PO Box 742, Milwaukee, WI 53201-0742, chi@csd.uwm.edu

1) Price Dispersion in Electronic Markets, ***Il-Horn Hann***, University of Pennsylvania, The Wharton Sch., 3620 Locust Walk, #1300, Philadelphia, PA 19104, hann36@wharton.upenn.edu

With lower search costs in electronic markets and with the resulting transparency, it has been argued that price dispersion should diminish. First empirical results refute that. We explore why higher price dispersion can be observed for some goods and not others.

2) Converging Channels for Promotion & Customer Service, ***Mika Raulas***, Helsinki School of Economics, PO Box 1210, Helsinki, 001001, Finland, raulas@hkkk.fi www.hkkk.fi, ***Ari P. Vepsalainen, Jukka K. Kallio***

Marketing and service relationships would seem to converge into a single channel with the Internet and EC. Customers, however, still value the conventional channels and intermediary organizations. Our model of customer channels spans the full scope and trade-offs between technological options and customer preferences.

3) The Effects of Electronic Data Interchange Usage Patterns on Channel Outcomes, ***Heonmoon Lim***, Korea, 17 Woomyun-dong Seocho-gu, Seoul, Korea, limhm@kt.co.kr, ***Philhwan Lee, InKee Jung, Moon-Gil Yoon***

Many marketing researchers and practitioners have recognized a great opportunity to get more competitive advantages and to improve channel performance by using EDI in trade exchange. Unfortunately, most researchers have focused mainly on the impact that the adoption of EDI has on channel performance. As a result, they couldn't present a full understanding of how EDI influences channel performance.

4) Optimal Pricing Policy for Manufacturers Selling Online, ***Wenyu Dou***, University of Wisconsin, Sch. of Bus., PO Box 742, Milwaukee, WI 53201, wenyu@csd.uwm.edu http://www.wum.edu/~wenyu, ***Tailan Chi***

Using a game-theoretic approach, we examine the optimal pricing policy for a manufacturer that sells its products both to an internet retailer and on its own web site. A model is built on 2 major parameters: substitutability between the online merchants and selling effort of the internet retailer.

MC38 Information Systems I

Contributed Session

Chair: Adam S. Huarng, Purdue University, Comp. Sci. Dept., KT 252, Fort Wayne, IN 46805, huarng@ipfw.edu

1) The Application of Client/Server Technology in Operations Research, ***Weidong Zhou***, 4741 S Fulton # 201, Tulsa, OK 74135, zhouw@centum.utulsa.edu http://members.tripod.com/~zhouw/index.htm, ***Wen-Chyuan Chiang***

Client/server technology has been widely accepted in business applications. However, it is rarely used in the field of OR. We suggest a new way to fully utilize available network resources to compute OR problems by using client/server technology.

2) Development of a Model for Pre-Mathematical Problem Specification, ***Yasuki Sekiguchi***, Hokkaido University, Dept. of Bus. Admin., Kita 9 Nishi 7, Kita-ku, Sapporo, 060-0809, Japan, seki@econ.hokudai.ac.jp

A model for pre-mathematical problem specification is proposed.

3) Management of Information & Information Systems in State Rehabilitation Agencies, ***Sita Misra***, West Virginia Rehabilitation Research & Training Center, 806 Allen Hall, Morgantown, WV 26506-6122, misra@rtcl.icdi.wvu.edu.

We present the major findings of a survey research project undertaken to examine the state-of-the-art in management ISs in federal-state rehabilitation programs. Thirty-six general agencies and 11 agencies serving persons with visual impairments participated in the survey.

4) Management for Software Reuse, ***Adam S. Huarng***, Purdue University, Comp. Sci. Dept., KT 252, Fort Wayne, IN 46805, huarng@ipfw.edu

Reusability of software is a wide goal for reducing development time and increasing reliability of software development. Experience shows that reusability is difficult to achieve. We describe some of the obstacles to reuse and several approaches to achieving higher levels of reuse.

5) withdrawn - author email of 8/24, ***Jaak Jurison***, Fordham University, Grad. Sch. of Bus., 113 W 60th St., New York, NY 10023, jurison@mary.fordham.edu

MC39 Facilities Planning & Design

Contributed Session

Chair: Timothy P. Van Voorhis, Iowa State University, 205 Engineering Annex, Ames, IA 50011, tvanvoor@iastate.ecu http://www.public.iastate.edu/~tvanvoor

1) Job Routing & Machine Location in Multi-Product Flowlines, ***Bhaba R. Sarker***, Louisiana State University, Dept. of IMSE, Baton Rouge, LA 70803-6409, bsarker@unix1.sncc.lsu.edu, ***Ahmad Diponegoro***

The job routing and machine location problem in manufacturing cells for multiple products is one that is complex in nature, particularly when compounded by looping back to the previous station(s). A heuristic method is developed to minimize the material flow along the production line for both asymmetric and unequally-spaced machine locations. Computational results are demonstrated.

2) A Prediction Limit Signal for Initiating Capacity Expansion, ***Sarah M. Ryan***, University of Nebraska, 175 Nebraska Hall, Lincoln, NE 68588-0518, smryan@unlinfo.unl.edu

Uncertain demand coupled with lead times for adding capacity may call for initiating capacity additions before they will be needed. An appealing heuristic for timing expansions hedges the demand forecast with a prediction limit, but which probability interval is best? The most appropriate probability hedge in a rolling decision environment depends on demand uncertainty, lead time, etc...

3) Chromatic Representation Location Model, ***Thanatphong Pratheepthaweephon***, Assumption University, Ramkamhaeng 24 Rd, Bangkapi, Bangkok, 10240, Thailand, p2819752@au.ac.th, ***Chamnong Jungthirapanich***

The model recommends locations through a hue, saturation and value color model. Location scores are translated into colors within the hexcone or 6-sided pyramid subset of the 3D cylindrical coordinate system. The best location is stated quantitatively via the color equation and is visualized as the tip of the hexcone.

4) Optimization & Heuristic Strategies for Facility Layout, ***Timothy P. Van Voorhis***, Iowa State University, 205 Engineering Annex, Ames, IA 50011, tvanvoor@iastate.ecu http://www.public.iastate.edu/~tvanvoor

We describe the block layout problem and consider a B&B algorithm for solving it. Methods are given for improving lower bounds and SA is used to generate a good initial layout. Computational considerations and results are discussed.

Monday 14:45-16:15

MD01 Panel: The Case for an INFORMS Decision Analysis Journal

Sponsor: Decision Analysis
Sponsored Session

Chair: L. Robin Keller, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697-3125, lrkeller@uci.edu

Co-Chair: Craig W. Kirkwood

1) Panel: The Case for an INFORMS Decision Analysis Journal, ***Vicki M. Bier***, University of Wisconsin, 1513 University Ave., Mech. Engineering Bldg., Madison, WI 53706-1572, bier@ie.engr.wisc.edu, ***Dana R. Clyman***, University of Virginia, Darden School, PO Box 6550, Charlottesville, VA 22906-6550, clymand@darden.gbus.virginia.edu, ***L. Robin Keller***, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697-3125, lrkeller@uci.edu, ***Craig W. Kirkwood***, Arizona State University, Coll. of Bus., Dept. of Mgmt., Tempe, AZ 85287-4006, craig.kirkwood@asu.edu http://www.public.asu.edu/~kirkwood, ***Don N. Kleinmuntz***, University of Illinois, Dept. of Bus. Admin., 1206 S 6th St., Champaign, IL 61820, dnk@uiuc.edu

An INFORMS decision analysis journal might better position DA as a field within universities, as well as provide a way for practitioners to keep current with developments in methodology and applications. This panel will discuss the pros and cons of starting such a journal.

MD02 Railroad Capacity Issues

Sponsor: Railroad Applications
Sponsored Session

Chair: Bill Vanmarter, Canadian Pacific Railway, 401 9th Ave. SW, Desk F4135, Calgary, Alberta, T2P 4Z4, Canada, bill_vanmarter@cpr.ca

1) Modeling Slotted Operation on Single Track, ***Bill Richardson***, Canadian Pacific Railway, 401 9th Ave. SW, Desk F4134, Calgary, Alberta, T2P 4Z4, Canada, bill_richardson@cpr.ca

Models of the relationship between transit time, slot frequency and inter-siding spacing will be explored. In certain situations, the slot frequency can "resonate" with the track layout to give smaller train delay.

2) Estimating the Capacity of Railroad Terminal Complexes, ***Carl D. Martland***, MIT, Dept. of Civil & Environ. Eng., Cambridge, MA 02139, martlan@mitvma.mit.edu

Most models of rail capacity deal with line capacity; a few deal with yard capacity; almost none deal with complex terminals. We will describe TERMCAP, a spreadsheet model designed to estimate the capacity of a terminal area where a half dozen mainlines converge upon a number of classification yards, intermodal yards and industrial support facilities.

3) The Mainline/Yard Interface, ***Bill Vanmarter***, Canadian Pacific Railway, 401 9th Ave. SW, Desk F4135, Calgary, Alberta, T2P 4Z4, Canada, bill_vanmarter@cpr.ca

Railroad mainline capacity is necessarily analyzed at train level. Yard capacity is usually analyzed separately in terms of blocks and cars. Identifying root causes of bottlenecks from a network perspective requires a common ground between mainline and yards. We present a simulation approach to this problem.

MD03 Teaching, Cases & Learning

Sponsor: Education
Sponsored Session

Chair: James J. Cochran, University of Cincinnati, PO Box 210130, Cincinnati, OH 45221-0130, cochrajj@econqa.cba.uc.edu

1) The Role of Teaching in Learning, ***Judith S. Liebman***, University of Illinois, 110 Whitehall Ct., Urbana, IL 61801, jliebman@uiuc.edu

In universities, teaching has long been equated with lecturing and student learning with classroom presence. Recent technological advances and emerging results from cognitive psychology research have enriched our opportunities to promote student learning. How is our teaching role changing?

2) Teaching OR/MS Topics in a Finance Context, ***Ronald H. Wright***, Le Moyne College, Dept. of Bus. Admin., Syracuse, NY 13214, wright@palm.lemoyne.edu, ***Salwa Ammar***

The decline of MS as a core course in business schools has been the subject of much attention. However, there seems to be a growing role for OR/MS within traditional business functional areas. We describe efforts at teaching MS topics in a finance context.

3) A Case Methodology for Introductory Statistics & MS Courses in Undergraduate Business Programs, ***James J. Cochran***, University of Cincinnati, PO Box 210130, Cincinnati, OH 45221-0130, cochrajj@econqa.cba.uc.edu

Use of small-scale cases in introductory MS courses will be discussed. An approach to small-scale case development will be presented. Motivation, of both instructor and student and implementation of the case approach will be considered. Results achieved through this approach will also be addressed.

MD04 Computing Environment for Modeling & Solving Stochastic Programming Problems

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Gautam Mitra, Brunel University, West London, UK, gautam.mitra@brunel.ac.uk

1) Computing Environments & Representation of Stochastic Programs, ***Gyana R. Parija***, IBM Corporation, 522 South Rd., Poughkeepsie, NY 12601, parija@us.ibm.com, ***Alan J. King***

SMPS provides a good external format for SP, but is limited in its scope for manipulation. Issues covering internal representation of models are considered. In particular, methods of introducing simulation, sampling and probability distributions which can be used by inner decomposition algorithms are discussed.

2) Stochastic Programming Integrated Environment, ***Gautam Mitra***, Brunel University, West London, UK, gautam.mitra@brunel.ac.uk, ***Cormac Lucas, Ali Mirhassani, A. Nagar, P. Valente***

We describe an extension of the algebraic modeling language MPL to SMPL which can represent 2-stage and multi-stage SP problems. The integration of the modeling, solving and the database systems as an environment for well-known classes of SP models is considered and illustrated by examples.

3) Modeling Stochastic Multi-Stage Linear Programs with Information, ***J. J. Bisschop***, Paragon Decision Tech. BV, The Netherlands, ***J.B.J. Heerink***

We discuss the effects of including information in stochastic multi-stage LPs. Predictions about uncertain event parameters based on prior probabilities are incorporated into an extended scenario tree. This approach seems more realistic than the one without predictions. An example is provided.

4) SLP-IOR: A Model Management System for Stochastic Linear Programming, ***P. Kall***, Universitaet Zuerich, Institute fuer Operations Res., Switzerland, kall@ior.unizh.ch

No abstract supplied.

5) STOCHGEN: A Software System for Modeling & Solving Stochastic Programming Problems, ***M. A. H. Dempster***, Judge Institute, Cambridge, UK, mahd2@cus.cam.ac.uk

No abstract supplied.

MD05 Information/Incentives in Supply Chain Coordination

Sponsor: MSOM
Sponsored Session

Chair: Dawn Barnes-Schuster, University of Chicago, Grad. School of Bus., 1101 East 58th St., Chicago, IL 60637, dawn.barnes-schuster@gsb.uchicago.edu

1) Designing an Ideal Returns Processing System, ***Ronald S. Tibben-Lembke***, University of Nevada, Dept. of Managerial Sci., MS 028, Reno, NV 89557, rtl@unr.edu

Reverse logistics is a significant cost area for large retailers. The largest source of RL material is the flow of returned products. We consider centralized and decentralized systems for processing returns and present a method for designing an ideal system as well as computational results.

2) Coordinating Supply Chains with Competition: Capacity Allocation in Semiconductor Manufacturing, ***Suman Mallik***, University of Pennsylvania, Wharton Sch., Philadelphia, PA 19104-6366, mallik84@wharton.upenn.edu, ***Patrick T. Harker***

Many multi-divisional firms make their production/allocation decisions based on forecasts from divisions/plants. The process is often characterized by incentive problems. Motivated by experiences of a major US-based semiconductor manufacturer, we present an integrated model of incentive problems arising in

forecasting and intra-company coordination problems.

3) Supply Contracts with Options: Issues in Channel Coordination, ***Dawn Barnes-Schuster***, University of Chicago, Grad. School of Bus., 1101 East 58th St., Chicago, IL 60637, dawn.barnes-schuster@gsb.uchicago.edu, ***Ravi Anupindi, Y. Bassok***

We explore the issues involved in using contingent claims or options as a mechanism for coordinating supply chains. We develop conditions under which no coordination is possible and examine the necessary cost/price structures when coordination is possible.

4) A Two-Echelon Service Parts Logistics System for Repairables with Two Classes of Customer Service, ***Yunzeng Wang***, University of Mississippi, Sch. of Bus. Admin., University, MS 38677, ywang@bus.olemiss.edu, ***Morris A. Cohen, Yu-Sheng Zheng***

We consider a 2-echelon service parts system for repairables, consisting of a single repair depot and multiple local inventory centers. Based on diffrent response times, 2 classes of customer service, emergency and non-emergency, are provided at the local centers. System performance measurements are derived and system optimization is carried out.

MD06 FMS Design & Control

Cluster: **Flexible Manufacturing Systems**
Invited Session

Chair: Kathryn E. Stecke, University of Michigan, Sch. of Business Admin., Tappan Rm. 5206, Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) withdrawn - author request of 9/17, ***Ulrich A. Tetzlaff***, George Mason University, Sch. of Mgmt., MSN 5F4, Fairfax, VA 22030-4444, tetzlaff@som.gmu.edu, ***Harold J. Kushner***

2) Performance Evaluation of an Automated Flow Line with Limited Repair Capacities, ***Heinrich Kuhn***, Universitat Eichstatt, Wirtschaftswissenschaftliche, Auf der Schanz 49, Ingolstadt, 85049, Germany, heinrich.kuhn@ku-eichstaett.de

The interrelations between production and maintenance systems are mostly neglected during the design phase of automated production systems. We present an analytical approach for performance evaluation of an automated flow line which especially takes into account the dependence between the production and maintenance system.

3) Simultaneous Location of I/O Stations & Orientation of Path Segments in Automated Guided Vehicle System Design, ***Andre Langevin***, Ecole Polytechnique, Dept. of Math. & IE, Box 6079 Centre-Ville, Montreal, Quebec, H3C 3A7, Canada, andrel@crt.umontreal.ca, ***Diane Riopel, Gilles Savard***

We address the 2 problems of location the I/O stations and orientating the guide path segments in the design of an AGV system. An integer LP is used to model both problems and an efficient implementation of a B&C method is discussed.

4) A Heuristic Method for a Flexible Manufacturing System Design Problem, ***H. Felix Lee***, Southern Illinois University, Dept. of IE, Box 1805, Edwardsville, IL 62026-1805, hflee@siue.edu

We address a design problem for FMSs with multiple machine types. This problem determines several key design issues subject to a throughput constraint with the objective of minimum cost. Using closed queueing network models, we propose a heuristic method based on decomposition in order to reduce computation. Experimental results will be reported.

MD07 Supply Chain Optimization

Cluster: **Supply Chain Management**
Invited Session

Chair: Tom Ervolina, IBM Corporation, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, ervolina@us.ibm.com

1) Integrating Production & Transportation in a Single-Supplier/ Single-Customer System, ***Jan Dethloff***, University of Hamburg, Inst. for Logistics/Transport., Von-Melle-Park 5, Hamburg, 20146, Germany, dethloff@rrz.uni-hamburg.de http://www.uni-hamburg.de/ilt/de-engl.htm

A single supplier/single customer system where the supplier produces in batch production and the customer has to meet a constant demand rate is reviewed. The production batches are split into shipments. We present a generalized policy explicitly taking into account realistic transportation costs.

2) A Two-Echelon Inventory System with Supply Lead Time Flexibility, ***Eric B. Diks***, Baan Company, Zonneoordlaan 17, PO Box 250, Ede, 881-BG, The Netherlands, ediks@research.baan.nl

We consider a 2-echelon inventory system where each stockpoint uses an echelon order up-to-policy. Each end-stockpoint requires a target service level, e.g., fill rate. Unlike most models, the outstanding orders (in the pipeline of the central depot) can be made available before the end of the planned lead time with a certain probability...

3) Implosion Issues for the Large Enterprise: Centralized vs. Local Planning, ***Tom Ervolina***, IBM Corporation, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, ervolina@us.ibm.com, ***Dan Connors, Brian Eck***

Implosion is the technique of allocating constrained resources to best meet demand. It is a core component of most advanced planning systems. We consider how application of implosion technology differs when planning is enterprise-wide vs. localized. We focus on IBM using its own implosion optimization solver, SCE.

MD08 Markov Decision Processes & Games

Sponsor: **Applied Probability Section**
Sponsored Session

Chair: Eugene A. Feinberg, SUNY, Harriman Sch. of Mgmt., Stony Brook, NY 11794-3775, efeinber@fac.har.sunysb.edu

1) A Genetic Algorithm Heuristic for Finite Horizon Partially Observed Markov Decision Processes, ***Alex Z.-Z. Lin***, University of Michigan, IOE Dept., Ann Arbor, MI 48109-2140, ***James C. Bean, Chelsea C. White, III***

It is known that the value functions for a finite horizon POMDP are piecewise affine and convex over its information state space, and can be uniquely represented by a set of affine vectors. We propose a GA exploiting this property to quickly determine an approximation solution set with high solution quality.

2) Consumption & Investment Policies with Transaction Costs, ***Ulrich Rieder***, Universitaet Ulm, Abteilung Mathematik VII, Ulm, D-89069, Germany

We study the problem of maximizing the expected utility in an incomplete discrete-time financial market containing a bond and a finite number of stocks. First, we solve the problem by MDP-techniques and prove several structural properties, then the so-called martingale approach is considered...

3) How to Bid for a Pizza: A Two-Person Strategic Market Game, ***P. Secchi***, University of Minnesota, School of Stats., Minneapolis, MN 55455, ***W. Sudderth***

Two players hold money which they bid each day to purchase a nondurable consumer good - say pizza. The pizza goes to the high bidder each day and the money from the winning bid recirculates to one of the players according to whether a coin lands heads or tails. We find optimal strategies for the discounted and average reward games.

4) Continuous-Time Discounted Markov Decision Processes: A Discrete Event Approach, ***Eugene A. Feinberg***, SUNY, Harriman Sch. of Mgmt., Stony Brook, NY 11794-3775, efeinber@fac.har.sunysb.edu

We show that policies that select actions just at jump epochs are sufficient for continuous-time jump Markov decision processes. We describe the results for constrained and unconstrained problems that follow from this approach.

MD09 Auctions in a Deregulated Electricity Market

Cluster: **Competitive Bidding**
Invited Session

Chair: Shmuel S. Oren, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, shmuel@euler.berkeley.edu

1) Designing an Auction for Ancillary Services, ***Harry Singh***, Pacific Gas & Electric Co., MC B20A, PO Box 770000, 77 Beal St., San Francisco, CA 94177, hxs7@pge.com, ***Alex Papalexopoulos***

We discuss the design of an auction for procurement of ancillary services in a competitive electricity market. Ancillary services include operating reserves and automatic generation control necessary to ensure the real-time balancing of demand and supply in an electric power system. Such auctions have been proposed for California's new electricity market.

2) Multi-Unit Auctions for Electric Power with Imperfect Information, ***Wedad Elmaghrabi***, University of California, IEOR Dept., Berkeley, CA 94720, wood@cimsim.ieor.berkeley.edu

We examine efficiency properties of electricity auctions conducted by a power exchange procuring electricity from competitive generators to meet forecasted load for the day ahead. The auction is modeled as a multi-unit auction with

production cost dependencies and imperfect information. We consider sequential vs. simultaneous auctions and alternative lot definitions.

3) Using Auctions to Divest Generation Assets, ***Lisa Cameron***, Charles River Associates, 200 Clarendon St. T-33, Boston, MA 02116, ljc@crai.com, ***Peter C. Cramton***, ***Robert Wilson***

We argue that an auction is the best way to establish a market value for utilities, but auction rules can impact sellers' ability to achieve their goals of revenue maximization and transparency. We advocate use of the simultaneous ascending auction for utility asset divestitures. It is transparent, revenue maximizing and successfully tested in high stakes situations.

MD10 Access, Bandwidth & Modeling Problems in High Performance Networking

Sponsor: Telecommunications
Sponsored Session
Chair: John M. Rulnick, Worcester Polytech Institute, Dept. of Elec. & Comp. Eng., Worcester, MA 01609, rulnick@ece.wpi.edu

1) Scheduling Algorithm for High Performance Switches, ***Steven M. P. Yip***, Cisco Multi-Service Switching, MS SJC 3/4, 170 W Tasman Dr., San Jose, CA 95134-1706, syip@cisco.com, ***Nicholas Bambos***

We focus on the design of high performance crosspoint switches. Assuming a continuous flow of random packets, various scheduling policies with tremendously different characteristics exist. We propose a class of scheduling schemes that would achieve optimality in throughput under all stationary and ergodic packet flows.

2) Bandwidth Allocation in Wireless Networks, ***Nicholas Bambos***, Stanford University, Terman Eng. Ctr., Stanford, CA 94305, bambos@leland.stanford.edu, ***George Michailidis***

We consider the problem of dynamic bandwidth allocation in wireless networks, where the service rates are exogenously randomly modulated. We design allocation policies that maximize the network's capacity, given the statistics of the job input flows and the modulating environment and evaluate their performance characteristics.

3) Mechanisms for Inducing Long-Range Dependence in Simple Queueing Models, ***D. J. Daley***, Australian National University, Sch. of Math. Sci., Australia, daryl@maths.anu.edu.au

The output of a stationary M/G/infinity queue with finite mean service time is never LRD, whereas the output of a stationary M/G/1 system that is stable can be LRD. We discuss conditions for M/G/k systems to be LRD or not.

4) Stochastic Model of Timed-Token Multimedia Networks, ***Dawn K. Campanelli***, Worcester Polytech Institute, Dept. of Elec. & Comp. Eng., Worcester, MA 01609, tyler@wpi.edu, ***John M. Rulnick***

Networks such as FDDI-II use timed-token protocols that are modified to support isochronous (telecommunications) traffic as well as synchronous and asynchronous data. We investigate the performance of these networks through a stochastic model that addresses dynamic bandwidth allocation and the competition for resources among different traffic types.

5) A Resource Allocation Problem in Internet Service Provision, ***John M. Rulnick***, Worcester Polytech Institute, Dept. of Elec. & Comp. Eng., Worcester, MA 01609, rulnick@ece.wpi.edu

Telecommunications firms and regional and national ISPs are introducing central reserve access pools to accommodate overflow from local network access channels. The service provision and management issues are formulated and studied as a queueing resource allocation problem. Strategies for the highly competitive ISP market are discussed.

MD11 Interdisciplinary Product Development Education

Sponsor: Technology Management
Sponsored Session
Chair: Joseph A. Heim, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195, jheim@u.washington.edu

1) A Collaborative Concurrent Engineering Curriculum

The Manufacturing Engineering Education Partnership consists of faculty, staff and industry partners from Pennsylvania State University, the University of Puerto Rico Mayaguez, the University of Washington and Sandia National Laboratories. We describe a collaboratively developed undergraduate course in concurrent engineering and our assessment after 3 years of offering the course.

2) Interdisciplinary Product Development Education at MIT, ***Steven D. Eppinger***, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02139, eppinger@mit.edu

At MIT, we have been experimenting with interdisciplinary education in the area of product design and development for 10 years. Teaching methods have included case studies, student projects, hands-on exercises, thesis research, distance learning, cross-registration and more. We will share lessons learned and further challenges in this exciting area.

3) Interdisciplinary Product Development Education at the University of Washington, ***Emer Dooley***, University of Washington, Box 353200, Seattle, WA 98195, emer@u.washington.edu

We will discuss the UW Business School's part interdisciplinary class for MBAs and computer science graduate students. The class teaches all aspects of software product development. Students develop demonstrable prototypes and "pitch" their ideas for financing to a group of venture capitalists at the end of the quarter.

4) Concept Prototypes as Market-Test Vehicles, ***Joseph A. Heim***, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195, jheim@u.washington.edu

Prototypes are an important part of product development, but they are often not developed until a comprehensive product concept has been completed. We will discuss how students use very early concept-testing prototypes in our technology-based entrepreneurship class to evaluate and refine product ideas in the market.

MD12 Developments in Management of Technology Programs

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session
Chair: Nan Muir Bodensteiner, University of Houston, Box 234, 2700 Bay Area Blvd., Houston, TX 77058

1) Three-Year Progress Report on IC2 Institute's MS Degree Program in Science & Technology Commercialization, ***David V. Gibson***, University of Texas, IC2 Inst., 2815 San Gabriel Ave., Austin, TX 78705, davidg@icc.utexas.edu, ***Barbara Fossum***

We will describe the challenges and benefits of establishing a global classroom for IC2 Institute's MS degree program in Science & Technology Commercialization. Multidisciplinary and virtual student teams and faculty work on the commercialization project and are educated by this "living laboratory" in the US and Europe.

2) Development of an Interdisciplinary MOT Degree Program Under AACSB & ABET Accreditation Guidelines, ***William T. Flannery***, University of Texas, Mgmt. of Tech. Program, 6900 N Loop 1604 W, San Antonio, TX 78249-0634, wflannery@utsa.edu, ***Richard Howe***, ***W. Austin Spivey***

We will detail the process of developing a Master of Science in the Management of Technology as a joint program of the College of Business and the College of Sciences & Engineering at the University of Texas at San Antonio that meets the guidelines of the AACSB and ABET.

3) Curriculum for the Technology Manager in 2010: A Perspective Analysis for Mexico, ***Alezandra Perez-Cordova***, Universidad Nacional Autonoma de Mexico, Nicolas Bravo 32, Col. Martin Carrera, Mexico, DF 07070, Mexico, perezca@servidor.unam.mx, ***Arturo Rodriquez-Penaloza***, ***Arturo Miklos-Ilcovics***

The MOT curriculum for the year 2010 must attend to the challenge of globalization as well as to the history of Mexico. Delphi and projection methodologies were used to analyze the MOT curriculum and assess the qualities, pertinence, relevance and utility of the curriculum for the technology manager as well as society.

MD13 Organization Theory

Contributed Session
Chair: Ashok Mukherjee, Case Western Reserve University, WSOM, 10900 Euclid Ave., Cleveland, OH 44106, axm89@po.cwru.edu

1) The Dynamics of Diversification, ***Shayne Gary***, London Business School, Sussex Place, Regent's Park, London, England, NW1 45A, UK, sgary@lbs.ac.uk

It is becoming widely accepted that dynamic theories are more powerful for gaining understanding about organizational diversification issues than their static counterparts, but there has been no attempt to formalize the emerging dynamic theories using approaches suited to investigate dynamic problems. We operationalize diversification in a holistic, causal model.

2) From Markets to Hierarchies...to Dynamic Modularity,

Melissa A. Schilling, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, melissa1@bu.edu

Rapid technological innovation is changing the nature of the firm. Hierarchical organizations are being replaced by non-hierarchical entities that are permeable and interconnected. We integrate the resource-based view of the firm, transaction cost economics and theories of modularity to build a model explaining previous, present and future organizational forms.

3) Organizational Approach to Restructuring of the Large Corporation, *Ivan Pavic*, Faculty of Economics, Radovanova 13, Split, 21000, Croatia, pavic@efst.hr, ***Zelimir Dulcic***, ***Duro Benic***

Possibilities for the design of the adequate large corporations restructuring model are discussed. Two fundamental approaches have been developed: the former is based on restructuring through the creation of a large number of small independent enterprises while the latter utilizes restructuring as a manner of improving the management efficiency in large enterprises.

4) withdrawn - author request of 9/25, ***Quey-Jen Yeh***, University of California, 2096 Ascot Dr. #22, Moraga, CA 94556, yehgij@aol.com, ***Mengkwan Lai***

5) Determinants of Operations Adaptability to Change in Manufacturing Tasks, ***Ashok Mukherjee***, Case Western Reserve University, WSOM, 10900 Euclid Ave., Cleveland, OH 44106, axm89@po.cwru.edu, ***Will Mitchell***, ***Brian Talbot***

We examine the effectiveness with which production lines of a focused factory adapt to a change in manufacturing task. Our research identifies several dimensions of task execution capability endowment and task execution capability management that influence the success of an attempted change of manufacturing task.

MD14 Logistics II

Contributed Session

Chair: Joong Y. Son, University of Washington, Dept. of MS, 370 Mackenzie Hall, Box 353200, Seattle, WA 98195-3200, sonjy@u.washington.edu

1) A Sales-Inventory Model for Demand Management, ***Mark Goh***, Ntl. University of Singapore, Dept. of Dec. Sci., 10 Kent Ridge Crescent, Singapore, Singapore, mark_goh@nus.edu.sg, ***Moosa Sharafali***

We consider a sales-inventory model with discount offers from the supplier, at random epochs, subject to deteriorating demand for the sale item at the retail outlet. The decision is to determine the optimal pricing by the buyer to offer to the end customers.

2) Inventory Systems with Expedited Delivery, ***Kwan E. Wee***, Purdue University, Krannert Sch. of Mgmt., W Lafayette, IN 47907, kwaneng_wee@mgmt.purdue.edu, ***Maqbool Dada***

Motivated by the increased use of third-party logistics carriers who provide expedited delivery, we study the impact of such a service on single- and two-echelon inventory systems. We find that most of the benefits can be realized by a single-echelon system; adding a second echelon has limited incremental benefit.

3) Cost vs. Flexibility: Supply Contracts in a Capacity-Constrained Supplier Oligopoly, ***Elizabeth C. Junqueira***, University of California, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, junqueir@ieor.berkeley.edu http://www.ieor.berkeley.edu/~junqueir, ***Candace A. Yano***, ***J. George Shanthikumar***

We model the supplier's problem of allocating its capacity among multiple buyers when each buyer's contract specifies bounds on the order quantity in each period. Our goal is to quantify the cost of offering more flexibility to buyers, which can be used in the supplier's contract negotiation decisions.

4) Order Coordination in a Two-Echelon Inventory System with Random Demands, ***Joong Y. Son***, University of Washington, Dept. of MS, 370 Mackenzie Hall, Box 353200, Seattle, WA 98195-3200, sonjy@u.washington.edu, ***Theodore D. Klastorin***, ***Kamran Moinzadeh***

We consider a 2-echelon system with random demand where retailers can purchase items at a discounted price if they coordinate with the supplier's cycle. For given retailers' stocking policies, we propose and analyze strategies which will maximize the supplier's expected profit. A numerical experiment illustrates the managerial implications.

MD15 LGO: A Program System for Continuous/Lipschitz Global Optimization

Tutorial Session

Chair: Zelda B. Zabinsky, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195, zelda@u.washington.edu http://weber.u.washington.edu/~zelda

1) Tutorial: LGO - A Program System for Continuous/Lipschitz Global Optimization, ***Janos D. Pinter***, PCS/Dalhousie University, Fac. of Mgmt., 129 Glenforest Dr., Halifax, NS, B3M 1J2, Canada, pinter@tuns.ca

GO is aimed at finding the best solution of non-linear decision models in the presence of multiple local solutions. The program system LGO serves to solve GO problems under very general (continuity or Lipschitz) structural assumptions. Hence, it is particularly suitable to solve GO problems related to "black box" system models or to models supported by limited, difficult-to-use analytical information...

MD16 Applications for Urban Public Transportation

Sponsor: Transportation Science
Sponsored Session

Chair: Mark D. Hickman, Texas A&M University, College Station, TX 78845-3136, mhickman@tamu.edu

1) Real-Time Bus Arrival Time Estimation with GPS Data, ***Wei-Hua Lin***, Virginia Polytech. Inst. & State University, Dept. of Civil Eng., 200 Patton Hall, Blacksburg, VA 24061, whlin@ctr.vt.edu

Development and evaluation of real-time bus arrival prediction with GPS data in rural areas is discussed. There are 3 parts: methodology for analyzing bus on-time performance and delay patterns with GPS data, algorithm formulation based on identified bus delay pattern and a measure of performance developed to evaluate the performance of alternative algorithms.

2) The Value of Real-Time Vehicle Location in Bus Arrival Information Systems, ***Sungjoon Lee***, Ohio State University, Dept. of Civil & Environ. Eng., 2070 Neil Ave., Columbus, OH 43210, ***Mark R. McCord***, ***Rabi Mishalani***

We analytically determine the value of vehicle location systems in providing real-time forecasts of bus arrivals to random passengers arriving at bus stops. We investigate the values of functions of the bus route, information system parameters and travelers utilities and illustrate with empirical data from a GPS-based location system.

3) Real-Time Control on High Frequency Rail Lines, ***Nigel Wilson***, MIT, Dept. of Civil Eng., Rm. 1-180, Cambridge, MA 02139, ***Wei Song***, ***Su Shen***

The problem of real-time control on high frequency rail lines is addressed with regard to routine control and for recovery from service disruptions. The routine control problem focuses on optimal dispatching policies at the end of a rail line based on information on train positions. The disruption recovery problem deals with the use of real-time expressing...

4) Techniques for Scheduling Integrated Transit Service, ***Mark D. Hickman***, Texas A&M University, College Station, TX 78845-3136, mhickman@tamu.edu, ***Kelly Blume***

Demand-responsive transit service may be integrated with fixed route service to carry passengers on longer trips. We present a modified shortest path algorithm to schedule these passenger trips. The use of the algorithm for both passenger and vehicle scheduling and a case study in Houston are described.

MD17 Location Models II

Sponsor: Location Analysis
Sponsored Session

Chair: Joyendu Bhadury, California State University, Dept. of Mgmt. & Finance, Sch. of Business & Economics, Hayward, CA 94542, jbhadury@csuhayward.edu

1) New Results on the Complexity of Robust Location Models, ***Igor Averbakh***, Western Washington University, 516 High St., MS 9063, Mathematics Dept., Bellingham, WA 98225-9063

In the robust (minmax regret) approach to optimization problems under uncertainty, one is looking for a solution that is "uniformly good" for all possible scenarios. We will discuss some new results on the complexity of robust versions of some classic location models.

2) Design-Location Problems, ***Zvi Drezner***, California State University, Dept. of MS/IS, Fullerton, CA 92834, zdrezner@fullerton.edu, ***George O. Wesolowsky***

We propose problems which require the simultaneous design of a network and location of facilities on the designed network. The objective function is affected both by the design and the location. We analyze the problem of determining which paths in the network allow for one-way or two-way traffic and the

location of a facility which minimizes transportation cost on the network.

3) Partitioning of Biweighted Trees, ***Alessandro Agnetis***, Universita di Roma La Sapienza, Dipt. di Informatic e Sis., Via Buonarroti 12, Roma, 00185, Italy, ***Andrea Pacifici***, ***Pitu B. Mirchandani***

In highway patrol design, a road network must be partitioned into districts for p different squads or facilities. Workloads of squads must be balanced and maximum response time, i.e., the maximum diameter of the districts, minimized. We propose a new location model, show its solution complexity and give preliminary results.

4) The Maximum Covering Facility Location-Network Design Problem, ***Sanjay Melkote***, Oklahoma State University, Sch. of IE&M, Stillwater, OK 74078-5018, meklote@hakimi.inden.okstate.edu, ***Mark Daskin***

We introduce the maximum covering location-network design problem, a generalization of the classic maximum covering location problem with important applications. We present an MIP formulaton and derive several classes of valid inequalities. Computational experience is reported.

5) Genetic Algorithms for Location Problems, ***Jorge Jaramillo***, SUNY, Dept. of IE, Buffalo, NY 14260-2050, ***Joyendu Bhadury***

We present some work that has been done in designing GAs for some well known location models. We focus on presenting these algorithms first and then discussing their empirical behavior.

MD18 DEA-Health

Sponsor: Health Applications
Sponsored Session

Chair: Yasar A. Ozcan, Virginia Commonwealth University, Williamson Inst. for Health, PO Box 980203, Richmond, VA 23298-0203, ozcan@hsc.vcu.edu

1) The Changes in Technical Efficiency of Teaching Hospitals Under the Implementation of the National Health Insurance, ***Ray-E Chang***, National Taiwan University, 19 Su-Chow Rd., Ste. 306, Taipei, Taiwan, ROC, rchang@ccms.ntu.edu.tw, ***Ying-Hui Hou***, ***Yu-Chi Tung***

The implementation of NHI has redistributed the demand for health care services among providers. It is believed that the NHI impacts hospitals with different accreditation statuses differently. We use a non-parametric Malmquist output index approach to investigate the changes in technical efficiency of teaching hospitals.

2) The Measurement of Hospital Efficiency Using Parametric & Non-Parametric Approaches, ***Liam O'Neill***, University of Iowa, Div. Health Mgmt. & Policy, 2700 Steindler Bldg., Iowa City, IA 52242, loneill@mail.pmeh.uiowa.edu

We apply both parametric (stochastic frontier estimation) and non-parametric (DEA) approaches to measure the technical and allocative efficiency of 60 rural hospitals. The advantages and caveats of each method are discussed along with recommendations to enhance the efficacy of each technique for health care decision-making.

3) Quality Adjusted DEA: Seeking Best Physician Practice Patterns, ***H. David Sherman***, Northeastern University, Coll. of Bus. Admin., Boston, MA 02115, hsherman@lynx.neu.edu

Identifying physician practice patterns that are low cost and high quality to serve as models for other physicians and to enhance anaged care organization performance is explored. Alternative models to integrate quality and productivity measures are demonstrated and evaluated, suggesting new paths to develop more meaningful physician performance measures.

4) Configuration Efficiency for Strategic Hospital Alliances, ***Yasar A. Ozcan***, Virginia Commonwealth University, Williamson Inst. for Health, PO Box 980203, Richmond, VA 23298-0203, ozcan@hsc.vcu.edu, ***Roice D. Luke***, ***James D. Bramble***

We report the configuration efficiency of SHAs. Configuration efficiency is defined as the minimal level of service capacity required to produce given levels of SHA output. An input-oriented DEA model was used to evaluate 443 SHAs. Results showed that only 8% of the SHAs were placed at the frontier. Overall SHA efficiency score was 0.732...

MD19 New Value Management, Theory of Constraints Developments & Applications

Cluster: Partnering Value Methodology, Theory of Constraints & DA
Invited Session

Chair: Steven Dightman, 5946 S. Sheridan, Tacoma, WA 98408, steven.d.dightman@boeing.com

1) Out of the Box Using Different Modeling Techniques Together, ***Adam Betcher***, The Boeing Company, PO Box 3707, MS 7W-43, Seattle, WA 98124, adam.betcher@boeing.com, ***Steven Dightman***

Value analysis and theory of constraints are 2 improvement methodologies that do an excellent job of focusing different intuitions to identify and resolve core problems in practical ways. And, when used together, they create a synergy to achieve outstanding results. We explore the synergy of these intuitions.

2) A Project Management Simulation Model Demonstrating the Additive Effects of Systematic Factors Leading to Continued On-Time Failures, ***James Holt***, Washington State University, 429 SE 13th Ct, Gresham, OR 97080, holt@vancouver.wsu.edu http://vancouver.wsu.edu/fac/holt/holt_home.htm

This simulation captures statistical variability of series and parallel processes, resource conflicts, skewed activity distributions, "student syndrome" behavior, "saving face" behavior and localized safety as they contribute extending project duration's 2-3 times the necessary flow time. Methods of overcoming these debilitating effects are discussed.

3) Using FAST Modeling to Accelerate Adult Learning in the Classroom Environment, ***David Butler***, The Boeing Company, PO Box 3707, MS 96-01, Seattle, WA 98124, david.l.butler@boeing.com, ***Steve Baltazor***, ***Steven Dightman***

Our experiments are confirming FAST modeling with its functions expressed as verb-nouns and patterned in a how-to-why and why-to-how relationships, accelerating adult student learning. We overview our exploration and suggest some further applications.

MD20 Data Association for Multitarget Tracking I

Sponsor: Military Applications
Sponsored Session

Chair: Matthew Berge, The Boeing Co., PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, matthew.e.berge@boeing.com

1) A Generalized S-D Assignment Algorithm for Multisensor-Multitarget State Estimation, ***Krishna Pattipati***, University of Connecticut, Dept. of Elect. Systems Eng., Storrs, CT 06269-3157, krishna@sol.uconn.edu, ***Yaakov Bar-Shalom***, ***R. Kirubarajan***, ***Somnath Deb***

We develop a new algorithm to associate measurements from multiple sensors to identify real targets in a surveillance region and to estimate their states. This data association problem is formulated as a generalized S-dimensional assignment problem and is efficiently solved with a recursive algorithm employing a successive Lagrangian relaxation technique.

2) A Fast Heuristic Approach to the Solution of the Multiple-Hypothesis Tracking Problem, ***Matt L. Miller***, Signafy, 4 Independence Way, Princeton, NJ 08540, mlm@signafy.com, ***Harold S. Stone***, ***Ingemar Cox***

We present a new heuristic algorithm for solving the multiple hypothesis tracking problem many times faster than the prior art. The average running time of the new algorithm grows roughly linearly in the number of targets and number of best solutions retained.

3) A Fast Heuristic Algorithm for Solving the Target Tracking Data Association Problem, ***R. A. Murphey***, Eglin Air Force Base, Air Force Research Lab., Munitions Directorate, Eglin AFB, FL 32542, murphey@eglin.af.mil, ***Panos M. Pardalos***, ***Leonidas Pitsoulis***

The most computationally challenging element of multitarget multisensor tracking regards the data association problem which may be formulated as a MAP. We propose solving the MAP using a GRASP. Computational results and issues unique to the GRASP will be discussed.

4) Algorithms for Data Association in Multitarget-Multiscan Tracking, ***Matthew Berge***, The Boeing Co., PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, matthew.e.berge@boeing.com, ***Sharon Filipowski***, ***Esmond Devun***

Data association is a computationally intensive aspect of multitarget-multiscan tracking that can be formulated as a MAP. We will discuss alternative approaches to solving these MAPs along with computational results.

MD21 DEA Applications in Utilities & Construction

Cluster: DEA
Invited Session

Chair: Keith B. Hollingsworth, Morehouse College, Dept. of Econ. & Bus. Admin., Atlanta, GA 30314, khollingsworth@morehouse.edu

1) withdrawn - author request of 8/25, ***Thomas R. Sexton***, SUNY, Harriman Sch. of Mgmt./Policy, Stony Brook, NY 11794-3775, tsexton@notes.cc.sunysb.edu, ***Richard Silkman***

2) The Impact of Deregulation on the Efficiency of US Utility Companies, ***Janice Forrester***, Cytera Systems, 9220 SW Barbur Blvd., Ste. 119-148, Portland, OR 97213, ***Sami Khawaja***

As the trend in deregulation continues, companies are forced to evaluate their efficiency. One such industry is the electrical utilities. This study uses DEA to examine the operational efficiency of 94 US utility companies. Additionally, dynamic DEA is used to determine if companies have made efficiency improvements in recent years.

3) An Evaluation of Construction Contracting Methods Using DEA, ***Gerald H. Williams, Jr.***, Portland State University, Eng. Mgmt. Program, Portland, OR 97207-0751, gerry@emp.pdx.edu, ***Timothy R. Anderson***

We describe alternative methods for deriving metrics (or attributes) and eliciting weight restrictions for a DEA model used to evaluate construction contracting method efficiency. We present some initial results and a review of the literature in this area of DEA and contractor selection metrics.

MD22 Natural Resources Management V

Cluster: Natural Resources Management
Invited Session

Chair: Francis Greulich, University of Washington, Coll. of Forest Resources, Box 352100, Seattle, WA 98195-2100, greulich@u.washington.edu

1) Prescribed Fire & Fuel Treatments: Simultaneous or Sequential Decisions?, ***Tara Barret***, University of Montana, Sch. of Forestry, Missoula, MT 59812, tara@forestry.umi.edu, ***Greg Jones***

Previous approaches to prioritizing forest stands for prescribed fire and fuel treatment have often considered stand treatments to be either spatially independent or sequential. However, decisions may need to be treated as spatially interdependent and simultaneous. A simple example with expected value maximization is used to illustrate the problem.

2) Statistical Parameters for the Airtanker Travel Distance Model, ***Francis Greulich***, University of Washington, Coll. of Forest Resources, Box 352100, Seattle, WA 98195-2100, greulich@u.washington.edu

Airtanker initial attack fires are assumed to occur with uniform probability across a pre-established protection area. A determinant of airtanker productivity is travel distance from airtanker base to fire. The population mean and variance of the travel distance model are very easily calculated for protection areas of complex shape.

3) Spatial Models for Fire Frequency for the Columbia River Basin, ***Don McKenzie***, University of Washington, Coll. of Forest Resources, Box 35210, Seattle, WA 98195, dmck@silvae.cfr.washington.edu

Mean fire return intervals for the Interior Columbia River Basin were estimated by coarse-seale modeling. Two strategies were used - regression tree models incorporating vegetation types as predictive factors, and a combination of principal components analysis and regression that incorporated subjective numerical rankings of vegetation types as quantitative variables.

4) Partitioning of a Probability Distribution to Include Large Forest Fires in Decision Making, ***Ernesto Alvarado***, University of Washington, Field Station Protected Area, Coll. of Forest Resources, Seattle, WA 98195-2100, alvarado@u.washington.edu

Large wildfires have been very infrequent events but some climatic change scenarios call for their increased occurrence. This paper proposes a methodology, using a two-parameter Weibull and the Truncated Shifted Pareto, whereby large fires may be better included in the initial attack decision making process.

MD23 Entrepreneurial Behavior, Innovation & Sustainable Business

Cluster: Ecologically Sustainable Business Practices
Invited Session

Chair: Richard Johnson, University of Virginia, Darden Sch. of Bus. Admin., PO Box 6550, Charlottesville, VA 22906-6550, johnsonri@darden.gbus.virginia.edu

Co-Chair: Andrea Larson, University of Virginia, Darden Sch. of Bus. Admin., PO Box 6550, Charlottesville, VA 22906-6550, larsona@darden.gbus.virginia.edu

1) Storage Solutions, Inc., ***Susan Carlson-Skalak***, University of Virginia, Mech., Aero. & Nuclear Eng., Thorton Hall, Charlottesville, VA 22903, sec2avirginia.edu http:vlead.mech.virginia.edu/people.susan.html, ***John Leschke***

Despite resource constraints, small companies can make significant economic performance breakthroughs with sustainable product strategies. We present a case study of how a small company, even within their limited scope of control, used a streamlined LCA to make quick efficiency improvements, enabling redesign for a competitive, more sustainable product.

2) Sustainability as the New Entrepreneurial Frontier, ***Andrea Larson***, University of Virginia, Darden Sch. of Bus. Admin., PO Box 6550, Charlottesville, VA 22906-6550, larsona@darden.gbus.virginia.edu

Sustainable business strategy and practice (competitively, ecologically and socially sustainable) represents a new frontier of innovation. We discuss the entrepreneurial nature of sustainable business activity and explore conditions under which sustainability can be employed to enhance innovative breakthroughs, financial performance and competitive advantage.

3) Creating Competitive Advantage through Ecological Sustainability at Walden Paddlers, Inc., ***Richard Johnson***, University of Virginia, Darden Sch. of Bus. Admin., PO Box 6550, Charlottesville, VA 22906-6550, johnsonri@darden.gbus.virginia.edu, ***Paul Farrow***

We present a case study of a small company, acting as a "virtual corporation" in a network of relationships, in which all decision-making is made against a backdrop of ecological sustainability. Consideration of ecological sustainability led to product breakthroughs and competitive advantage for all members of the network.

MD24 Financial Instruments & the Energy Markets

Cluster: Energy
Invited Session

Chair: John R. Birge, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, jrbirge@engin.umich.edu jrbirge@umich.edu

1) Alternative Transmission Regimes in Oligopolistic Power Markets: Computable Models, ***Yves Smeers***, Universite Catholique de Louvain, CORE, Voie du Roman Pays 34, Louvain La Neuve, B-1348, Belgium, smeers@core.ucl.ac.be, ***Olivier Daxhelet***

We consider an oligopolistic market consisting of power producers, power marketers, consumers and an ISO. Power production is competitive, power marketing is oligopolistic and consumers are price takers. The ISO organises transmission. Three different transmission pricings are considered: short run opportunity cost, (approximate) long run marginal cost and fully distributed cost...

2) Using Stochastic Programming to Evaluate Electricity Contracts, ***Samar Takriti***, IBM, TJ Watson Res. Ctr., PO Box 218, Yorktown Heights, NY 10598, takriti@watson.ibm.com, ***Lilian S. Wu***

The electric power industry is going through deregulation. Instead of an electric utility controlling the market in a specific region, energy suppliers will be allowed to compete in an open market and customers will choose their providers. In such an environment, generating companies need to consider uncertainties when evaluating electricity contracts...

3) Equilibrium Values in Energy Markets, ***Chonawee Supatgiat***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, chonawee@engin.umich.edu, ***John R. Birge***, ***Rachel Zhang***

We consider an open energy market with uncertainty in electricity demand. Each bidder has to decide on the quantity and price of the bid to maximize profit. All dispatched units are sold at the market-clearing price, which is the highest bid price among the dispatched units. Under the assumption of market stability, we find Nash equilibrium solutions and bidders' optimal bidding strategies.

4) Exotic Electricity Options & the Valuation of Electricity

Generation & Transmission Assets, ***Shijie Deng***, University of California, Dept. of IEOR, Berkeley, CA 94720, deng@ieor.berkeley.edu, ***Blake Johnson***, ***Aram Sogomonian***

We present a methodology for valuing electricity derivatives. Valuation formulae are derived for both geometric Brownian motion and mean reverting price processes. These valuation results are used to construct real options-based valuation formulae for generation and transmission assets. Theoretical values of generation assets are compared to the observed recent sales prices.

MD25 Computational Integer Programming

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: Eva Lee, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, evakylee@isye.gatech.edu

1) Computational Experience with Parallel Branch & Bound Based on Semidefinite Programming, ***Stefan Karisch***, Technical University of Denmark, Dept. of Math. Modeling, Bldg. 321, Lyngby, DK-2800, Denmark, sk@imm.dtu.dk, ***Jens Clausen***, ***Jesper Larsen***

Semidefinite programming provides strong bounds for many combinatorial optimization problems. We report on computational experience with parallel B&B based on semidefinite programming. Difficulties arising in load balancing are addressed and numerical results are given.

2) Computational Experience with Generic Parallel Branch & Cut, ***Les Trotter***, Cornell University, Sch. of OR & IE, Rhodes Hall, Ithaca, NY 14853, ltrotter@cs.cornell.edu, ***M. Eso***, ***L. Ladanyi***, ***T. Ralphs***

We present results of computational experimentation with the generic, parallel B&C implementation combinatorial optimization multi-processing system (COMPSys) in solving 3 distinct applications: traveling salesman, vehicle routing and crew scheduling. For each application, only preprocessing and separation routines must be user-supplied; remaining components are entirely internal.

3) Further Report on Computational Experience with a General Purpose Mixed Integer Programming Solver, ***Eva Lee***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, evakylee@isye.gatech.edu

A general-purpose mixed 0/1 integer programming solver is presented. The solver is designed to exploit common substructures within MIP formulations and to apply cutting planes, primal heuristics, heuristic branching and an iterative cut strengthening procedure. Computational experience with MIPLIB instances and with instances arising from radiation treatment planning is reported.

MD26 Network Design & Connectivity Problems

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: J. Scott Provan, University of North Carolina, Dept. of OR, Chapel Hill, NC 27599-3180, scott_provan@unc.edu

1) Computational Experiments with Network Design Problems, ***Dan Bienstock***, Columbia University, Dept. of IEOR, New York, NY 10027, dano@ieor.columbia.edu

We present ongoing work on a general-purpose network design algorithm, relying on an approximate LP relaxation solver. It is used for solving difficult design problems.

2) Approximating Minimum-Size K-Connected Spanning Subgraphs, ***Joseph Cheriyan***, University of Waterloo, Dept. of Combinatorics & Opt, Waterloo, Ontario, N2L 3G1, Canada, jcheriyan@watdragon.uwaterloo.ca, ***R. Thurimella***, ***A. Sebo***, ***Z. Szigeti***

We will survey recent research on approximation algorithms for the NP-hard problem of finding a minimum-size k-connected spanning subgraph of a given graph. By exploiting results from matching theory, approximation guarantees of 3/2 or less are attained. The relation to the TSP 4/3 conjecture will also be discussed.

3) Higher Connectivity Problems in the Euclidean Plane, ***J. Scott Provan***, University of North Carolina, Dept. of OR, Chapel Hill, NC 27599-3180, scott_provan@unc.edu, ***Emily Larson***

For a given set of terminal points in the plane and specified connectivity requirements, we study the problem of constructing the shortest Euclidean length network for which each pair of terminals has the required level of connectivity. We give results concerning structure and solution techniques for these types of problems.

MD27 Interior Point Methods & Semidefinite Programming

Cluster: Linear Programming & Related Topics
Sponsor: Optimization
Sponsored Session
Chair: Yin Zhang, Rice University, Dept. of CAAM, MS 134, Houston, TX 77005-1892, zhang@caam.rice.edu

1) Software for Semidefinite-Quadratic-Linear Programming, ***Madhu Nayakkankuppam***, Courant Institute, 251 Mercer St., New York, NY 10012, madhu@cs.nyu.edu, ***Michael L. Overton***, ***J-P. A. Haeberly***

We present a software package designed to solve mixed semidefinite-quadratic-LPs. The code is written in C and is based on the Blas and LAPACK. We discuss several algorithmic issues, i.e., higher order methods, free variables, bound constraints, sparsity, etc., and present numerical results.

2) withdrawn - author request of 9/15, ***Rongqin Sheng***, Argonne National Laboratory, MCS Division, Argonne, IL 60439, sheng@mcs.anl.gov, ***Florian A. Potra***

3) Computational Experience with the Maximum-Volume Ellipsoid Problem, ***Yin Zhang***, Rice University, Dept. of CAAM, MS 134, Houston, TX 77005-1892, zhang@caam.rice.edu

We study several algorithmic and computational issues for the maximum-volume ellipsoid problem and present numerical results.

4) Optimization Problems with Deterministic Uncertainty: A Semidefinite Programming Approach, ***Laurent El Ghaoui***, Ecole Nationale Superieure de Techniques, Avancees 32, B. Victor, Paris, 75739, France, elghaoui@ensta.fr

Most optimization problems in engineering involve uncertainty; classical approaches of this problem include sensitivity analysis and stochastic programming. We present a new approach to deal with uncertainty that yields robust solutions, meaning that the (uncertain) constraints are satisfied for every value of the data in the uncertainty set.

MD28 Global Optimization Approaches for Molecular Problems

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: Panos M. Pardalos, University of Florida, 303 Weil Hall, ISE Dept., Gainesville, FL 32611, pardalos@ufl.edu

1) Computing Force Field in N-Body Simulations Using a Fare-Split Tree, ***Guoliang Xue***, University of Vermont, Dept. of Comp. Sci., Burlington, VT 05405, xue@cs.uvm.edu

Force field computation is an important component in N-body simulations computation of force fields. Computational results are compared with those of the traditional O(n*2) method.

2) Global Optimization in Biological Macromolecular Interaction, ***J. B. Rosen***, University of California, Dept. Comp. Sci. & Eng. Dept., San Diego, CA 92093, jbrosen@cs.ucsd.edu, ***A. T. Phillips***

A key problem in computational molecular biology is predicting the interaction of biological macromolecules, with applications to drug design and cellular signaling. These problems require global minimization of a difficult energy function. Use of the CGU global minimization algorithm on problems of this type will be described.

3) Distance Geometry Optimization & Applications, ***Zhijun Wu***, Tera Computer Co., 2815 Eastlate Ave., E Seattle, WA 98102, zwu@gershwin.tera.com

I will describe how a distance geometry problem can be formulated as a global optimization problem and solved by using a global continuation method. I will discuss applications of distance geometry problems in molecular modeling and structural engineering.

MD29 Satisfiability Problems

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Brian Borchers, New Mexico Tech, Dept. of Math., Socorro, NM 87801, borchers@nmt.edu

1) A Comparison of Methods for Solving MAX-SAT Problems, ***Steve Joy***, RPI, Dept. of Math. Sci., Troy, NY 12180, joys@rpi.edu, ***Brian Borchers***, ***John Mitchell***

We compare the performance of 3 approaches to the solution of MAX-SAT problems, including a version of the Davis-Putnam-Loveland algorithm extended to solve MAX-SAT, an integer programming B&C algorithm and an algorithm for MAX-2-SAT problems based on a semidefinite programming relation.

2) Solving SAT Problems Using Elliptic Approximations, ***Joost P. Warners***, Technical University of Delft, Dept. of Tech. Math., Fac. of IT/Systems, Mekelweg 4, Delft, 2628 CD, The Netherlands, j.p.warners@twi.tudelft.nl, ***Hans van Maaren***

An elliptic approximation of the SAT polytope is derived. Using specific properties of this ellipsoid, strong branching and probing heuristics are obtained. Computational results are provided.

3) Probabilistic Analysis of Some Satisfiability Algorithms & Polynomial Time Solvable Subclasses, ***John Franco***, University of Cincinnati, ECECS, Cincinnati, OH 45221-0030, franco@gauss.ececs.uc.edu

We present recent advances in determining the probabilistic behavior of algorithms for certifying that no solutions exist for random, unsatisfiable k-SAT formulas. The work of the speaker and others will be explained.

4) Randomized Local Search with Trap Handling, ***Jun Gu***, University of Calgary, 2500 University Dr. NW, Calgary, Alberta, T2N 1N4, Canada, gu@cs.ust.hk, ***Li H. Hui***, ***Zhou Zhi***

A trap is a group of local minima confined in a "well." Traps make local search much harder. We give an implementation of an early randomized local search algorithm with trap handling capability. Experimental results confirmed the effectiveness of this approach.

MD30 Using Metamodels for Engineering Design

Cluster: Engineering Optimization
Sponsor: Simulation
Invited/Sponsor Session
Chair: Russell R. Barton, Pennsylvania State University, Dept. of IME, 207 Hammond Bldg., University Park, PA 16802, barton@simplex.psu.edu http://www.ie.psu.edu/people/faculty/barton.htm

1) Design & Analysis of Computer Experiments, ***Andrew J. Booker***, The Boeing Company, PO Box 3707, MS 7L-22, Seattle, WA 98124-2207, andrew.j.booker@boeing.com

Computer simulations used in engineering analysis at Boeing provide a large arena for the application of DACE as described in Sacks, Welch, Mitchell & Wynn's 1989 statistical sciences paper. We will describe successes and problems with the approach to DACE used at Boeing.

2) Spatial Correlation Metamodels for Global Approximation in Computer-Based Engineering Design, ***Timothy W. Simpson***, Georgia Institute of Technology, Woodruff Sch. of Mech. Eng., Atlanta, GA 30332-0405, gt0037c@prism.gatech.edu http://www.srl.gatech.edu/people/tim, ***Farrokh Mitree***

We seek to foster discussion about spatial correlation metamodels which show great promise for building global approximations of computationally expensive computer analyses. Accordingly, we discuss ongoing research into the efficacy of different sampling techniques, correlation functions and validation procedures when testing these metamodels on a variety of engineering examples.

3) Response Surface Models of CFD Results in High-Speed Civil Transport Optimization, ***Duane L. Knill***, University of Washington, Dept. of Aero. & Astronautics, Guggenheim Bldg., Seattle, WA 98195-2400, knill@aoe.vt.edu knill@aa.washington.edu, ***Bernard Grossman***, ***William H. Mason***, ***Layne T. Watson***, ***Raphael T. Haftka***

Response surface surrogates for aerodynamic response are applied in HSCT optimization. Intervening functions, for which surrogates are created, are chosen using simplified aerodynamic models. The low cost of evaluating metamodels allows central difference gradient calculations for optimization and permits identification of local minima resulting from nonconvex contraints.

4) Metamodel-Based Integration Strategies for System-Level Design, ***Martin Meckesheimer***, Pennsylvania State University, Dept. of IME, 207 Hammond Bldg., University Park, PA 16802, mxm74@psu.edu http://marie.psu.edu/~martin/, ***Russell R. Barton***

A metamodel-based integration strategy allows simulation results from multiple submodels to be combined into a system-level simulation. This strategy for system-level design depends on an effective architecture to implement experiment design strategies for fitting/updating subsystem metamodels, over the parameter region being explored by the designer.

MD31 Tabu Search, Metaheuristics & Finite Search

Cluster: Tabu Search
Invited Session
Chair: Fred Glover, University of Colorado, Coll. of Bus., Boulder, CO 80309-0419, fred.glover@colorado.edu

1) Tabu Search with Path Relinking for the Linear Ordering Problem, ***Manuel Laguna***, University of Colorado, Coll. of Bus., CB 419, Boulder, CO 80309, manuel.laguna@colorado.edu, ***Rafael Marti***, ***Vicente Campos***

We develop a new heuristic for the linear ordering problem. The proposed algorithm is based on TS methodology and incorporates the search strategy known as path relinking. Extensive computational experiments with input-output tables show that the proposed procedure outperforms the best heuristics reported in the literature.

2) How to Search Neighborhoods: Experimental Study with the Generalized Assignment Problem, ***Mutsunori Yagiura***, Kyoto University, Dept. Applied Math & Physics, Grad. Sch. of Eng., Kyoto, 606-8501, Japan, yagiura@kuamp.kyoto-u.ac.jp, ***Toshihide Ibaraki***

Local search and metaheuristic algorithms are among the most effective approaches for hard combinatorial optimization problems. A key issue is how to search the neighborhood. We study alternative neighborhoods for the generalized assignment problem, including shift, swap and ejection chain, and test strategies to combine them under some metaheuristic frameworks.

3) On Diversification Strategies in Tabu Search, ***Ching-Chung Kuo***, Pennsylvania State University, Sch. of Bus. Admin., Middletown, PA 17057, ***Jeifeng Xu***

Diversification strategies are important in generating solutions significantly different than those encountered previously in TS. Several fundamental heuristics are proposed for efficiently obtaining sequences of maximally diverse new solutions in the search process. Advanced approaches based on the concept of strategic oscillation will also be discussed.

4) Tabu Search & Finite Convergence, ***Fred Glover***, University of Colorado, Coll. of Bus., Boulder, CO 80309-0419, fred.glover@colorado.edu, ***Said Hanafi***

We give new proofs and bounds that establish a conjecture by Glover about finite convergence of a TS proposal. Our results lead to a new type of tree-search based on TS "reverse elimination memory" and additionally yield designs for more efficient forms of convergent TS.

MD32 Software Demonstrations

Chair: Jeff Gulbransen, PROMODEL Corp., 1875 South State St., Orem, UT 84097, education@promodel.com

1) Software Demonstration: Introducing DPL 4.0 Decision Analysis Software, ***Dan Smith***, Applied Decision Analysis, 2710 Sand Hill Rd., Menlo Park, CA 94025, www.adainc.com, ***Chris Dalton***

DPL is the professional DA software using influence diagrams, decision trees and spreadsheets. Graphical outputs include Rainbow Diagrams, Tornado Diagrams, Risk Profiles, Policy Trees and Policy Summaries. New in DPL 4.0: a new Win95 interface, strategy tables, graphical value of perfect information and control, and more!

2) Software Demonstration: PROMODEL Simulation Technology, ***Jeff Gulbransen***, PROMODEL Corp., 1875 South State St., Orem, UT 84097, education@promodel.com

ProModel, the leader in the simulation industry, features a powerful, easy-to-use interface and a built-in optimization tool for designing and analyzing your business processes. The impressive user base includes such institutions as MIT, GE, Ford, the Mayo Clinic and NASA. We illustrate the advanced capabilities of the software and its ease of use in the professional world and in the classroom.

MD33 ATM Operational Concept I

Sponsor: Aviation Applications
Sponsored Session
Chair: Aslaug Haraldsdottir, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, aslaug.haraldsdottir@boeing.com

1) ATS Concept of Operations for the National Airspace System,

Wayne A. MacKenzie, FAA, 800 Independence Ave. SW, Washington, DC 20591, wayne.mackenzie@faa.dot.gov, ***Douglas E. Campbell***

A Concept of Operations for the National Airspace System in 2005 describes an air traffic environment designed to provide increased user flexibility with the required operating efficiencies needed to develop a global airspace system incorporating the International Civil Aviation Organization's communication, navigation and surveillance (CNS/ATM) concept.

2) Terminal Area Flow Planning, *Dallas G. Denery*, NASA, NASA Ames Research Ctr., MS 262-1, Moffett Field, CA 94035, ddenery@mail.arc.nasa.gov, ***Heinz Erzberger***

The Center TRACON Automation System, CTAS, will be the basis for air traffic planning and control in the terminal area. The system accepts arriving traffic within an extended terminal area and optimizes the flow based on current traffic and airport conditions. The operational use of CTAS will be presented together with results from current operations.

3) Collaboration & Traffic Flow Management: Status & Future Directions, *John O. Pyburn*, MITRE Corp/CAASD, 1830 Dolley Madison Blvd., McLean, VA 22102, jpyburn@mitre.org

Collaboration has been one of the cornerstones for future directions in air traffic management for nearly a decade. We will discuss some history, current status and achievements, and what these portend for future directions in the users and the FAA working together to manage the NAS. Discussion will include the relationship between local and national TFM...

MD34 Production Planning

Contributed Session

Chair: Mohsen El Hafsi, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521-0203, mohsen.elhafsi@ucr.edu

1) Managing Variety in Automobile Manufacturing: The Importance of the Sequencing Point, *Thomas R. Nitsch*, University of California, Dept. of IE/OR, 4176 Etcheverry, Berkeley, CA 94720, tnitsch@ieor.berkeley.edu

2) Adjustment of Traditional Run-Out Time Control in Multi-Product Production Systems, *Jan C. Fransoo*, Eindhoven University of Technology, PO Box 513, Pav F12, Eindhoven, NL 5600 MB, The Netherlands, j.c.fransoo@tm.tue.nl

3) An Integrated Technique for AGVs Layout & Flowpath Design with the Consideration of Production Schedule, *Weerapat Sessomboon*, Waseda University, 3-4-1 Ohkubo Shinjuku-Ku, Grad. Sch. of Sci. & Eng., Tokyo, 169-8555, Japan, weerapat@yoshi.mgmt.waseda.ac.jp, ***Kazuho K. Yoshimoto***

4) An Operational Decision Model for Lead-Time & Price Quotation in Congested Manufacturing Systems, *Mohsen El Hafsi*, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521-0203, mohsen.elhafsi@ucr.edu

MD35 OR/MS Applications in Investment Finance

Sponsor: Financial Services
Sponsored Session

Chair: Martin R. Young, University of Michigan Business School, Stats. & MS Dept., Ann Arbor, MI 48109, myoung@umich.edu http://www.bus.umich.edu/faculty/myoung.html

1) Option Pricing Under Regime Switching, *Ivilina Popova*, Purdue University, 1310 Krannert Bldg., Grad. Sch. of Mgmt., W Lafayette, IN 47907-1310, ipopova@mgmt.purdue.edu http://www3.mgmt.purdue.edu/faculty/ipopova

We develop an option pricing model when the underlying stock follows a bidirectional Markov regime switching model with asymmetric response of volatility to good and bad news. Analytical and computation option pricing methods are presented. Empirical tests show that the model offers dramatic improvements over the Black-Scholes model.

2) Dynamic Optimization Models in Asset-Liability Management, *John R. Birge*, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, jrbirge@engin.umich.edu jrbirge@umich.edu

Static portfolio models often lead to poor solutions of asset-liability management problems over time. We give a formulation of a stochastic programming solution of the dynamic and provide a structure of the optimal solution in terms of asset classes and additional requirements. We compare dynamic and static portfolio solutions quality.

3) Predicting the Long Run Return of the US Stock Market, *Martin R. Young*, University of Michigan Business School, Stats. & MS Dept., Ann Arbor, MI 48109, myoung@umich.edu http://www.bus.umich.edu/faculty/myoung.html

Historical returns of US stock market indices are analyzed under various statistical models, in order to infer the probability distribution for the long-run (20 year) return on US equities. Analyses which fail to account for time-varying volatility and mean-reversion lead to significant over-statement of the riskiness of equity investment.

MD36 Strategic Planning I

Contributed Session

Chair: Eve D. Rosenzweig, University of North Carolina, 140 BPW Club Rd., Apt. B11, Carrboro, NC 27510, rosenzwe@icarus.bschool.unc.edu

1) Supply Chain Analysis Using System Dynamics Modeling & Simulation, *Chris White*, Decision Dynamics, Inc., 4600 East West Hwy, Ste. 410, Bethesda, MD 20814, jcwhite@decisiondynamics.com www.decisiondynamics.com

We introduce the benefits of system dynamics modeling and show its use in analyzing the long-term performance of supply chains under different "what if" scenarios. A case study demonstrates how this approach was used to model procurement decisions for a DoD tactical missile program and its suppliers.

2) The Effects of Ownership Structure on Board Functions & the Strategic Decision Process, *Davide Ravasi*, Universita Luigi Bocconi, Via Bocconi 8, Milano, Italy, davide.ravasi@uni-bocconi.it, ***Alessandro Zattoni***

We focus on the relationships between ownership structure and the functions of the board, in firms with a low number of shareholders with partially conflicting interests. A comparative case study suggests that ownership concentration and the nature of shareholders' interests affect several aspects of the strategic decision process.

3) Divisionalization Study for a Symmetric Oligopoly, *K. Jo Min*, Iowa State University, IMSE Dept., 205 Engineering Annex, Ames, IA 50011, jomin@iastate.edu, ***P. S. Subramaniam***

We construct and analyze a symmetric oligopoly model to characterize divisionalization policies based on relevant costs and benefits. This divisionalization behavior is modeled as a 2-stage game and various conditions are derived under which the firms find it optimal to divide. Various managerial insights are obtained.

4) Dynamic Manufacturing Strategy: An Empirical Study of Future Integrative Improvement Paths, *Eve D. Rosenzweig*, University of North Carolina, 140 BPW Club Rd., Apt. B11, Carrboro, NC 27510, rosenzwe@icarus.bschool.unc.edu, ***Aleda V. Roth***

This research bridges the 2 topics of dynamic strategy and integrative strategic choice by empirically linking manufacturing business unit, MBU, past performance, current level of integration and intended integrative choices within the North American consumer products industry. Results indicate that alternative improvement paths exist for MBUs...

MD37 Marketing III

Contributed Session

Chair: Abhijit Sanyal, Mercer Mgmt. Consulting, 33 Hayden Ave., Lexington, MA 02173, abhijit_sanyal@mercermc.com

1) Identifying the Customers About to Make a Purchase, *Dennis H. Gensch*, University of Wisconsin, Sch. of Bus., 3202 N Maryland Ave., Milwaukee, WI 53211, gensch@nsd.uwm.edu

The method looks at the variation and range of the attribute ratings on the alternatives in choice set as a methodology for measuring propensity to purchase. These measures are compared to the standard "stated intention" measures for the same sample. The behavioral theory underlying this approach is presented.

2) Identifying Customer Demand Processes from Data, *Douglas A. Popken*, Systems View, 9139 S Rdrunner St., Highlands Ranch, CO 80126, dpopken@systemsview.com http://www.systemsview.com, ***Tony Cox***

We apply system identification techniques to forecast customer demands for telecommunications products. These techniques deduce the structure and estimate parameters of dynamic systems from observed inputs and outputs. We compare the performance of canonical state-space, maximum entropy, compartmental and hidden Markov modeling algorithms for predicting customer

purchases from observed past behaviors.

3) Consumer Promotion & Purchase Timing: An Empirical Study Using a Non-Durable Commodity, ***Francisco F. Ribeiro Ramos***, University of Porto, Faculty of Economics, Porto, 4200, Portugal, framos@fep.up.pt

The dynamics of cheese purchases are analyzed by estimating a series of econometric models of duration based on a 170-week household panel data. Besides purchase quantity and price data, information with respect to coupon use and household demographic characteristics are used in a variety of models which build upon each other...

4) Preparing a Program for Market Trials, ***Abhijit Sanyal***, Mercer Mgmt. Consulting, 33 Hayden Ave., Lexington, MA 02173, abhijit_sanyal@mercermc.com

Market trials are an important part of research methods to use in tailoring and targeting offers to your valuable customer segments. We develop and explore the following conceptual issues: What are ideal conditions for market trials? Market trials vs. experimental trade-off techniques. Design of market trial experiments. Using results from market trials.

MD38 Information Systems II

Contributed Session

Chair: Gerald E. Evans, University of Montana, Sch. of Bus. Admin., Missoula, MT 59812, jevans@selway.umt.edu

1) The Analysis & Management of User-Maintained Remote Materialized Views, ***David D. Chao***, San Francisco State University, Coll. of Bus., 1600 Holloway Ave., San Francisco, CA 94132, dchao@sfsu.edu

Due to the development of computer networks and database management systems, many applications today are supported by downloaded views. Very often, these views are maintained by users, and hence, are non-consistent with the base databases. We analyze the various kinds of user-maintained remote materialized views and investigate their management.

2) An Evolutionary View of Object-Oriented Modeling for Business Information Systems Development Using UML, ***Shu-Feng Tseng***, National Chengchi University, Dept. of MIS Sec. 2, Chihnan Rd. Wenshan District, Taipei, Taiwan, ROC, sftseng@cc.nccu.edu.tw

OO concept is appealing and becoming the mainstream for BIS development. Many believe the OO methodology requires a radical change and thus, incurs big training efforts. We suggest an evolutionary view to address the paradigm shift to help convincing current BIS developers for early adoption.

3) Knowledge Acquisition for Expert Systems in Production/ Operations Management, ***William Wagner***, Villanova University, Mgmt. Dept., Villanova, PA 19085, ***Mohammad K. Najdawi***

We discuss the knowledge acquisition problem, which has been identified as a bottleneck in the expert systems development process. We propose a mapping between a generic problem domain taxonomy and existing expert systems in POM.

4) Theater Medical Information Program Block 1 Architecture, ***Aaron R. Dewispelare***, Southwest Research Institute, 6220 Culebra Rd., PO Drawer 28510, San Antonio, TX 78228, adewispelare@swri.edu

The TMIP is a DoD Health Affairs-managed program to provide automated information system support to deployed military forces. An architecture is described which optimizes the use of the Service's existing communications infrastructure to move health care-related data in a deployed envirnoment to a centralized database for repositing and use.

5) Evaluating Operations-Oriented Systems Using Intervention Analysis, ***Gerald E. Evans***, University of Montana, Sch. of Bus. Admin., Missoula, MT 59812, jevans@selway.umt.edu

IA is an outcomes-based method for evaluating ISs. We will outline the application of IA to operations-oriented systems including data and results from several businesses. The findings indicate that operations-oriented systems appear to be more effective in small businesses than decision-oriented systems.

MD39 Decision Support Systems in Industry & Education I

Contributed Session

Chair: Kasumu Salawu, NCR Corporation, 436 Lenox Pl., Maplewood, NJ 07040-1025, kas.salawu@newyorkny.ncr.com

1) An Optimization-Based Decision Support System for Aggregate Production Planning: The Case of a Chilean Manufacturing Firm, ***Pedro Gazmuri***, Universidad de los Andes, Av San Carlos Apoquindo 2200, Santiago, Metro, Chile, pgazmuri@uandes.cl, ***Sergio V. Maturana***, ***Cristian Villena***

We describe our experience implementing an optimization-based DSS for the aggregate production planning of a Chilean manufacturing firm. We describe the different stages of the implementation, the different versions of the model and the main difficulties we encountered. We also evaluate the results obtained and the lessons learned.

2) Next Generation Order Fulfillment Systems, ***Ripu Daman Singh***, i2 Technologies, 909 Las Colinas Blvd., 16th Fl., Irving, TX 75039, ripu_daman_singh@i2.com, ***Rajeev Pany***

To meet the needs of the marketplace, companies require different order promising strategies based on the operational/business characteristics of the supply chain. The RHYTHM demand fulfillment product achieves this by an on-line application of true constrained-based logic in concert with business objectives, thereby improving customer service levels and profitability.

3) withdrawn - author request of 8/27, ***Raymond G. Taylor***, North Carolina State University, 652 Swan Point, Bayboro, NC 28515, nidrgt2@unity.ncsu.edu www.ored.com

4) An A-Team-Based Global Planning & Scheduling System for the Paper Industry, ***Annap Derebail***, IBM, 3200 Windy Hill Rd., Atlanta, GA 30339, anap@us.ibm.com, ***Santhosh Kumaran***, ***Naveen Bala***

Planning and scheduling across multiple paper mills is complicated by dependence of scheduling (trimming) efficiency on planning (order allocation). We describe a global planning and scheduling system for the paper industry, which takes into account order allocation, block schedule formation and sequence, trimming and load planning.

5) Fuzzy Expert Systems in Bank Channel Management, ***Kasumu Salawu***, NCR Corporation, 436 Lenox Pl., Maplewood, NJ 07040-1025, kas.salawu@newyorkny.ncr.com

Neurofuzzy systems integrate the knowledge representation of fuzzy logic with complementary, ANNs that train themselves to learn from very large databases. Rule-based fuzzy expert systems examine customer usage of branch, call center and ATM channels at a bank using error back propagation algorithms with fuzzy associative memories.

Monday 16:30-18:00

ME01 Decision Analysis Society Awards Presentation

Sponsor: **Decision Analysis**

Sponsored Session

Chair: Detlof Von Winterfeldt, University of California, University Park, Los Angeles, CA 90089, detlof@aol.com

1) Decision Analysis Society Awards Presentation, ***Detlof Von Winterfeldt***, University of California, University Park, Los Angeles, CA 90089, detlof@aol.com

Each year, the Decision Analysis Society of INFORMS presents awards for the best publication and the best student paper. The Society also periodically awards the Ramsey Medal for lifetime contribution. Current awardees will be honored and will make presentations related to their work.

ME02 Competitive Marketing & New Product Strategies

Sponsor: **Marketing**

Sponsored Session

Chair: Venkatesh Shankar, University of Maryland, Maryland Bus. School, 3450 Van Munching Hall, College Park, MD 20742, vshankar@mb.sumd.edu

1) The Impact of Feature/Innovation Evolution on Category Diffusion, ***Douglas Bowman***, Purdue University, Krannert Grad. Sch. of Mgmt., W Lafayette, IN 47906-1310, bowman@mgmt.purdue.edu, ***Hubert Gatignon***

We investigate how the diffusion of a new product category may be influenced by changes in the features or characteristics of the innovation over time and across brands using data from a consumer durable category. Our results contribute to research seeking to understand the drivers of category diffusion.

2) Does Early Leadership Lock In Long-Term Leadership?, ***Peter Golder***, NYU, 44 W. 4th St., New York, NY 10012, pgolder@stern.nyu.edu

Most research finds that early leaders maintain their leadership for a long time. Indeed, some claim for decades. This study addresses the question: how stable are the market shares of leading brands over prolonged periods? New data in scores of categories raise doubts about the current beliefs regarding long-term

leadership.

3) Information Sharing in Marketing Channels, ***Manish Kacker***, Pennsylvania State University, 701 BAB, Smeal Coll. of Bus., University Park, PA 16802, mxk28@psu.edu, ***Gerrit H. Van Bruggen***

Retailers and manufacturers possess marketing information of value to each other. Yet, marketing information sharing does not take place on the same scale as the sharing of logistical information. Why? We present a game-theoretic model that identifies the competitive conditions suitable for information sharing.

4) Optimal Marketing Mix Decisions in the Presence of Network Externalities: Analytical Model & Empirical Analysis, ***Venkatesh Shankar***, University of Maryland, Maryland Bus. School, 3450 Van Munching Hall, College Park, MD 20742, vshankar@mb.sumd.edu

We analyze optimal marketing mix decisions of firms in markets with network externalities. We formulate an analytical model and develop propositions on firms' optimal marketing mix decisions and their outcomes. We test some of these propositions through an empirical analysis of the video game industry.

ME03 Industry Speaks! OR/MS Education & Reality

Sponsor: Education
Sponsored Session
Chair: Matt Carlyle, Arizona State University, Dept. of IMSE, Tempe, AZ 85287, mcarlyle@asu.edu

1) Case Studies in Statistics: A Collaboration Between Academe & Industry, ***Roxy Peck***, California Polytechnic, Coll. of Sci. & Math., San Luis Obispo, CA 93407, rpeck@calpoly.edu

The NSF-funded Collaboration Project paired academic statisticians with business and industry colleagues for collaborative work to improve communication. One outcome is a collection of 20 case studies, based on industry practice and designed for classroom use. Cases developed through this collaboration differ from existing case collections and have some advantages.

2) No Title Supplied, ***Jeff Keisler***, Strategic Decision Group, Two International Place, 20th Fl., Boston, MA 02110-4101, jkeisler@sdg.com

Abstract not supplied.

3) No Title Supplied, ***Matt Carlyle***, Arizona State University, Dept. of IMSE, Tempe, AZ 85287, mcarlyle@asu.edu

Abstract not supplied.

ME04 Topics in Constraint Programming

Sponsor: INFORMS Computing Society
Sponsored Session
Chair: Carol Tretkoff, ILOG, Inc., 1901 Landing Dr., Mountain View, CA 94043, tretkoff@ilog.com

1) Parallel Constraint Programming Using Threads on A Symmetric Multiprocessor, ***Fabian Zabatta***, Brooklyn College, Dept. of CS, Brooklyn, NY 11210, fabian@sci.brooklyn.cuny.edu http://www.sci.brooklyn.cuny.edu/~fabian

Constraint satisfaction problems are most often solved with time-consuming depth-first backtracking algorithms. We present a template to parallelize hybrid searches using threads on an SMP and give computational results on set covering, timetabling, etc. This technique incorporates methods such as dichotomization and cooperating solvers to improve search performance.

2) A Cooperative Approach to Integer Programming via an Automatic Linearization of Logical Constraints, ***Jean Francois Puget***, ILOG S.A., 9 Rue de Verdun, BP85, Gentilly, 94253, France, puget@ilog.fr, ***Philippe Refalo***

We present a new integration of constraint programming and LP where logical constraints such as "all different" are automatically linearized. The integer linear model obtained is then solved using a cooperative approach using a constraint propagation solver, ILOG Solver, together with a simplex algorithm, CPLEX.

3) A Hybrid Approach to Vehicle Routing: Combining Conventional Heuristics & Constraint-Based Methods, ***Martin Shell***, ILOG, Inc., 124 Mt. Auburn St., Cambridge, MA 02138, shell@ilog.com

The combination of constraint propagation methods for search domain reduction with conventional VRP heuristics provides a powerful platform for the solution of complex VRPs. We will describe a specific application solved with Ilog Dispatcher and Solver and then present generalizations to a wider range of potential applications.

4) Constraint-Based Heuristic Repair for Air Traffic Flow Management, ***Ulrich Junker***, ILOG S.A., 9 Rue de Verdun BP 85, Gentilly Cedex, 94253, France, junker@ilog.fr

ATFM consists of delaying flights to avoid congestion of air sectors while minimizing the total delay. A heuristic repair strategy quickly finds solutions of a constraint programming model (2000 flights in 10 sec). Results are better than the optimum of the IP model having a less precise time granularity that is commonly used.

ME05 Advances in Flexible Resource Scheduling

Sponsor: MSOM
Sponsored Session
Chair: Richard L. Daniels, Georgia Institute of Technology, DuPree Sch. of Mgmt., Atlanta, GA 30332-0520, rich.daniels@mgt.gatech.edu

Co-Chair: Joseph B. Mazzola, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, jmazzola@mail.duke.edu

1) Scheduling on Parallel Machines with Flexible Resources & Stochastic Job Processing Times, ***Sigurdur Olafsson***, University of Wisconsin, 275 ME Bldg., 1513 University Ave., Madison, WI 53706, olafsson@ie.engr.wisc.edu, ***Leyuan Shi***

We propose a new method for simultaneously sequencing jobs and allocating flexible resources in parallel manufacturing systems. Our approach utilizes a new optimization methodology, the nested partitions method, which combines adaptive global sampling and local heuristics. An important feature is that it can be applied when job processing times are stochastic.

2) The Value of Operating Flexibility in Project Management with Alternative Resource Options, ***George Vairaktarakis***, Case Western Reserve University, Weatherhead Sch. of Mgmt., Cleveland, OH 44106, gxv5@po.cwru.edu

We consider minimizing the duration of a project where activities may be processed by 1 of several processors. These flexible characteristics are modeled using a binary availability matrix which together with the project network, can capture the majority of production layouts. We present bounding schemes, solution algorithms and extensive computational results.

3) Simultaneous Resource Allocation & Job Scheduling to Minimize Weighted Number of Tardy Jobs, ***Zhi-long Chen***, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu

We propose a column generation-based exact solution method for solving the problem of simultaneously allocating resources and scheduling jobs on parallel machines with the objective of minimizing weighted number of tardy jobs.

4) Flow Shop Scheduling with Partial Flexible Resource Flexibility, ***Richard L. Daniels***, Georgia Institute of Technology, DuPree Sch. of Mgmt., Atlanta, GA 30332-0520, rich.daniels@mgt.gatech.edu, ***Joseph B. Mazzola***, ***Dailun Shi***

We present a model for job sequencing and resource assignment in a flow shop, where individual resources can be assigned to only a subset of the stages in the production process. We discuss the relationship between system performance and the amount and distribution of resource flexibility.

ME06 FMS Capacity Considerations

Cluster: Flexible Manufacturing Systems
Invited Session
Chair: Kathryn E. Stecke, University of Michigan, Sch. of Business Admin., Tappan Rm. 5206, Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) A Descriptive Multiattribute Model for Reconfigurable Machining System Selection that Examines Buyer-Supplier Relationships, ***Chelsea C. White, III***, University of Michigan, IOE Dept., Ann Arbor, MI 48109-2117, ***Stephen E. Chick***, ***Tava Lennon Olsen***, ***Kathryn E. Stecke***, ***Kannan Sethuraman***

We present a model of the machining system selection process that focuses on capital intensive, complex machining systems that are intended to provide service over a long time horizon. This model was developed based on interviews with both machine tool suppliers and buyers. We discuss the potentially conflicting demands.

2) The Role of Technology & Capacity in Supply Chains, ***Rodney P. Parker***, University of Michigan, Sch. of Bus. Admin., Ann Arbor, MI 48109-1234, rpparker@umich.edu

We investigate the role that finite capacity plays in supply chains and illustrate

methods for how decisions regarding capacity can be made in this context. In addition, differing technologies will be considered.

3) Stochastic Modeling of FMS with the Software Package NSPNexpress, ***Christoph Lindemann***, University of Dortmund, Dept. of Comp. Sci., Dortmund, 44221, Germany, cl@cs.uni-dortmund.de

The software package DSPNexpress consists of efficient algorithms for the numerical analysis of the stochastic process underlying a deterministic and stochastic Petri net (DSPN) as well as a graphical interface for user-friendly DSPN model generation. We describe the application of DSPNexpress for performance and reliability modeling of FMS.

4) Flexible Manufacturing System Practices in the Global Economy, ***Koty Lapid***, Hungarian Academy, PO Box 3317, Beer Sheva, Israel, kolap@magnet.hu

In response to changes in demands in a global economy, output adjusts itself first before either prices or wages are influenced. We explore the 2 main types of FMS manufacturing practices that global companies utilize to adjust their outputs of standardized and complex goods.

ME07 Supply Chain Research Across the Globe

Cluster: Supply Chain Management
Invited Session

Chair: Wenny H. M. Raaymakers, Eindhoven Univ. of Technology, Faculty TM, Dept. LBS, PO Box 513, Eindhoven, 5600 MB, The Netherlands, w.h.m.raaymakers@tm.tue.nl

1) New Service Strategies for Third Party Logistics Providers, ***Anu H. Bask***, Helsinki School of Economics, Runeberginkatu 22-24, Helsinki, 00100, Finland, abask@hkkk.fi, ***Ari P. Vepsalainen***

We discuss the role of TPL providers in the emerging supply chain structures. How does the type of relationship shared in supply chain interfaces affect different service solutions? Interestingly, we found that when supply chain interface is based on standardized service, TPL providers need to provide customized service.

2) Locational Factors & Supply Chain Competitiveness: An LP-Based Approach, ***Rohit Bhatnagar***, Nanyang Tech. University, Nanyang Bus. Sch., B2A-26 Nanyang Ave., Singapore, 639798, Singapore, arbhatnagar@ntu.edu.sg

We study the relationship between factors considered by decision makers for location of manufacturing plants and the competitiveness of supply chains. Using empirical data from companies with plants in Singapore, we solve an LP-based model to develop a discriminant function that measures the relative impact of different locational factors in supply chain competitiveness.

3) withdrawn - author request of 9/25, ***Subheer Gupta***, McGill University, Fac. of Mgmt., 1001 Sherbrooke St. W, Montreal, Quebec, H3A 1G5, Canada, gupta@management.mcgill.ca

4) Prediction Models for Customer Order Acceptance in Batch Process Industries, ***Wenny H. M. Raaymakers***, Eindhoven Univ. of Technology, Faculty TM, Dept. LBS, PO Box 513, Eindhoven, 5600 MB, The Netherlands, w.h.m.raaymakers@tm.tue.nl

Batch process industries with overlapping operations, parallel machines and no-wait restrictions are considered. A prediction model is developed for predicting if a job set can be completed within a given time period, based on aggregate characteristics of the job set. This model may support customer order acceptance decisions.

ME08 Markov Decision Processes: Analysis & Computation

Sponsor: Applied Probability Section
Sponsored Session

Chair: Bernard F. Lamond, Laval University, Dept. of ODS, Sch. of Bus. Admin., Quebec, Quebec, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca

1) Optimizing the Performance of Serial Queueing Systems, ***Linn I. Sennott***, Illinois State University, Dept. of Math. CB 4520, Normal, IL 61790-4520, sennott@math.ilstu.edu

Optimal policies for load balancing in serial systems will be computed under various assumptions, including infinite buffers before each station. The effect of the location of the bottleneck station will be discussed. The optimal control of various other queueing configurations will also be discussed.

2) Markov-Modulated Nonstationary Affine Dynamic Models, ***Matthew J. Sobel***, NYU, Stern School Ste. 7-01A, 40 West 4th St., New York, NY 10012-1118, msobel@stern.nyu.edu

The Markov decision process we discuss has expected single-period rewards and dynamics which are affine functions of the current state with Markov-modulated nonstationary coefficients. Although an optimum is not likely to be myopic, it can be computed relatively efficiently. Applications include production, advertising and fisheries.

3) Computational Comparisons of Using Markov Decision Processes & Math Programming Decomposition Techniques on Reservoir Control Problems, ***Thomas W. Archibald***, University of Edinburgh, Dept. of Bus. Studies, 50 George Sq., Edinburgh, EH8 9JY, UK, t.archibald@ed.ac.uk, ***C. Buchanan***, ***K.I.M. McKinnon***, ***Lyn C. Thomas***

Control of systems of reservoirs can be modeled as a stochastic dynamic programming problem (Markov decision process) or by ignoring head effect as a stochastic LP problem. It is a good example to compare the computational aspects and relative accuracy of these 2 major OR tools...

4) A Numerical Study of Head Effect on Hydroelectric Production of Reservoirs in Series With Random Inflows, ***Abdeslem Boukhtouta***, Laval University, Dept. of ODS, School of Bus. Admin., Quebec, Quebec, G1K 7P4, Canada, aboukhto@lagrande.osd.ulaval.ca, ***Bernard F. Lamond***

We examine the problem of managing hydroelectric production, taking turbine head effects into account when natural inflows are stochastic. We revisit the work of Soares & Carneiro, 1990, on reservoirs in series, but we use stochastic dynamic programming for computations to show the effect of uncertainty on inflows.

ME09 Modeling Auctions

Cluster: Competitive Bidding
Invited Session

Chair: Richard Engelbrecht-Wiggans, University of Illinois, Dept. of Bus. Admin., 1206 S 6th St., Champaign, IL 61820

1) Daily Repetition of Electricity Auctions, ***Michael H. Rothkopf***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu http://rutcor.rutgers.edu/~rothkopf/

The daily repetition of electricity auctions affects desirable auction design. We discuss games and nongame theoretic ways of thinking about designing sequential auctions. We find that daily repetition reduces the potential efficiency advantages of progressive auctions over sealed bids, and makes collusion a greater potential problem...

2) Econometrics of the First-Price Auction with Asymmetric Bidders, ***Pat Bajari***, Harvard University, Dept. of Economics, 212 Littauer Ctr., Cambridge, MA 02138, pbajari@arrow.fas.harvard.edu

We present an econometric approach to first-price sealed bid auctions with independent private values that allows heterogeneity of bidders. After establishing existence and uniqueness of equilibrium for the theoretical model, we analyze asphalt firms bidding for government contracts near Minneapolis. A test for bid rigging strongly favors the hypothesis of competition.

3) Corners & Collusion in Auctions, ***Indranil Chakraborty***, ITAM, Mexico, ***Richard Engelbrecht-Wiggans***

Different pricing rules in multi-unit auction provide different incentives. We show that the pay-your-bid auction provides the greatest incentive to corner the auction market, that the experimental uniform-price Treasury auction provides less incentive and that the uniform-price auction proposed by Friedman proves the least incentive.

ME10 Network Design Problems Arising in Telecommunications I

Sponsor: Telecommunicatins
Sponsored Session

Chair: Luis Gouveia, University of Lisbon, DEIO-CIO Fac. of Sci., Bloco C/2-Campo Grande, Lisbon, 1700, Portugal, lgouveia@fc.ul.pt

1) Quadratic Assignment Problems and M/G/C/C/ State Dependent Network Flows, ***J. MacGregor Smith***, University of Massachusetts, Dept. of MIE, Amherst, MA 01003, jmsmith@ecs.umass.edu, ***Wu-Ji Li***

One of the most notorious network design problems is the QAP. We develop a heuristic algorithm for QAPs along with an M/G/C/C state-dependent queueing model for capturing congestion in the traffic system interconnecting the nodes in the network. Computational results are also presented.

2) The Partial Sum Criterion for Paths, ***Cees Duin***, University of

Amsterdam, Inst. of Actuarial Sci. & Eco., Roetersstraat 11, Amsterdam, 1018 WB, Netherlands, ceesd@fee.uva.nl, ***Ton Volgenant***

In combinatorial optimization, one normally optimizes over feasible solutions S that are subsets of a ground set E. Each element e in E has a weight c(e) and the criterion is the sum of the weights in S. In the partial p-sum criterion, one minimizes the sum of only the p largest elements in the solution...

3) New Neighborhood Structures for the Capacitated Minimum Spanning Tree Problem, ***James Orlin***, MIT, E53-357, Cambridge, MA 02139, jorlin@sloan.mit.edu, ***Ravindra K. Ahuja***, ***Dushyant Sharma***

Currently, the best available heuristic algorithms for the capacitated minimum spanning tree problem are TS algorithms which use neighborhood structures based on exchanging a single node or a set of nodes between 2 subtrees only. We generalize these neighborhood structures to allow exchanges of nodes among multiple subtrees simultaneously without substantial increase in computational effort.

4) The Capacitated Minimum Spanning Tree: Some Experiments with a Family of Hop-Indexed Flow-Based Models, ***Luis Gouveia***, University of Lisbon, DEIO-CIO Fac. of Sci., Bloco C/2-Campo Grande, Lisbon, 1700, Portugal, lgouveia@fc.ul.pt, ***Pedro Martins***

We discuss our recent work on obtaining lower bounds for the unit-weight capacitated minimum spanning tree problem using a family of hop-indexed flow-based models. Our method is based on a combination of disaggregation with cutting planes. We also discuss new branching schemes based on the variables involved in the hop-indexed models...

ME11 Teaching Product Development

Sponsor: Technology Management
Sponsored Session

Chair: Robert P. Smith, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195, smith@ieng.washington.edu

1) Industrial Projects as a Senior Capstone Design Activity, ***James L. Fridley***, University of Washington, Dept. of Mech. Eng., Box 352600, Seattle, WA 98195-2100, ***Jens E. Jorgensen***

To prepare students for interdisciplinary design projects, the curriculum has been augmented with material in conceptual design and in the design principles of components that make up modern products. The use of product dissection and benchmarking has been our teaching pedagogy. Case studies of the approach will be presented.

2) Observations from Teaching the Set-Based Design Paradigm, ***Durward K. Sobek, II***, Montana State University, Dept. of MIE, Bozeman, MT 59717-3800, dsobek@ie.montana.edu

Set-based design is a novel product development paradigm where designers reason and communicate about sets of design ideas rather than one at a time. I will present lessons learned from seminars that attempt to teach the new paradigm to experienced engineers and discuss potential implications for design engineering education.

3) Design Processes Employed by Student & Professional Engineers, ***Robert P. Smith***, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195, smith@ieng.washington.edu

Groups of professional engineers and engineering students were observed while designing. Professionals were more likely to engage in management activities, outline a design philosophy and view early design attempts as experiments. Students were more likely to engage in a generate-and-test pattern throughout. These differences are useful for guiding engineering education.

ME12 Distinguished Speaker Session

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session

Chair: Michael Radnor, Northwestern University, Kellogg Sch. of Mgmt., Evanston, IL 60201, m-radnor@nwu.edu

1) Trends in R&D/Technology Management Revisited - Again, ***Al Rubenstein***, Northwestern University, Dept. of IE, Evanston, IL 60208

No abstract supplied.

ME13 Project Management I

Contributed Session

Chair: John Moussourakis, Rider University, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648, moussourakis@rider.edu

1) On Maximizing the Net Present Value of a Project Under Resource Constraints, ***Erik L. Demeulemeester***, Katholieke Universiteit Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, B-3000, Belgium, erik.demeulemeester@econ.kuleuven.ac.be, ***Willy S. Herroelen***, ***Mario Vanhoucke***

We discuss the resource-constrained project scheduling problem where the net present value is maximized. A new solution procedure is presented, based on a very fast solution procedure for the unconstrained problem. A thorough computational analysis is given, comparing the new procedure with the one by Icmeli & Erenguc.

2) Project Scheduling with Resource Constraints, ***Cerry M. Klein***, University of Missouri, Dept. of IE, Columbia, MO 65211, klein@ecn.missouri.edu, ***Charles Tai***

A stochastic project scheduling problem subject to an incompatibility constraint and multiple renewable resource constraint is presented. The problem is modeled as a Markov decision process. Solution procedures are presented. Jobs have multiple operating modes and each mode is associated with a set of resource requirements and a duration distribution.

3) Bayesian Sequential Decision-Making in Project Management, ***Sungbin Cho***, George Washington University, Monroe Hall, Ste. 403, 2115 G St. NW, Washington, DC 20052, sung@gwis2.circ.gwu.edu, ***Zvi Covaliu***

We use several diagrams to represent various aspects of decision making in project management, including precedence, dependence and sequentiality. We propose a linear Bayes model to update the first 2 moments of posterior distributions of upcoming activity durations based on priors and observation of completed activities.

4) A Comparison of Two-Solution Procedures for the Discrete Time/Cost Tradeoff Problem, ***Mario Vanhoucke***, Katholieke Universiteit Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, B-3000, Belgium, mario.vanhoucke@econ.kuleuven.ac.be, ***Erik L. Demeulemeester***, ***Willy S. Herroelen***, ***Bert De Reyck***

We discuss the deterministic project scheduling problem, where the duration of each activity is a discrete, non-increasing function of the amount of a single nonrenewable resource. The objective is to construct the complete, efficient time/cost profile of the project. A computational evaluation of 2 totally different solution procedures is presented.

5) Critical Path Analysis with Nonlinear Expediting Cost Functions, ***John Moussourakis***, Rider University, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648, moussourakis@rider.edu

In a number of instances, the time/cost relationships used in CPM are best described by nonlinear functions such as step functions. We consider such a case and suggest an optimizing model.

ME14 Logistics III

Contributed Session

Chair: Wen-Chyuan Chiang, University of Tulsa, Coll. of Bus. Admin., 600 S College Ave., Tulsa, OK 74104-3189, qm_wc@centum.utulsa.edu

1) An OR Approach to Supplier Evaluation, Selection & Negotiation, ***Charles A. Weber***, Institute for Defense Analyses, 1801 N Beauregard St., Alexandria, VA 22311, cweber@ida.org, ***John R. Current***, ***Anand Desai***

With increased emphasis on supply chain management, supplier selection has received increased recognition in recent years. We explore an approach to supplier evaluation, selection and negotiation using the OR tools of multiobjective mathematical programming and DEA. A case study from a manufacturing firm is presented.

2) Vehicle Routing for Long Haul Operations Under Cyclic Constraints, ***Cenk Caliskan***, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, caliskan@usc.edu, ***Randolph W. Hall***

We consider the problem of optimally routing vehicles in a long haul network where demand is 2-ended, driver movements are constrained to be cyclic and there is a time limit on the routes of the drivers. We develop an LP model and propose a column-generation-based solution method. The model is tested with networks up to 40 nodes, using both actual and randomly generated data sets.

3) Siting Noxious Facilities Under Uncertainty, ***Kimberly A. Killmer***, University of Pennsylvania, Dept. of Systems, Towne 248,

220 South 33rd St., Philadelphia, PA 19104, killmer@seas.upenn.edu, ***G. Anandalingam, Scott A. Malcolm***

We consider the problem of siting noxious facilities under uncertainty. We develop a robust optimization formulation of this problem. The model generates solutions which are relatively insensitive to uncertainties in model parameters. A case study in hazardous materials facility siting is presented.

4) Optimal & Heuristic Approaches to a Mail Transportation Network Problem, ***Wen-Chyuan Chiang***, University of Tulsa, Coll. of Bus. Admin., 600 S College Ave., Tulsa, OK 74104-3189, qm_wc@centum.utulsa.edu, ***Panagiotis Kouvelis***

We consider a mail transportation network problem. We propose an optimal approach and efficient heuristics to solve the problem. For large problems, lower bounds are computed for evaluating the quality of our heuristic results.

ME15 Using the Integral Simplex Algorithm for Finding Pseudo-Polynomial Algorithms for Some NP-Complete Problems

Tutorial Session

Chair: Robert D. Carr, Sandia National Labs., Dept. of Applied Math., PO Box 5800, MS 1110, Albuquerque, NM 87111, bobcarr@cs.sandia.gov

1) Tutorial: Using the Integral Simplex Algorithm for Finding Pseudo Polynomial Algorithms for Some NP Complete Problems, ***Gerald L. Thompson***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213-3890, gt04@andrew.cmu.edu

The author's recently announced integral simplex method was originally developed to solve set partitioning problems and shown to have pseudo polynomial time computational complexity. The method begins with the initial tableau of the problem and makes pivots on ones until no more such pivots can be found...

ME16 Optimizing Freight Networks

Sponsor: Transportation Science
Sponsored Session

Chair: Daeki Kim, IBM, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598

1) Adaptive Learning Strategies for Dynamic Service Network Design, ***Belgacem Bouzaiene-Ayari***, Princeton University, Dept. of Civil Eng. & OR, Princeton, NJ 08544, ***Katerina Papadaki, Warren B. Powell***

We propose an adaptive learning algorithm applied to the dynamic service network design problem for freight transportation. The method iteratively simulates a large-scale network with flows of freight and containers and adaptively approximates the value function. Numerical results are presented.

2) A Stochastic Multicommodity Network Flow Model, ***Daeki Kim***, IBM, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, ***Russell A. Rushmeier***

We consider the problem of large-scale multicommodity network flow with stochastic demand involving optimal allocation of capacities to flows at minimum cost. We describe our model, solution approach and computational experiences in solving a problem faced by many transportation carriers.

3) Real-Time Capacity Forecasting & Driver Scheduling at Roberts Express, ***Ahmad I. Jarrah***, Transport Dynamics Inc., 103 Carnegie Ctr., Ste. 317, Princeton, NJ 08540, jarrah@transdynamics.com, ***Derek H. Gittoes, Warren B. Powell, Trevor Poole***

We discuss the design and development of the system including demand forecasting for daily forecasting of expected loads including the capability of continual re-sampling of demands, fleet management for identifying and balancing shortages in network resources on a continual basis and driver scheduling for real-time generation of optimal tour of duties...

ME17 Location Models III

Sponsor: Location Analysis
Sponsored Session

Chair: Richard L. Francis, University of Florida, ISE Dept., 303 Weil Hall, Gainesville, FL 32611-6595, francis@ise.ufi.edu

1) Locating Facilities that Compete & Cooperate, ***Kevin R. Gue***, Naval Postgraduate School, Dept. of Systems Mgmt., Monterey, CA 93943, krgue@nps.navy.mil

We model locating recruiting stations for competing Services at minimal cost to DoD, subject to Services achieving established production targets. Services can cooperate by collocating stations to reduce costs, at the expense of lower expected production for the cooperating stations. We show some results for the Los Angeles recruiting district.

2) The Maximal Expected Coverage Location Problem, ***Jeffrey D. Camm***, University of Cincinnati, PO Box 210130, QUAM Dept., Cincinnati, OH 45221-0130, jeff.camm@uc.edu, ***Susan K. Norman***

The maximal expected coverage location problem is to locate k facilities so as to maximize the expected coverage provided by the chosen facilities. Applications in nature reserve site selection and in marketing will be discussed along with solutions approaches.

3) New Results for the Inspection Station Location Problem on a Network, ***David E. Lucas***, University of Arizona, Dept. of ISE, PO Box 210020, Tucson, AZ 85721-0020, lucas@sie.arizona.edu, ***Pitu B. Mirchandani***

In an earlier paper, we introduced the problem of locating inspection facilities on a network, where we wished to maximize the number of vehicles inspected for a given number of facilities. We introduce a B&B approach to solve the problem, where subproblems are solved iteratively. We present some computational results, a new location model, show its solution complexity and give preliminary results.

4) Aggregation in Location Models, ***M. Brenda R. Rayco***, Florida State University, Coll. of Eng., Dept. of IE, 2525 Pottsdamer St., Tallahassee, FL 32611, rayco@eng.fsu.edu

We present a review of aggregation methodologies for location problems and consider further areas for study.

5) Demand Point Aggregation for the Location Covering Model, ***Hulya Emir***, University of Florida, Dept. of ISE, Gainesville, FL 32611, emir@ise.ufl.edu, ***Richard L. Francis***

A common covering location model is to minimize the number of facilities located subject to a closest facility being within a given coverage "radius" of every customer/demand point. We consider the effect that demand point aggregation has on the model error, as well as how to measure the error.

ME18 Health Care Efficiency & Effectiveness

Sponsor: Health Applications
Sponsored Session

Chair: Ramesh K. Shukla, Virginia Commonwealth University, Williamson Inst. for Health, PO Box 980203, Richmond, VA 23298-0203, shukla@hsc.vcu.edu

1) The Impact of Gatekeeping on Cardiovascular Surgery, ***James G. Anderson***, Purdue University, Social Research Inst., 1365 Stone Hall, West Lafayette, IN 47907-1365, swy@vm.cc.purdue.edu, ***Hui-Ching Weng***

We examine the effectiveness of gatekeeping performed by cardiovascular surgeons. Time series analysis and structural equation modeling were used to anlayze the data from 447 Medicare patients who underwent coronary artery bypass graft operations during 25 months since beginning of 1993 as part of a HCFA demonstration project. Results show that resource utilization and hospital costs increased over time...

2) Validity of Data Envelopment Analysis for Assessing the Efficiency of Health Services Organizations, ***Alan M. Sear***, University of South Florida, Dept. of Health Policy & Mgmt., 13201 N. 30th St. MDC 56, Tampa, FL 33647, asear@com1.med.usf.edu, ***Lee Revere***

Our study begins with the analysis of the basic input/output relationship between 2 then systematically adds input variables to the model, followed by the systematic addition of output variables. At each stage, the relative effects of the additional variables on the basic relationship are assessed.

3) The Impact of the PPS on Technical Efficiency of Hospitals, ***Thomas T. H. Wan***, Virginia Commonwealth University, Williamson Inst. for Health, PO Box 980203, Richmond, VA 23298-0203, twan@hsc.vcu.edu, ***Jin-Yuan Chern***

DEA was used to evaluate efficiency scores of 80 hospitals in Virginia from 1984-93. The longitudinal panel design tested the effect of PPS on technical efficiency. Contrary to expectations, no significant difference in efficiency was found in each hospital peer group over the study period. Managerial implications of this result will be discussed.

4) Small Area Variations in Hospital Admission & Its Severity for Ambulatory Sensitive Conditions, ***Ramesh K. Shukla***, Virginia Commonwealth University, Williamson Inst. for Health, PO Box 980203, Richmond, VA 23298-0203, shukla@hsc.vcu.edu, ***John P. Pestian***

Merging sub-sets of UB-92, census and area resource files created the county

level data set of ambulatory sensitive conditions, i.e., asthma, diabetes, hypertension, etc. Results from multiple-regression analysis show that demographic variables rather than access to medical care were important to hospital admissions, however, severity at admission was higher in rural communities.

ME19 Conceptualizing the Big Picture Using Function Analysis System Techniques

Cluster: **Partnering Value Methodology, Theory of Constraints & DA Invited Session**

Chair: Mike Denton, Amoco, 2727 Oakland Dr., Sugarland, TX 77479, madenton@amoco.com

1) The Power of Function Analysis System Technique in Value Management, ***Jerry Kaufman***, JJ Kaufman Associates, Inc., 12006 Indian Wells Dr., Houston, TX 77066, jkaufman@flash.net, ***Jimmie Carter***

FAST is a powerful analysis for innovating products; however, innovative products alone don't assure success. Companies must also learn creative organization concepts to react quickly and effectively to business opportunities. We focus on how to use FAST, an effective mapping technique, to extend VM beyond products into management.

2) withdrawn - chair email of 7/14, ***Michael Cook***, DuPont Engineering, PO Box 80840, Wilmington, DE 19880-0840, michael.j.cook@usa.dupont.com

3) Institutionalizing Value Engineering, ***Randle R. Russo***, Pratt & Whitney, 400 Main St., MC 161-25, East Hartford, CT 06108, rusorr@pweh.com

The success of VE at Pratt & Whitney has led to an investigation to make VE a part of their operating culture, not a committee, or activity, or organizational unit, but integrating VE into the way Pratt & Whitney operates their business. The objective is to make VE transparent in Pratt & Whitney.

4) Value Methodology for Developing Organizations, ***Mike Denton***, Amoco, 2727 Oakland Dr., Sugarland, TX 77479, madenton@amoco.com

VM systematically develops shared visions and identifies resource requirements for projects. It includes describing what has to be done (function) instead of what they are (title). Functions are mapped into process flow diagrams with responsibility, accountability and the time to complete each function shown.

ME20 Military Operations Research at TRAC-White Sands

Sponsor: **Military Applications Sponsored Session**

Chair: Philipp A. Djang, TRAC-White Sands, TRADOC Analysis Ctr., WSMR, NM 88002, djang@trac.wsmr.army.mil

1) Linkage of Constructive Analytical Models to C4I Systems, ***Carl R. Baxley***, Nations, Inc., WSMR, NM 88002, baxleyc@trac.wsmr.army.mil, ***Stanley C. Ritter***

FBCB2, Force XXI Battle Command, Brigade and Below, is a digital command and control system used at brigade and below consisting of PC class computers and software using modern GUIs. There is a continuing requirement to do effective analysis of this emerging C2 systems as well train the unit to use the systems within the bounds of limited time and money. Training and analysis are described.

2) The Utility of Modeling & Simulation in Fleet Training, ***Charles Carey***, Kapos Associates, Inc., 591 Camino de la Reina, San Diego, CA 92119, ccarey@mosc.mil

We address the methodology and results of the first of three phase processes to assess the utility of modeling and simulation in fleet training. First phase focus was on the potential to substitute modeling and simulation for underway/in-flight training and thereby reduce associated operating costs. We address implications of the findings...

3) Maximizing Force Effectiveness: TRAC-WSMR Mix Model Enhancements, ***Bruce Gafner***, US Army, TRADOC Analysis Ctr., ATTN: ATRC-WAD, WSMR, NM 88002, gafnerb@trac.wsmr.army.mil

The TRAC-WSMR Mix Model addresses changes to friendly weapon systems and optimizes a force consisting of a mix of current and multiple new weapon systems. Target stealing and other factors often cause interactions and synergy to occur. Ongoing research addresses new modeling approaches to take into consideration the interaction effects. Proposed model enhancements and results will be presented.

4) The Army's Training Mix Model, ***Philipp A. Djang***, TRAC-White Sands, TRADOC Analysis Ctr., WSMR, NM 88002, djang@trac.wsmr.army.mil, ***Richard R. Laferriere***

We discuss the problem of constructing cost effective training strategies. We describe a MIP model and a method for estimating training effectiveness. The model is embodied in a Microsoft Windows program that removes the complexity of using mathematical programming and relational database software. It is a very difficult problem...

ME21 Panel: Building Relationships Between Universities & Business & Government

Sponsor: **Academic/Practitioner Interface Committee Sponsored Session**

Chair: Frederic H. Murphy, Temple University, Sch. of Bus. & Mgmt., 2402 Pine St., Philadelphia, PA 19122, v5256e@vm.temple.edu

1) Panel: Building Relationships Between Universities & Business & Government, ***Joseph H. Discenza***, Daniel Wagner Assoc., 11 Canal Dr., Poquoson, VA 23662, joe@va.wagner.com, ***Nelson M. Fraiman***, Columbia University, Grad. Sch. of Bus., 405A Uris Hall, New York, NY 10027, nmf1@columbia.edu, ***Patrick T. Harker***, University of Pennsylvania, Dept. of OPIM, The Wharton Sch., Philadelphia, PA 19104-6366, harker@wharton.upenn.eduhttp://opim.wharton.upenn.edu/~harker, ***R. Warren Langley***, Pacific Stock Exchange, 301 Pine St., San Francisco, CA 94104, rwarren@pop.net, ***Shmuel S. Oren***, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, shmuel@euler.berkeley.edu

The Academic/Practitioner Interface committee has organized this panel to illustrate ways in which academics and practitioners can work together for the benefit of both sets of organizations. The panelists have been selected to illustrate the different types of programs that bring academics and practitioners together.

ME22 Natural Resources Management VI

Cluster: **Natural Resources Management Invited Session**

Chair: Vincent Gallucci, University of Washington, Sch. of Fisheries, Box 357980, Seattle, WA 98195, gallucci@fish.washington.edu

1) Economic Value of Improved Salmon Forecasts, ***Daniel D. Huppert***, University of Washington, Sch. of Marine Affairs, Box 355685, Seattle, WA 98195, huppert@u.washington.edu, ***Janne Kaje***

The economic decision model of Katz & Murphy is adapted to the dynamic Washington coastal coho fishery. A 2-stage inshore/offshore fishery that harvests a mix of hatchery and wild salmon is modeled. Stochastic simulation over a 50-year period provides estimates of economic value under different levels of forecasting accuracy.

2) Allocating Fishing Effort among Gillnets with Different Mesh Sizes, ***Benjounes Amjoun***, ***Vincent Gallucci***

Ideal multiple species fisheries [no by-catch] would have a 1-1 relationship between fish caught and capture gear used. When gill-nets of different sizes are used for fish of different sizes the 1-1 relationshop disappears and by-catch appears. An optimization methodology is presented to estimate optimum catch from 4 nets.

3) The Simultaneous Assessment of Multiple Fish Stocks in the Bering Sea, ***Jesus Jurado-Molina***, University of Washington, Sch. of Fisheries, Box 357980, Seattle, WA 98195, jesus@fish.washington.edu, ***Patricia Livingston***

Progress has been made representing multiple fish stock capture fisheries in the Bering Sea ground fishery. Estimated food consumption by rate and species is used to parameterize a virtual VPA. A "suitability" coefficient relates predator-prey preferences and availability.

4) A Dynamic Game for Pollution Management in an Estuary, ***Rebecca A. Crabb***, University of Washington, Dept. of Applied Math., Box 352420, Seattle, WA 98195, crabb@amath.washington.edu www.amath.washington.edu/people/~crabb/, ***Thomas M. Leschine***

A model for pollution reduction is formulated as a non-0 discrete asymmetric dynamic game between cities on an estuary. Pollution strategies are determined by a Nash equilibrium feedback solution. A realistic model for estuarine flow developed by the National Oceanic and Atmospheric Agency is incorporated in the model.

ME23 Strategy & Sustainability

Cluster: Ecologically Sustainable Business Practices
Invited Session

Chair: Stuart Hart, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109-1234, stuart_hart@ccmail.bus.umich.edu

1) Integrated Sustainability: Lessons from the Forest Products Sector, ***Rob Day***, World Resources Institute, Mgmt. Inst. for Environ. & Bus, 1709 New York Ave. NW, Washington, DC 20006, robd@wri.org http://www.wri.org/meb/, ***Stuart Hart***, ***Matthew Arnold***

A growing number of companies have emerged as innovators in sustainable forestry management, SFM. We analyzed more than 20 business cases in SFM and using a conceptual framework derived from the environmental strategy literature, conclude that successful SFM requires pursuing ecological sustainability as part of an integrated business strategy.

2) Global Sustainability & the Creative Destruction of Industries, ***Stuart Hart***, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109-1234, stuart_hart@ccmail.bus.umich.edu

Confronting the challenge of global sustainability requires fundamentally new socio-technical systems and a new model of strategic management. The re-inventing process of "creative destruction" required by industry to respond to this challenge is being driven by the growing realization that existing industrial practices can not be continued indefinitely.

3) Strategic Sustainability, ***Russell Barton***, EKOS International, 7419 W Mercer Way, Mercer Island, WA 98040, rbekos@aol.com

We are at a strategic inflection point requiring revolutionary change and breakthrough improvements. We present a perspective on sustainability not as eco-efficiencies, though this is a part, but as achieving strategic pre-eminence through the design of business models, products and services and processes from a whole new vantage point.

4) Sustainability & the Firm, ***Forest Reinhardt***, Harvard Business School, Morgan Hall 265, Boston, MA 02163, freinhardt@hbs.edu

At the macroeconomic level, "sustainability" means no reduction in total assets (Solow, Hartwick & Weitzman). We propose an analogous test, applied at the level of the firm. It argues that profit and investment as well as environmental behavior must inform assessments of "sustainability."

ME24 Electricity Markets

Cluster: Energy
Invited Session

Chair: James B. Bushnell, University of California, Energy Inst., 2539 Channing Way, Berkeley, CA 94720-5180, jimb@ieor.berkeley.edu

1) Strategic Effects of Capacity Payments in an Electricity Pool, ***Christopher J. Day***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, cday@lbs.ac.uk, ***Derek W. Bunn***

The ability of generating companies to increase profits by withholding capacity is investigated in an electricity pool of the England and Wales type. By reducing the amount of capacity available to the market, a generator may increase both the market clearing price and at times of high demand, the payments made for making capacity available...

2) GENCOMP 2.0: A Model of Competition Among Electric Generators, ***J. Scott Rogers***, University of Toronto, Dept. of MIE, 5 Kings College Rd., Toronto, Ontario, M5S 3G8, Canada, rogers@mie.utoronto.ca, ***K. Wong***

We describe a model, GENCOMP 2.0, of generator competition under the influence of an independent market operator. The generators are profit maximizers with an endowment of units and an anticipation of the others' behavior. Results illustrate the effects on prices of different numbers of competitors and endowments.

3) The Impact of Alternative Regulatory Environments on Firm Efficiency in the US Electricity Market: DEA & Econometric Evidence, ***Christopher Knittel***, University of California, Energy Institute, 2539 Channing Way, Berkeley, CA 94720-5180, knittel@econ.berkeley.edu

We estimate the impact of different regulatory environments on technical and allocative efficiency in US electricity markets and compare both DEA and econometric techniques that have been developed to estimate firm level efficiency.

4) Minding the Store: Monitoring the Electricity Markets of the California ISO, ***James B. Bushnell***, University of California, Energy Inst., 2539 Channing Way, Berkeley, CA 94720-5180, jimb@ieor.berkeley.edu

The electricity market in California has several unique characteristics. Primary among these is the separation of several previously bundled services into individually priced markets. We provide an overview of this market structure and discuss the performance of these various markets to date.

ME25 Network & Cutting Plane Methods

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session

Chair: Dan Wilson, University of Kentucky, c/o Jon Lee Math. Dept., Patterson Office Tower, Lexington, KY 40506, jlee@ms.uky.edu

1) withdrawn - author request of 9/1, ***Sungsoo Park***, KAIST, Dept. of IE, 373-1 Gusong-Dong Yusong-Gu, Taejon, Korea, sspark@cais.kaist.ac.kr, ***Kyungsik Lee***

2) withdrawn - chair request of 9/16, ***Antoine Deza***, Ecole des Hautes, Centre d'Analyse et de Math., 54 Boulevard Raspail, Paris, 75 006, France, deza@ehess.fr, ***David Avis***

3) A Combinatorial Polynomial-Time Algorithm for Generalized Min Cost Flow, ***Kevin Wayne***, Princeton University, wayne@cs.princeton.edu

We develop the first combinatorial polynomial-time algorithm for the generalized min cost flow problem. Despite a rich history dating back to Dantzig, until now, all previous polynomial-time algorithms were based on general LP techniques. Our techniques also extend to optimize LPs with 2 variables per inequality.

4) Polyhedral Methods for Piecewise-Linear Functions, ***Dan Wilson***, University of Kentucky, c/o Jon Lee Math. Dept., Patterson Office Tower, Lexington, KY 40506, jlee@ms.uky.edu, ***Jon Lee***

We formulate nonseparable piecewise-linear functions using methods of integer LP. Our formulations generalize the well-know lambda and delta methods. We use strong cutting-plane and reformulation techniques to make our methods practical. We present computational results obtained using AMPL.

5) The p-Cycle Polytope, ***Mark Hartmann***, University of North Carolina, Dept. of OR CB 3180, 210 Smith Bldg., Chapel Hill, NC 27599-3180, mudville@or.unc.edu, ***Ozgur Ozluk***

The p-cycle polytope is the convex hull of incidence vectors of directed cycles with p nodes (the p-node ATSP polytope is a face). We give the equality set, dimension and facet-defining inequalities for $2 < p < n$. We show how to identify "rank" facets and discuss separation problems.

ME26 Theoretical Studies of the TSP

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session

Chair: Egon Balas, Carnegie Mellon University, Grad. School of IA, Pittsburgh, PA 15213, eb17@andrew.cmu.edu

1) New Domination Analysis Results on the Traveling Salesman Problem & Related Problems, ***Abraham Punnen***, University of New Brunswick, Dept. of Math. Stats. & CS, St. John, NB, E2L 4L5, Canada, punnen@unbsj.ca

Domination analysis of a heuristic algorithm for a combinatorial optimization problem links the problem solving ability of a heuristic algorithm alpha to the number of solutions that are guaranteed to be dominated by the solution produced by alpha. We provide domination analysis of certain heuristics for the TSP and some variations.

2) The Mean Radius of the Traveling Salesman Polytope, ***Raymond Robb***, 110 Hill St., Apt. 7, Ann Arbor, MI 48104, rrobb@umich.edu, ***Alexander Barvinok***

We compute the median of the support function of several convex bodies, including the Birkhoff and the traveling salesman polytope, and discuss the significance of these results to the corresponding optimization problems.

3) Connections Between the Asymmetric & Symmetric Traveling Salesman Problems, ***Egon Balas***, Carnegie Mellon University, Grad. School of IA, Pittsburgh, PA 15213, eb17@andrew.cmu.edu, ***Robert D. Carr***, ***Matteo Fischetti***

We establish a close connection between the asymmetric and symmetric traveling salesman polytopes: facets of the asymmetric traveling salesman polytope can be mapped into facets of a certain face of the symmetric traveling

salesman polytope and then lifted into facets of the symmetric traveling salesman polytope.

ME27 Interior Point Methods for Mathematical Programming

Cluster: Linear Programming & Related Topics
Sponsor: Optimization
Sponsored Session
Chair: Renato D. C. Monteiro, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, monteiro@isye.gatech.edu

1) Finite Precision Effects in Interior-Point Methods for Nonlinear Programming, ***Stephen Wright***, Argonne National Laboratory, MCS Div., Argonne, IL 60439, wright@mcs.anl.gov

The effects of finite precision in solving the linear equations at each iteration of interior-point algorithms for nonlinear programming are benign. We describe results for the 3 most common formulations of the linear system, using the Mangasarian-Fromovitz constraint qualification in place of the usual stronger nondegeneracy assumption.

2) Interior-Point Methods for Process Engineering Problems, ***Reha Tutuncu***, Carnegie Mellon University, 6113 Wean Hall, Pittsburgh, PA 15213, reha+@andrew.cmu.edu, ***Lorenz T. Biegler***, ***Andreas Waechter***

We discuss the use of interior-point methods for the solution of large-scale chemical process engineering problems. We investigate a new technique for adaptive centering and also discuss our experimental results on the use of warm-starts for the solution of successive subproblems.

3) General Interior-Point Maps & Existence of Weighted Paths for Nonlinear Semidefinite Complementarity Problems, ***Renato D. C. Monteiro***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, monteiro@isye.gatech.edu, ***Paulo R. Zanjacomo***

We discuss properties of fundamental maps that are used to describe the central path of the monotone complementarity problem over the cone of symmetric positive semidefinite matrices. Each fundamental map leads to a family of "weighted" continuous trajectories which include the central trajectory as a special case.

ME28 Advances in Global Optimization

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: Nick Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 S Mathews Ave., Urbana, IL 61801, nikos@uiuc.edu http://archimedes.scs.uiuc.edu

1) withdrawn - chair request of 8/31, ***Donald R. Jones***, General Motors R&D Ctr., 30500 Mound Rd., MC 480-106-359, Warren, MI 48090-9055, djones@mgr.com

2) Finiteness Issues in Global Optimization, ***Joseph Shectman***, University of Illinois, Dept. of MIE, Urbana, IL 61801, jshectma@uiuc.edu, ***Nick Sahinidis***

Typical global optimization algorithms do not exhibit finite convergence when applied to continuous multiextremal problems. We report on our progress towards provably finite algorithms. The main tool is the integration of optimality conditions and other problem-specific analytical properties into the context of B&B.

3) Concave Envelope Analysis for Nonconvex Logistics, Distribution & Planning Networks, ***Gavin Bell***, University of Canterbury, Dept. of Mgmt., Christchurch, New Zealand, g.bell@mang.canterbury.ac.nz, ***B. W. Lamar***

Nonconvex network models have numerous applications in many fields, including network design, logistics, physical distribution, electricity transmission and telecommunications problems. We develop the concept of "concave envelopes" which are used in parametric analysis to speed solution methods for nonconvex network flow problems. Computational results and examples are provided.

4) Optimization of Composite Beams, ***Vesna Savic***, University of Washington, Mechanical Eng., Box 352600, Seattle, WA 98195-2600, savic@u.washington.edu, ***Zelda B. Zabinsky***, ***Mark E. Tuttle***

Optimization for composite beams has primarily focused on the geometrical shape of the beam, ignoring the manufacturing level-details such as number of plies and ply orientations. We include these as design variables in an optimization formulation for thin-walled composite beams of constant cross-section and investigate C- and J-shaped beams.

ME29 Logical Analysis of Data

Cluster: Optimization & Artificial Intelligence
Sponsor: Optimization
Sponsored Session
Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) Logical Analysis of Data: The Binary Case, ***Peter L. Hammer***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu, ***Endre Boros***, ***Yves Crama***, ***Toshihide Ibaraki***, ***Alexander Kogan***

LAD is a logic-based methodology for analyzing archives of data consisting of collections of true and false binary n-vectors. Support sets, patterns, and theories are defined, calculated and used for diagnosis, data compression, attribute ranking, error detection, constriction of DSSs, etc.

2) Logical Analysis of Data: Numerical Input, ***Endre Boros***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, boros@rutcor.rutgers.edu, ***Peter L. Hammer***, ***Toshihide Ibaraki***, ***Alexander Kogan***

LAD is applicable to numerical input if one introduces binary indicator variables, each showing whether the value of an original attribute is above or below a certain level. We shall study combinatorial optimization problems related to the minimization of the number of binary variables.

3) Logical Analysis of Data: Computational Studies, ***Alexander Kogan***, Rutgers University, Fac. of Mgmt., 180 University Ave., Newark, NJ 07102, kogan@rutcor.rutgers.edu, ***Endre Boros***, ***Slava Brover***, ***Peter L. Hammer***, ***Toshihide Ibaraki***, ***Eddy Mayoraz***, ***Ilya Muchnik***

We present the results of numerical experiments demonstrating classification performance of LAD in comparison with other procedures. We also describe 3 pilot studies in oil exploration, psychometric testing and the analysis of Chinese transitional economy, demonstrating the flexibility of LAD and its capability to provide solutions to various case-dependent problems.

ME30 Multiple Criteria Decision Making: Theory & Practice

Cluster: Engineering Optimization
Invited Session
Chair: Abu S. M. Masud, Wichita State University, I&ME Dept., Wichita, KS 67269-0035, masud@imfge.twsu.edu

1) Incorporating Probability Analysis of Uncertainties into Multiple Criteria Optimization, ***Craig W. Kirkwood***, Arizona State University, Coll. of Bus., Dept. of Mgmt., Tempe, AZ 85287-4006, craig.kirkwood@asu.edu http://www.public.asu.edu/~kirkwood

Recently developed approximation methods will be presented for incorporating probability analysis methods into optimization approaches to MCDM. These methods hold promise of expanding the benefits of such optimization approaches in decision situations where there are substantial risks.

2) A Branch & Bound Method to Solve Linear Bicriteria Integer Problems, ***Ramanujan Thirumaai***, Pennsylvania State University, Dept. of I&ME, 207 Hammond Bldg., University Park, PA 16802, rst160@psu.edu http://indy.ie.psu.edu/~rxt160, ***A. Ravi Ravindran***

This method combines the B&B technique with the Tchebycheff norm to solve linear bicriteria integer problems. It searches through both unsupported and supported efficient points in an interactive manner to find the best compromise solution of the decision maker. The software works on MS Excel.

3) Dynamic Design Assistance Code: An On-Line Decision Making Key to a Feature-Based Dynamic Design Assistance Methodology, ***Tridip K. Bardhan***, Wichita State University, IME Dept., Wichita, KS 67260-0035, tbardhan@cme.nist.gov http://www.engr.twsu.edu/imfge, ***Venkat N. Rajan***, ***Abu S. M. Masud***

A DDA methodology for a feature-based design environment has been developed for identifying and solving problems at the design stage. During the development of the part geometry, a 12-digit code is added to every feature to facilitate on-line advice about life-cycle criteria. The role of the code as an MCDM key in the methodology is discussed and an example presented.

4) Multicriteria Linear Regression Analysis, ***John F. Wellington***, Capital University, Grad. School Admin., 2199 E Main St., Columbus, OH 43209-2394, jwelling@capital.edu, ***Subhash C.***

Narula

Sometimes the choice of criterion for estimating the unknown parameters of the linear regression model is not clear. In such cases, it may be more appropriate to use multiple criteria to estimate the parameters. We illustrate this approach with an example.

ME31 Tabu Search Strategies & Their Applications

Cluster: Tabu Search
Invited Session
Chair: Buyang Cao, ESRI, Inc., Dept. Transport/Logistics, 380 New York St., Redlands, CA 92373, bcao@esri.com

1) Using Group Theory to Guide & Direct Tabu Search, *Bruce W. Colletti*, University of Texas, Grad. Program in OR/IE, PO Box 7022, Austin, TX 78713-7022, bcolletti@compuserve.com, ***J. Wesley Barnes***

We describe a method wherein group theory may guide the choice of TS move strategies and for a specific strategy, define the incumbent solution's neighborhood. Specific illustrations will be given in the context of the TSP.

2) Longer Term Implementation of a 2-Phase Tabu Search Algorithm for the Location Routing Problem, *Dilek Tuzen*, Lehigh University, Dept. of IMSE, Mohler Lab 200, Bethlehem, PA 18015, dit2@lehigh.edu, ***Laura Burke***

The LRP, which combines the facility location and the vehicle routing decisions in a distribution system, is NP-hard. We present the longer term implementation of a 2-phase TS heuristic for the LRP and discuss the usage of TS concepts such as elite lists and strategic oscillation in the implementation.

3) A Tabu Search Solution Procedure for a Multiple Criteria Facility Location Problem, *Minghe Sun*, University of Texas, Div. of Mgmt. Mktg., Coll. of Bus., San Antonio, TX 78249-0634, msun@lonestar.utsa.edu, ***Per J. Agrell***

A TS heuristic procedure is developed for a multiple criteria facility location problem. TS is used to guide the search for good candidate solutions. The decision maker provides his preference information by selecting the best among sample solutions. Data structures used to implement the procedure are also discussed.

4) A Tabu Search Algorithm & GIS Interfaces, *B. Bozkaya*, University of Alberta, Fac. of Bus., Edmonton, Alberta, T6G 2R6, Canada, ***Erhan Erkut, Gilbert Laporte***

We present a TS algorithm and prototype DSS for the political districting problem. The TS algorithm is also integrated with an adaptive memory procedure, AMP. Our objective function includes both "objective" and "political" criteria. We describe particulars of the TS and AMP algorithms and compare maps produced for the City of Edmonton with actual ones.

ME32 Software Demonstrations

Chair: Jaret Hauge, Visual Thinking Intl. Ltd., 55A Port St. East, Mississauga, Ontario, L5G 4P3, Canada, jaret@visualt.com

1) Software Demonstration: Global Optimization in the Excel Solver, *Daniel Fylstra*, Frontline Systems, Inc., PO Box 4822, Incline Village, NV 89450, dfylstra@frontsys.com

Frontline Systems' Premium Solver for Excel now includes new probabilistic methods for finding the global optimum in a problem with multiple local optima and for solving problems involving non-smooth functions such as the spreadsheet's IF and CHOOSE. These methods are akin to evolutionary or genetic algorithms but are often faster and more robust...

2) Software Demonstration: SIMUL8 - Simulation for the Mass Market, *Jaret Hauge*, Visual Thinking Intl. Ltd., 55A Port St. East, Mississauga, Ontario, L5G 4P3, Canada, jaret@visualt.com

Come and see why SIMUL8 is quickly becoming the most popular simulation modeling tool ever. SIMUL8 is being sold to large organizations in packs of 100! Companies such as Ford, Fidelity, US Steel and General Foods are buying SIMUL8 in volume to equip their engineers with a high-quality, professional decision-making tool...

ME33 ATM Operational Concept II

Sponsor: Aviation Applications
Sponsored Session
Chair: Aslaug Haraldsdottir, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, aslaug.haraldsdottir@boeing.com

1) Air Traffic Management Capacity-Driven Concept Through 2015, *Aslaug Haraldsdottir*, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, aslaug.haraldsdottir@boeing.com, ***Robert W. Schwab, Monica Alcabin***

A NAS ATM operational concept through 2015 is presented, driven by a need to accomodate predicted traffic growth. The concept is based on the functional structure of the traffic flow management and separation assurance work system, with a system transition plan that incorporates CNS/ATM technologies to deliver specific capacity enhancements.

2) UK NATS Operational Strategy, *Ian R. Hall*, National Air Traffic Services Ltd., CAA House, 45-59 Kingsway, London, WC2B 6TE, UK

Although on the geographical periphery of Europe, the UK has the third highest traffic levels and the largest control centre. Traffic growth and the complexity of high density airspace provide significant operational challenges to NATS and its diverse customers. Strategic solutions must match European, North Atlantic and North American developments.

3) PD/3 - Multi-Layer Planning, *Bob Graham*, Eurocontrol, Experimental Ctr., BP 15-9122, Bretigny Sur Onge, France, robert.graham@eurocontrol.fr

PD/3, Programme for Harmonised Air Traffic Management Research in Eurocontrol Demonstration 3, aims to demonstrate integrated air-ground ATM including advanced system support tools and 4D trajectory negotiation with new operational concepts. We report on the operational concept of multi-layer planning evaluated in PD/3.

4) PD/3 - An Airborne Perspective, *Eric Hoffman*, Eurocontrol, Experimantal Ctr., BP 15-9122, Bretigny Sur Orge, France, eric.hoffman@eurocontrol.fr

The main objective of the EEC PD/3 airborne evaluation is to determine whether the facilities provided in the cockpit, namely the experimental flight management system and its associated airborne human machine interface, enable the crew to adequately and safely operate the aircraft within the PHARE integrated air/ground strategic ATM environment...

ME34 Web-Based Simulation Modeling

Sponsor: Simulation
Sponsored Session
Chair: Arnold H. Buss, Naval Postgraduate School, OR Dept., Monterey, CA 93943-5118

1) A Comparison of Distributed Architectures for Modeling & Simulation, *Leroy A. Jackson*, US Army DTRADOC Analysis Ctr., Monterey, CA 93943

The design and execution of distributed simulation models has become increasingly important to both the DoD and the commercial sector. We will compare the impact of 3 of the most important architectures: Common Object Request Broker, CORBA; Remote Method Invocation, RMI; and the High Level Architecture, HLA, on distributed simulation modeling.

2) Reusable Simulation Modeling Components, *Kevin J. Healy*, ThreadTec., Inc., PO Box 7, St. Louis, MO 63017, ***Richard A. Kilgore***

We discuss various aspects related to the design and implementation of reusable simulation modeling components using the Java-based Silk simulation language and the JavaBeans software component architecture.

3) Component-Based Distributed Simulation Modeling Using Java, *Arnold H. Buss*, Naval Postgraduate School, OR Dept., Monterey, CA 93943-5118

Traditional object-oriented software design is being supplanted by component-based design. We describe a modular approach to designing discrete-event simulation models using Simkit, a Java-based package. The component approach enables extremely generic simulation models to be constructed...

ME35 Financial Risk Analysis

Sponsor: Financial Services
Sponsored Session
Chair: Amy V. Puelz, SMU, Cox Sch. of Bus., 393 Crow, Dallas, TX 75275, apuelz@mail.cox.smu.edu www.cox.smu.edu/mis.misdept/faculty/puelz/html

1) Use of a Stepwise Approximation for Investor Utility in Portfolio Selection: Comparison of Alternative Stochastic Model Forms, *Amy V. Puelz*, SMU, Cox Sch. of Bus., 393 Crow, Dallas, TX 75275, apuelz@mail.cox.smu.edu www.cox.smu.edu/mis.misdept/faculty/puelz/html

The performance of a model for portfolio selection using stepwise approximation of investor utility is compared to continuous-form utility selection

models and mean-variance efficient set models. Comparisons across asset selection sets, portfolio cash flow requirements and planning horizons are presented and discussed.

2) Forecasting Money Market & CD Deposits via Transfer Function-Distributed Lag Models, ***Boyko Ivanov***, SABRE Research Group, MD 7390, 1 E Kirkwood, Southlake, TX 76092, boyko_ivanov@sabre.com

We discuss a major US bank's approach to forecasting financial product rates based on Bayesian VAR models with leading indicators. Competitive product pricing based on customers' price sensitivity is of primary interest. Empirical results, price elasticity coefficients and long-term forecasts are presented.

ME36 Strategic Planning II

Contributed Session

Chair: Paulo A. Dasilva, Military Institute of Engineering, Praca Gen Tiburcio, 80-DE/9-Urca, Rio De Janeiro, 22290-270, Brazil, paulo@taurus.ime.eb.br http://www.des.ime.eb.br/~paulo

1) Using Lighter Subjective Assessments in Telecommunications Scenarios, ***Bartolomeo Sapio***, Fondazione Ugo Bordoni, Via Baldassarre, Castiglione 59, Rome, 00142, Italy, bsapio@fub.it, ***Isabella Maria Palombini***, ***Roberto Ferraro***

Structural scenarios incorporate quantitative judgements into strategic planning, pointing out the structure of the relations among the variables in an economic system. We build a scenario of the convergence between fixed and mobile telecommunications networks using the original R-WISE method. A special emphasis is placed on the simplification of the experts' task in the assessment of subjective judgments.

2) Impact of Interorganizational Information Systems on Supply Chain Management: A Service Provider's Perspective, ***Man Kit Lai***, The University of Hong Kong, Rm. 824 Haking Wong Bldg., Hong Kong, Hong Kong, laimk@hkusua.hku.hk

We attempt to analyze the supply chain management based on the interorganizational relationships research paradigm. From the service provider's perspective, a framework is presented to analyze the impact of deploying IOIS on the coordination and competitiveness of the participating firms. A case is presented.

3) Globalization: Links to Technology & Business Strategy, ***L. L. Jayaraman***, Montclair State University, Sch. of Bus., Dept. of Mgmt., Upper Montclair, NJ 07043, jayaramanl@mail.montclair.edu

There are 2 areas that are relatively well understood: the role of technology in the pursuit of operational economies and developing overall technology strategy in support of cost leadership or differentiation strategies. Globalization introduces a new order of complexity with opportunities, risks and organizational challenges as they relate to technology and strategy.

4) An Assessment of Awareness & Accountability for Environmental, Health & Safety Performance, ***Karen Chinander***, University of Miami, Dept. of Mgmt., 414 Jenkins Bldg., Coral Gables, FL 33124, kchinander@miami.edu

As environmental regulations and compliance costs increase, attention to environmental concerns influence a firm's level of competitiveness. We assess how firms incorporate EHS objectives into their strategic plans, how these objectives are communicated throughout an organization and how management is held accountable for EHS performance.

5) The Brazilian National Quality Award: Major Influences in the Country, ***Paulo A. Dasilva***, Military Institute of Engineering, Praca Gen Tiburcio, 80-DE/9-Urca, Rio de Janeiro, 22290-270, Brazil, paulo@taurus.ime.eb.br http://www.des.ime.eb.br/~paulo

The Brazilian government launched a National Quality Award, PNQ, for creating an awarness of the importance of adopting quality to enhance the competitiveness in response to the globalization and fiercer competition. We discuss the PNQ influences in such different fields as the federal government and the software industry.

ME37 Marketing IV

Contributed Session

Chair: James J. Cochran, University of Cincinnati, PO Box 210130, Cincinnati, OH 45221-0130, cochrajj@econqa.cba.uc.edu

1) A Comparison of Attribute Partitioning Methods, ***Fred N. Silverman***, Pace University, 1 Martine Ave., White Plains, NY 10606, fns1@pace.edu, ***John C. Carter***

We compare 2 methods for determining a hierarchy of product attributes for frequently purchased products. The first method is based on the information theoretic concept of entropy and utilizes entropy reduction in evolving the hierarchy. The second is hierarchical cluster analysis which produces a dendrogram identifying attribute clusters.

2) Choice in Context: The Effect of Attribute Types, ***Tarja Joro***, Helsinki School of Economics, Dept. of Bus. Admin., PO Box 1210, Helsinki, 00101, Finland, joro@hkkk.fi http://www.hkkk.fi/methods/joro.html, ***Olli Ahtola***

An exploratory experiment on circumstances where the choice of a brand will and will not follow the theory of value maximization. We focus on extremeness aversion. We study the effect that different attribute types, e.g., unipolarity and bipolarity, have on choice.

3) Benchmarking Retail Units: A Technical Approach, ***Nadia Sinigaglia***, Catholic University of Mons, FUCaM, Chaussee de Binche, 151, Mons, 7000, Belgium, sinigagl@message.fucam.ac.be, ***Alain Bultez***

Control naturally follows the planning and implementation of companies' actions. Specifically, we evaluate the potential of efficiency frontier and DEA for benchmarking retail business units. We also attempt to explain observed inefficiencies by customer (in)satisfaction and intensity of competitive rivalry.

4) On Using Markov Chains for List Selection Problems, ***Chaim M. Ehrman***, Loyola University, Marketing Dept., 820 North Michigan Ave., Chicago, IL 60611

5) A Bayesian Predictive Justification of the Dirichlet-Multinomial Exposure Model, ***James J. Cochran***, University of Cincinnati, PO Box 210130, Cincinnati, OH 45221-0130, cochrajj@econqa.cba.uc.edu, ***Martin S. Levy***, ***Jeffrey D. Camm***

Advertising exposure is commonly modeled using the Dirichlet-multinomial distribution. This model has repeatedly been justified on the basis of empirical results. We provide a Bayesian predictive justification for the use of this model and interpret the model from both a Bayesian and empirical Bayesian perspective.

ME38 Information Systems III

Contributed Session

Chair: Shankar Sundaresan, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu

1) New Logistics & Information Channels in Electronic Commerce for Different Products & Services, ***Jukka Heikkila***, Helsinki School of Economics, PO Box 1210, Helsinki, SF 00100, Finland, heikkila@hkkk.fi www.hkkk.fi, ***Jukka K. Kallio***, ***Ari P. Vepsalainen***

Both physical and information flows are analyzed in EC. The analyses show how the channel will be streamlined or how they will be separated depending on the product/services characteristics. Practical examples are analyzed to highlight the benefits and problems related to the emerging structures in EC.

2) An Analysis of Open Outcry vs. Programmed Trading of Commodity Futures, ***Arthur A. Rasher***, University of Tulsa, 600 S College Ave., Tulsa, OK 74104-3189, arasher@utulsa.edu www.cba.utulsa.edu

As commodity exchanges such as the New York Mercantile Exchange and the Commodity Exchange were merged, a debate ensued over whether the combined exchange should follow programmed trading or whether it should hold onto the open outcry of traditionalists. We look at the factors, pro and con, that support both sides and attempt to measure the performance of the market under each.

3) A Real-Option Valuation Model for Sequential Development of Internet Technologies, ***Alvey N. Kelly***, Indiana University, Oper. & Dec. Tech. Dept., 1309 E. 10th St., Bloomington, IN 47405, kalvey@indiana.edu

We develop an option-based model for allowing a firm to incrementally establish an Internet presence, allowing the firm to alter their decisions during the evolution of the medium. Creating a website, allowing for on-line retail sales and determining the level of advertising are the broad set of decisions encountered.

4) A Study of the Effectiveness of Object-Oriented Analysis, ***Barin Nag***, Towson University, Dept. of Mgmt., Towson, MD 21252, bnag@towson.edu, ***Edward Sim***

Object-oriented concepts have formed the base of many new requirements methodologies. We address the issue of effectiveness by an experimental study comparing OOA and structured analysis in producing requirements. The quality of the requirements specification is measured and used to compare the

effectiveness.

5) Managing Information Technology Resources for Electronic Commerce, ***Shankar Sundaresan***, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu

Organizations are deploying Web-based applications for electronic commerce to benefit from the explosive growth of the Internet. We characterize the main approaches used in building such applications and discuss their suitability under various design considerations. Different strategies for managing IT resources for electronic commerce are analyzed.

ME39 Decision Support Systems in Industry & Education II

Contributed Session

Chair: Sergio V. Maturana, Pontificia Universidad Catolica de Chile, Casilla 306, Correo 22, Santiago, Chile, smaturan@ing.puc.cl www.ing.puc.cl/~gescopp.acerca/sergio_maturana/

1) Model-Based Decision Support for the Selection of Interdependent R&D Projects: A Multiperiod Multicriteria Approach, ***Christian Stummer***, University of Vienna, Bruenner Str. 72, Vienna, A-1210, Austria, christian.stummer@univie.ac.at, ***Kurt Heidenberger***

We present a model-based DSS for the interactive selection of an R&D project portfolio that offers the best user-specific compromise between multiple objectives. It takes into consideration several planning periods, uncertainty and varied interactions between an arbitrary number of projects.

2) withdrawn - author request of 9/24, ***Kenneth J. Sims***, Cumberland College, PO Box 456, Williamsburg, KY 40769, kenpc@ukcc.uky.edu, ***Ramakrishnan Pakath***

3) A Relative Assessment of Two Decision Support Systems, ***Mansoor Aminilari***, University of Kentucky, DSIS, Sch. of Mgmt., 425 B&E, Lexington, KY 40506-0034, mdumamin@ukcc.uky.edu, ***Ramakrishnan Pakath***

We describe the experimental platform and preliminary findings in the ex-ante relative assessment of a text-based and an image-based DSS in terms of their impacts on decision accuracies, speeds and information-gathering strategies of human subjects given performance-based monetary rewards in a time-constrained setting.

4) Deployment & Acceptance Issues of Optimization Solutions, ***George Kontoravdis***, PO Box 8507, Austin, TX 78713, condor@acm.org, ***Alexis Takvorian***

Both private- and public-sector organizations have increasingly been seeking optimization solutions for the many complex problems they are facing. An important component of successful optimization projects is the deployment and ultimate acceptance of the proposed solutions. Unfortunately, the component is too often neglected or even ignored, leading to good solutions that are nevet implemented...

5) A Comparative Analysis of the Solutions of a Real Problem Using Robust Optimization vs. Deterministic Optimization, ***Sergio V. Maturana***, Pontificia Universidad Catolica de Chile, Casilla 306, Correo 22, Santiago, Chile, smaturan@ing.puc.cl www.ing.puc.cl/~gescopp.acerca/sergio_maturana/, ***Luis B. Contesse***, ***Victor M. Albornoz***

We present the results of ongoing research on using robust optimization to handle uncertainty. We analyze the properties of the solutions obtained using a robust optimization approach vs. those obtained using a deterministic approach in the case of a real aggregate production planning problem of a Chilean manufacturing firm.

Tuesday 08:15-09:45

TA01 Decision Analysis Arcade

Sponsor: Decision Analysis
Sponsored Session

Chair: Dana R. Clyman, University of Virginia, Darden School, PO Box 6550, Charlottesville, VA 22906-6550, clymand@darden.gbus.virginia.edu

1) Normative Corporate Risk Attitude: The Corporate Contractual System, ***J. Eric Bickel***, Stanford University, EES/OR Dept., Stanford, CA 94305, bickel@stanford.edu

Standard corporate finance theory makes normative claims about corporate preferences, while decision analysts tend to view these preferences as subjective. The corporation is a nexus of contracts and, as such, has no preferences. If we want to understand and quantify "coroprate risk attitude," we must analyze this contractual system.

2) Quality of Probability & Value Forecasts for Projects at Alcoa, ***Sam E. Bodily***, University of Virginia, Darden Grad. Bus. Sch., Box 6550, Charlottesville, VA 22906, bodilys@virginia.edu, ***Paul R. Brugginк***

We study the quality of forecasts for R&D projects evaluated with DA at the Alcoa Technical Center. Forecasts and actuals are compared for the probabilities of technical success, commercial implementation given technical success and the NPV of the project given commercial implementation for projects where the outcome is known.

3) Assessing Technical Feasibility of R&D Projects in Portfolio Management, ***John S. Andersen***, Eli Lilly & Co., Lilly Corporate Ctr., DC 2120, Indianapolis, IN 46285, jsa@lilly.com

Understanding and quantifying the technical feasibility of R&D projects are critical in high risk businesses such as the pharmaceutical industry. However, the collection of relevant information to capture the value of projects on this dimension is not easy. The many hurdles to a quality assessment include team bias, calibration and organizational resistance...

4) Two-Stage Approach in Decision Making Under Uncertainty, ***Michael Kilka***, Universitaet Mannheim, Lehrstuhl fuer, Bankbetriebslehre, L5, 2, Mannheim, 68131, Germany, ***Martin Weber***

Cumulative prospect theory is an important theory to model decision behavior in the case of uncertainty. The decision weighting function reflects the decision maker's attitude towards ambiguity. We will experimentally investigate the 2-stage approach in modeling the decision weighting function.

TA02 Competition & Collusion

Sponsor: Marketing
Sponsored Session

Chair: Paul R. Messinger, University of Alberta, Fac. of Bus., Dept. of Mktg. Rm. 2-32E, Edmonton, Alberta, T6G 2R6, Canada, paul.messinger@ualberta.ca

1) Cheap Talk in Posted-Offer Markets, ***Amy Kallianpur***, University of Pennsylvania, Wharton Sch., Philadelphia, PA 19104, amy@fourps.wharton.upenn.edu, ***Leonard M. Lodish***

We examine whether cheap talk fosters collusive pricing in posted-offer environments. Since the theory is equivocal on whether cheap talk leads to higher prices or disintegrates into a "babbling" equilibrium, we design a posted-offer experiment and study whether non-binding price signals encourage collusive pricing.

2) An Analysis of Inter- & Intra- Format Switching by Supermarket Shoppers, ***Catarina Sismeiro***, ***David R. Bell***, ***Randolph E. Bucklin***, ***Giuseppe A. Galata***

We present a new approach to understanding supermarket competition in markets with EDLP and HILO price formats. We investigate differences in store switching behavior for households shopping primarily among EDLP stores, among HILO stores and among all the stores. Our models are estimated using market basket data provided by IRI.

3) Managing Fringe Entry: Dynamic Pricing & Advertising, ***Paul R. Messinger***, University of Alberta, Fac. of Bus., Dept. of Mktg. Rm. 2-32E, Edmonton, Alberta, T6G 2R6, Canada, paul.messinger@ualberta.ca, ***Gila E. Fruchter***

We consider a dominant company facing entry of smaller competitors and describe optimum pricing and advertising, numerically and qualitatively. The model characterizes skimming vs. penetration pricing, advertising that influences category vs. selective demand and the product life-cycle. We apply our approach to data for AT&T in the US telecommunications market.

4) withdrawn - chair message of 9/9, ***Jagmohan S. Raju***, University of Pennsylvania, The Wharton Sch., Philadelphia, PA 19104, rajuj@wharton.upenn.edu, ***John Walsh***

TA03 Undergraduate OR/MS Project Showcase

Sponsor: Education
Sponsored Session

Chair: James K. Lowe, USAF Academy, 2354 Fairchild Dr., Ste. 6H79F, Academy, CO 80840, lowejk.dfm@usafa.af.mil

1) Undergraduate OR/MS Project Showcase, ***James K. Lowe***, USAF Academy, 2354 Fairchild Dr., Ste. 6H79F, Academy, CO

80840, lowejk.dfm@usafa.af.mil

Several Western undergraduate programs have been invited to select their top OR/MS Projects of the past year. Students will present and discuss their projects during this showcase event. While demonstrating innovative undergraduate course ideas, this event highlights and congratulates excellent work of undergraduates and motivates their continued INFORMS involvement.

TA04 Panel: OR in 2048

Sponsor: INFORMS Computing Society
Sponsored Session

Chair: Peter Horner, OR/MS Today, 2555 Cumberland Parkway, Ste. 299, Atlanta, GA 30339, horner@lionhrtpub.com

1) Panel: OR in 2048, ***Peter Horner***, OR/MS Today, 2555 Cumberland Parkway, Ste. 299, Atlanta, GA 30339, horner@lionhrtpub.com

Where will OR be in 50 years? A dozen members of INFORMS make their predictions.

TA05 Models & Analysis of Production Agility

Sponsor: MSOM
Sponsored Session

Chair: Mark P. Van Oyen, Northwestern University, 2225 N Campus Dr., Dept. of IE/MS, Evanston, IL 60208-3119, vanoyen@iems.nwu.edu http://primal.iems.nwu.edu/~vanoyen

Co-Chair: Wallace J. Hopp, Northwestern University, Ie/Ms Dept., 2225 N Campus Dr., Evanston, IL 60208, hopp@iems.nwu.edu

1) Estimating & Modeling Information-Dependent Behavior in Worksharing Systems, ***Kenneth L. Schultz***, Cornell University, Johnson Sch. of Mgmt., Ithaca, NY 14853-4201, ks28@cornell.edu, ***John O. McClain, L. Joseph Thomas***

Previous research considered design of "worksharing" production lines. Here, we examine how workers change speed when they have different levels of information about relative workload. Learning and forgetting are studied to estimate possible loss from task variation. Experimental results are compared with predictions from simulation models and the implicatons are discussed.

2) Modeling Worker Flexibility in Serial Production Lines, ***Stephen G. Powell***, Dartmouth College, Tuck School of Bus., Hanover, NH 03755, sgp@dartmouth.edu, ***Kenneth L. Schultz***

Recent experimental evidence suggests that in some production lines, human processing times may be sensitive to current WIP levels in nearby buffers. We explore the implications of this behavior on the performance of serial lines. First, we develop a flexible model for human processing times that is sensitive to WIP levels, then study how this form of flexibility affects line performance.

3) Flexible Work Allocation in Hybrid Make-to-Stock/Make-to-Order Systems, ***Diwakar Gupta***, McMaster University, DeGroote Sch. of Bus., Production & MS, Hamilton, Ontario, L8S 4M4, Canada, guptad@mcmaster.ca, ***Saifallah Benjaafar***

We consider a multi-product system consisting of make-to-stock and make-to-order stages. In the first stage, products are undifferentiated and produced to fill a common inventory buffer. In the second, products are differentiated through additional processing to meet actual orders for specific products. We identify optimal work and capacity allocation among the 2 stages.

4) Analysis of Flowline Worksharing Systems, ***Esma G. Senturk***, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, esma@iems.nwu.edu, ***Wallace J. Hopp, Mark P. Van Oyen***

We develop new stochastic models and analyze them to obtain insights into questions such as: When is it advantageous to cross-train workers? What policy should a cross-trained worker follow? We explore key characteristics of serial production systems with a task that can be performed by more than one worker.

TA06 Process & Product Design Concepts for Quality Improvement

Cluster: Statistics/Quality Control
Invited Session

Chair: Dariusz J. Ceglarek, University of Michigan, Dept. of ME & Applied Mech., 1031 Dow Bldg. 2300 Hayward St, Ann Arbor, MI 48109-2136, darek@engin.umich.edu

1) Objective Functions for Design Decision Making & Quality, ***George A. Hazelrigg***, National Science Foundation, 4201 Wilson Blvd., ENG/DMII, Rm. 550, Arlington, VA 22230, ghazelri@nsf.gov http://www.eng.nsf.gov/dmii/die.htm

Design, optimization and quality concepts all require objective functions for ranking alternatives. From economics and decision theory, well-developed mathematics of objective functions have emerged. We review necessary conditions for the existence of an objective function and the consequences of those conditions on concepts such as quality.

2) Model-Based Quality Improvement Methodologies in Automotive Body Assembly, ***Dariusz J. Ceglarek***, University of Michigan, Dept. of ME & Applied Mech., 1031 Dow Bldg. 2300 Hayward St, Ann Arbor, MI 48109-2136, darek@engin.umich.edu

We highlight the effectiveness of integrating modeling of product and tooling processes with analysis of multivariate dimensional data for quality improvement. This approach enables the quick detection and localization of faults based on in-line dimensional measurements of assemblies. Fundamental concepts and industrial implementations will be highlighted.

3) Managing Sensitivity of Design to Enhance Quality in Product & Process, ***Hilario L. Oh***, Silicon Valley Group Inc., 77 Danbury Rd., Wilton, CT 06897, ohlWsvg.com

Variation is the root cause of poor quality in product and process. To reduce the effect of variation, the wisdom is not to control the source of variation but to make product and process insensitive to it. We demonstrate how managing sensitivity of a design can reduce the effect of variation, thus enhancing quality in product and process.

4) Designing for Quality in Mechanical Systems, ***Alan K. Jones***, The Boeing Company, PO Box 3707, MS 7L-21, Seattle, WA 98124-2207, alan.k.jones@boeing.com

Producing a quality product at a competitive price requires consideration of the entire process, from product design through fabrication, assembly and inspection. Changes at any stage can have consequences for every other. We illustrate this principle with examples from the aerospace industry and describe some relevant research programs.

TA07 Using Bayesian Statistics on Quality Problems

Cluster: Global Parnership, Information Systems & Quality
Invited Session

Chair: R. W. Andrews, University of Michigan Business School, 3200 Bus. Admin., 701 Tappan, Ann Arbor, MI 48109-1234, aandrews@umich.edu

1) Modeling Error Variances in Experimental Design, ***Pete Lenk***, University of Michigan Business School, Ann Arbor, MI 48109-1345, plenk@umich.edu

We propose a Bayesian method of analyzing the effects of experimental factors on the variance of a quality measurement. Unlike 2-stage methods that first estimate treatment variances, Bayesian inference accounts for the uncertainty in the variance estimates, resulting in more accurate estimates of the experimental effects.

2) Gradient Estimates in Bayesian Quality Control, ***Shreevardhan Lele***, University of Maryland, Maryland Bus. Sch., College Park, MD 20742, slele@mbs.umd.edu, ***Michael C. Fu***

The design of a Bayesian procedure for monitoring quality is shown to require the use of Monte Carlo simulation, and in particular, of gradient estimates from simulation output. Using perturbation analysis, we derive unbiased gradient estimators that are more efficient than those obtained using the likelihood ratio or finite difference methods.

3) Measurement Dependence Before & After Assembly, ***Karl D. Majeske***, University of Michigan Business School, 1205 Beal Ave., Ann Arbor, MI 48109-2117, karl_majeske@umich.edu, ***R. W. Andrews***

We investigate dependence between measurements of the same part with the same gage taken before and after assembly and show how this dependence is a function of the process variation and the measurement variation. For simple assemblies, such as attaching 2 stamped parts together, we present validated models that predict the fit better than single measurements.

TA08 Software Development for Stochastic Modeling

Sponsor: Applied Probability Section
Sponsored Session

Chair: Donald Gross, George Mason University, Dept. of ORE, Sch. of IT & Eng., Fairfax, VA 22030-4444

Co-Chair: Carl M. Harris, George Mason University, Dept. of Ore, Sch. of It & Eng., Fairfax, VA 22030-4444, charris@gmu.edu
http://www.mason.gmu.edu/~charris

1) Software Packages for Bulk Queueing Systems, ***M.L. Chaudhry***, Royal Military College of Canada, Dept. of Math. & CS, PO Box 17000 STN Forces, Kingston, Ontario, K7K 7B4, Canada, chaudhry@mail.rmc.ca

We discuss the methods used in developing various queueing packages that are currently being used by several people and show what information you can get from these packages. In addition, a hands-on demonstration will be given to those interested in trying these packages.

2) A Teaching Suite for Continuous-Time Stochastic Processes, ***Edward P.C. Kao***, University of Houston, Dept. of DIS, Houston, TX 77204-6282, ekao@uh.edu

We describe the development of a teaching suite for modeling, visualization and analysis of continuous-time stochastic processes. The suite provides an effective platform for introducing students to Brownian motion and Ito's processes with applications to financial economics.

3) The Curse of Dimensionality in Heterogeneous Multiserver Queues & How to Overcome Them, ***Winfried K. Grassmann***, University of Saskatchewan, Dept. of Comp. Sci., 57 Campus Dr., Saskatoon, SK, S7N 5A9, Canada, grassman@cs.usask.ca

A program for finding equilibrium probabilities for heterogeneous multiserver queues is discussed. The computational effort for finding these increases exponentially with number of servers, and becomes impractical for systems over 12 servers. However, in many cases, the curse of dimensionality can be overcome by exploiting special features of the problem.

4) Queueing Spreadsheet Software, ***Carl M. Harris***, George Mason University, Dept. of ORE, Sch. of IT & Eng., Fairfax, VA 22030-4444charris@gmu.eduhttp://www.mason.gmu.edu/~charris, ***Donald Gross***

This package is the culmination of an effort to develop easy-to-use queueing software. We had previously developed a set of routines built up from the TK-Solver mathematical tool kit and have now extended this to be fully spreadsheet-based, Excel or QuattroPro, and web-accessible.

TA09 When & How to Use Auctions

Cluster: Competitive Bidding
Invited Session
Chair: Ronald M. Harstad, Rutgers University, RUTCOR & FOM, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, harstad@rutcor.rutgers.edu

1) Auctions vs. Negotiations: Harness Competition or Tailor Exchange?, ***Ronald M. Harstad***, Rutgers University, RUTCOR & FOM, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, harstad@rutcor.rutgers.edu

A buyer procures, by auction or negotiations, a variety of commodity or service; which variety matters. Each potential seller's costs, and his lowest-cost variety, is his private information. An auction lowers price to the second-lowest willingness-to-accept but specifies variety ex ante. Negotiations reduce bargaining power but tailor variety.

2) The Competitive Effects of Concentration & Mergers in Auction Markets, ***Keith Waehrer***, US Bureau of Labor Statistics, 2 Massachusetts Ave. NE, Rm. 3105, Washington, DC 20212, waehrer_k@bis.gov, ***Martin K. Perry***

A buyer solicits bids from sellers with different cost distributions and, hence, different market shares. In open auctions, more inequality in market share makes the buyer worse off and results in a lower optimal reserve price; thus, increased market inefficiency. We use these results to analyze the effects of mergers.

3) The Impact of Discrete Bidding on Sellers' Strategies in Open English Auctions: Reserves & Covert Shilling, ***Atanu R. Sinha***, UCLA, The Anderson Sch., 110 Westwood Plaza, Los Angeles, CA 90095-1481, atsinha@agsm.ucla.edu, ***Eric Greenleaf***

We examine how discrete interval bidding affects sellers' strategies for identifying the lowest acceptable bid. This rule changes the optimal reserve price set before the auction and makes it depend on the number of bidders. It also enables sellers to profit from shilling, where they covertly raise genuine bids.

TA10 Network Design Problems Arising in Telecommunications II

Sponsor: Telecommunications
Sponsored Session
Chair: Luis Gouveia, University of Lisbon, DEIO-CIO Fac. of Sci., Bloco C/2-Campo Grande, Lisbon, 1700, Portugal, lgouveia@fc.ul.pt

1) withdrawn - author request of 9/22, ***Geir Dahl***, University of Oslo, Dept. of Info., PO Box 080, Blindern, Oslo, 0316, Norway, geird@ifi.uio.no, ***Martine Labbe***

2) A Column-Generation Approach to the Traveling Salesman Problem & its Extension in Telecommunication Network Design, ***Dong Shaw***, Purdue University, Sch. of IE, West Lafayette, IN 47907, ***Hsuliang Chang***

We present a method of obtaining a lower-bound of the TSP through column generation. A new column generation scheme based on the primal-dual simplex method (instead of the primal simplex) is developed. Our bounding technique is integrated into a B&B framework to find the optimal solution of the TSP.

3) Bounds for a Steiner Ring Network Design Problem with Revenue Costs, ***Luis Gouveia***, University of Lisbon, DEIO-CIO Fac. of Sci., Bloco C/2-Campo Grande, Lisbon, 1700, Portugal, lgouveia@fc.ul.pt, ***Jose Pires***

We present lower bounds for a ring network design problem which maximizes revenue profits between each pair of nodes minus link costs. For a similar problem, Gendreau, Labbe & Laporte (1995) have presented a formulation with a quadratic term in the objective function. We follow the ideas given in Gouveia & Pires (1997) and use a formulation with a linear objective function...

TA11 Applications in Technology Management

Cluster: Applications in Technology Management
Invited Session
Chair: Elena Katok, Colorado School of Mines, Div. of Econ. & Bus., Golden, CO 80401-1887, ekatok@mines.edu

1) Technology Planning in Aviation Information, ***William Tarantino***, Colorado School of Mines, Div. of Economics & Business, Golden, CO 80401-1887, wtaran@aol.com, ***Elena Katok***

A strategic plan that addresses Jeppesen's production process determines the best mix of technologies and an investment schedule under an uncertain demand and technological performance uncertainties. We identify and analyze alternatives with a stochastic optimization model to determine the value of flexibility under this uncertainty.

2) Production Planning with Implicit Treatment of External Setups, ***Elena Katok***, Colorado School of Mines, Div. of Econ. & Bus., Golden, CO 80401-1887, ekatok@mines.edu, ***William Tarantino***

We use a hierarchical approach to develop an intelligent production planning DSS for Jeppesen Sanderson, Inc., a major provider of aviation information technology. The system uses an optimization module to schedule production phases in a way that maximizes customer service while decreasing overtime.

3) Production Planning & Lot Sizing with Seasonal Demand, ***Dennis Ott***, Coors Brewing Company, Golden, CO 80401, ***Elena Katok***

Typically, a brewery needs to build up anticipation inventory prior to the peak summer months. Beer production is a complex process combining brewing, container production and feeling. We develop a production-planning model for manufacturing aluminum cans that simultaneously meets existing demand and determines the proper inventory level.

4) How to Have a Successful OR Program (In Terms of Crass Monetary Measures), ***Robert E. D. Woolsey***, Colorado School of Mines, Div. of Economics & Business, Golden, CO 80401, rwoolsey@mines.edu

We discuss the program that generated accomplishments in OR practice - the most successful and relentlessly applied OR program in the world. Letters verifying savings of over $185,545,000 are presented. The presentation will be made with the wit and humor expected of the speaker.

TA12 Multicriteria Decision Making Involving Risk & Uncertainty

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session

Chair: Margaret F. Shipley, University of Houston, 1 Main St., Houston, TX 77002, shipley@dt.uh.edu

1) Application of a Fuzzy Database to Address Team Member Diversity, ***Margaret F. Shipley***, University of Houston, 1 Main St., Houston, TX 77002, shipley@dt.uh.edu, ***Andre de Korvin***, ***Forrest F. Aven***

Fuzzy logic is used to evaluate a database of teams in which member commitment and group decision making style were considered instrumental to the success or failure of a project. Composition of the teams with respect to race, ethnicity, gender and age of members is analyzed for the purposes of structuring effective team composition while addressing diversity issues.

2) Issues in Corporate Technology Transfer: A Cross-Cultural Perspective, ***Michael K. Badawy***, Virginia Tech., Pamplin College of Bus., 7054 Haycock Rd., Falls Church, VA 22043, mbadawy@vt.edu

We explore some research and practical issues relating to technology transfer and new product development in technology-based companies. Taking a cross-cultural perspective, implications for scholars and managers will be discussed.

3) Analysis of Risk & Uncertainty in New Product Development Projects, ***John E. Hebert***, University of Akron, Dept. of Mgmt., Coll. of Bus. Admin., Akron, OH 44325-4801, jhebert@uakron.edu, ***Richard Deckro***, ***Jack M. Kloeber, Jr.***

We utilize simulation to investigate aspects of risk and uncertainty involving the selection and conduct of new product development projects. Project selection, scheduling and funding decisions are based on estimates of introduction cycles and market conditions in an attempt to maximize profit.

TA13 Computational Intelligence in OR & MS

Cluster: Soft Computing
Invited Session

Chair: Augustine O. Esogbue, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, augustine.esogbue@isye.gatech.edu

Co-Chair: Pamela McCauley Bell, Mit, Dept. Aeronautics/Astronautics, Cambridge, MA 02139-4307, prmccaul@mit.edu

1) Modeling & Optimization of Real World Systems via Fuzzy Dynamic Programming, ***Augustine O. Esogbue***, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, augustine.esogbue@isye.gatech.edu

Many real world systems are typically of a large-scale systems nature. Additionally, they are characterized by various forms of uncertainty. We present the theory of fuzzy dynamic programming and its computational aspects which are introduced as more appropriate than its classic analog for modeling and optimization of such systems...

2) Intelligent Agent Characterization Using Fuzzy Set Theory: A Proposed Approach to Support Early Supplier Integration, ***Pamela McCauley Bell***, MIT, Dept. Aeronautics/Astronautics, Cambridge, MA 02139-4307, prmccaul@mit.edu

We propose the development of fuzzy set theory-based intelligent agents to support interaction and security in ISs. The hypothetical example described promotes early supplier integration into the product development phase through the use of electronic communication and management of the interactions using intelligent agents.

3) Agents Granularity with Job-Shop Scheduling Problems, ***Jean-Philippe Vacher***, PSI-LIRINSA, Insa de Rouen, Place Emile Blondel, Mont-Saint-Aignam, France, jean-philippe.vacher@insa-rouen.fr, ***Thierry Galinho***

During the optimization of job-shop scheduling problems, agents with different granularities appear by crossovers and mutations. Consequently, new tendencies and behaviors are present in the multi-agent system. These take advantage of micro and/or macro heuristics obtained by genetic evolution. Then, new agents can contribute to work more efficiently on schedulings.

4) Object-Oriented Design in Intelligent Control for Manufacturing, ***Boris Kovalerchuk***, Central Washington University, Dept. of Comp. Sci., Ellensburg, WA 98926-7520, borisk@tahoma.cwu.edu, ***Natalie Kovalerchuk***

We developed a methodology and prototypes of reusable C++ classes for intelligent control tasks related to fuzzy control. This is based on object-oriented design and relations between fuzzy control and classic interpolation suggested by previous research. The effectiveness of the approach is illustrated using a problem that occurs in manufacturing.

5) Resource Allocation Leveling in Project Scheduling: Is There a Possible Contribution from a Fuzzy Set Point of View?, ***Ines Bloemen***, University of Antwerp, Dept. of Applied Econ., Prinsstrat 13, Antwerpe, B-2000, Belgium, fte.bloemen.i@alpha.ufsia.ac.be, ***Nico J. Vandaele***, ***Arie Weeren***

We discuss the resource allocation leveling problem by modeling the resource allocation level issue in the objective function instead of using resource constraints. Fuzzy set theory enables us to introduce a fuzzy resource allocation leveling factor which provides crucial information for the decision maker.

TA14 Logistics IV

Contributed Session

Chair: Savas Ozatalay, Widener University, 1 University Place, Chester, PA 19013, savas.ozatalay@widener.edu

1) A Strategic Implementation of Supplier Selection: US & Asia, ***Daewoo Park***, Xavier University, Dept. of Mgmt., CBA, 3800 Victory Pkwy., Cincinnati, OH 45207, park@xavier.xu.edu

Extending the findings of previous studies on global strategic supply chain management, we examine the cross-cultural differences between US and Asian companies regarding the issue of supplier selection. Findings indicate several major differences between US and Asian management as well as implications for successful global strategic supply chain management.

2) Delivery in EC of Groceries: Efficiency & Customer Preferences, ***Jukka K. Kallio***, Helsinki School of Economics, PO Box 1210, SF-00100 Helsinki, Finland, jkallio@hkkk.fi www.hkkk.fi, ***Timo O. Saarinen***, ***Ari P. Vepsalainen***

Different delivery strategies for electronic grocery shopping are analyzed. The critical attributes of each strategy are explored and related to the needs of different customer groups. Representative Finish experiments are described and evaluated with some practical conclusions.

3) The Impact of Information Systems Technology on Operations Management, ***Larry LeBlanc***, Vanderbilt University, Owen Grad. Sch. of Mgmt., Nashville, TN 37203

I cite successful applications of IT to improve operations management, including ERP, international supply chain managememt, quality improvements, etc. The importance of paperwork reduction is obvious - there are 1-million-page aircraft manuals and 25-ton ship manuals, and a 747's documentation is so extensive that it won't fit inside the plane!

4) Rough-Cut Demand Management, ***Savas Ozatalay***, Widener University, 1 University Place, Chester, PA 19013, savas.ozatalay@widener.edu

Most of the supply chain management activities in manufacturing are centered on the supply side. A lot of the time, this causes inefficient utilization of manufacturing assets. We present a rough-cut dmand management process which aims at classifying customers into categories according to their contribution to the shareholders' value.

TA15 Complementarity Problems: Applications, Modeling & Solution

Tutorial Session

Chair: Richard W. Cottle, Stanford University, Dept. of EES&OR, Stanford, CA 94305-4022, cottle@soe.stanford.edu

1) Tutorial: Complementarity Problems - Applications, Modeling & Solution, ***Michael C. Ferris***, University of Wisconsin, Comp. Sci. Dept., 1210 W Dayton St., Madison, WI 53706, ferris@cs.wisc.edu

Complementarity problems arise naturally in many engineering, economic and financial applications. Some interesting examples include carbon taxation policies, tolling procedures in a congested traffic network, option pricing and predicting structure failure. We will describe the mixed complementarity format and give simple examples of how such applications fit into this format...

TA16 Fleet Operations Under Uncertainty & Irregularity

Sponsor: Transportation Science
Sponsored Session

Chair: Amelia Regan, University of California, Dept. of Civil & Environ. Eng., Engineering Gateway E4151, Irvine, CA 92697, aregan@uci.edu
http://www.its.uci.edu/~aregan/

1) Design & Operation of Robust Commercial Airline Networks,

Alan L. Erera, University of California, Dept. of IE/OR, 4135 Etcheverry Hall, Berkeley, CA 94720, alerera@ieor.berkeley.edu, *Carlos F. Daganzo*

Passenger and freight airlines currently design routes and schedules for "normal" conditions. When unexpected events such as equipment and crew failures or adverse weather disrupt normal operations, excessive costs result. The design and operation of systems more robust to unexpected events and lead to lower recovery costs are discussed.

2) Balancing User Preferences for Aircraft Schedule Recovery During Airline Irregular Operations, ***Benjamin G. Thengvall***, University of Texas, Grad. Program in OR, Dept. of Mech. Eng., Austin, TX 78712-1063, benji@mail.utexas.edu, ***Gang Yu, Jonathan F. Bard***

A network model with side constraints is presented to resolve the irregular operations problem with the goal of minimizing deviations from the original flight schedule. Testing indicates that optimal solutions are routinely obtained from the LP relaxation. When integrality is not achieved, a rounding heuristic is used to find feasible solutions.

3) Fleet Operator Perceptions of Network Conditions & Variability: Implications for Operational & Planning Model Development, ***Amelia Regan***, University of California, Dept. of Civil & Environ. Eng., Engineering Gateway E4151, Irvine, CA 92697, aregan@uci.edu http://www.its.uci.edu/~aregan/, ***Thomas F. Golob, Sreeram Jagannathan***

Results of an extensive survey of the managers of over 1,000 private and for-hire trucking fleets are presented. Impacts of congestion and uncertainty are discussed. Implications for the development of operational and planning models for both surface and intermodal (surface/rail, surface/air and surface/maritime) freight transportation management are examined.

TA17 Logistics Planning & Execution

Sponsor: Logistics
Sponsored Session
Chair: Jack Levis, United Parcel Serive, OR & IE, 2311 York Rd., Timonium, MD 21093, jxl@ismd.ups.com

1) IT & OR Solutions in Logistics Planning & Execution, ***Mohan Sodhi***, Anderson Consulting, 161 N. Clark, Chicago, IL 60601, mohansodhi@aol.com

Logistics solution using OR and IT have changed dramatically in recent years due to increasing competition, greater awareness of OR and proliferation of IT solutions, particularly those based on the Internet. We sample solutions used in planning using OR models and execution using monitoring tools. The focus will be on off-the-shelf solutions rather than custom solutions...

TA18 Health Applications in Taiwan

Sponsor: Health Applications
Sponsored Session
Chair: Ray-E Chang, National Taiwan University, 19 Su-Chow Rd., Ste. 306, Taipei, Taiwan, ROC, rchang@ccms.ntu.edu.tw

1) Modeling Operating Theater Operations Using Advanced Computer Simulation System, ***Syi Su***, National Taiwan University, No. 1 Jen-Ai Rd., 1st Sec Ste. 1512, Taipei, Taiwan, ROC, susyi@hsoa.mc.ntu.edu.tw, ***Nien-Tzu Chang***

This research is aimed to reengineer the operation flowchart of the operating room in the university's teaching hospital. MedModel simulation was utilized to assess the optimal schedule pattern, operating room utilization rate and medical personnel occupancy rate. The model was expected to bring MS methodology to hospital administration decision making.

2) The Use of GSS to Establish Hospital Performance Evaluation Index, ***Hsin-Ginn Hwang***, National Chung Cheng University, Dept. of IM, Coll. of Mgmt., Chia-Yi, Taiwan, ROC, mishgh@ccunix.ccu.edu.tw, ***I-Chiu Chang, Ya-Li Wang***

Many empirical studies have been conducted to demonstrate the effects of GSSs on meetings. However, most of these studies were conducted in vitro; therefore, the validity of such is not certain. The purpose of this study is to use GSS in establishing a set of indices to evaluate hospital performance by experts in situ.

3) Hospital Technical Efficiency & External Environment, ***I-Chiu Chang***, Chung Hwa University, No. 21, ALY 56 Ln. 780, Si-Da RD, Hsin-Chu City Taiwan, ROC, puff@chu.edu.tw, ***Chi-Long Liu, Shin-Jung Shiao***

The performance of a hospital is influenced both by its internal managerial system and external conditions which could not be controlled by management. This study intends to evaluate technical efficiency for teaching hospitals given their external environment. A constrained game theoretic approach is employed to achieve this goal.

4) Defining Hospital Service Areas Through a Modified Hierarchical Cluster Analysis, ***Ray-E Chang***, National Taiwan University, 19 Su-Chow Rd., Ste. 306, Taipei, Taiwan, ROC, rchang@ccms.ntu.edu.tw, ***Wei-Her Hong, Tong L. Chiang***

Hospital service areas have been discussed and defined in substantial literature. However, few related work has been done in Taiwan. We identify hospital service areas for entire Taiwan. A modified hierarchical cluster analysis is applied and service areas are expresssed in a hierarchical relationship.

TA19 Augmenting Concepts for Strategic Decisions

Cluster: Partnering Value Methodology, Theory of Constraints & DA
Invited Session
Chair: James McCuish

, jdmccuish@amoco.com

1) Augmenting Decision Analysis with Value Engineering Concepts, ***James McCuish***, Amoco, jdmccuish@amoco.com

We address the utilization of VE concepts to augment the decision analyses process and develop actionable plans and resources assignment to arrive at the decision analyses output.

2) Role of Alignment & R&D Portfolio Management in Project Selection, ***Robert W. Lawler***, The Boeing Co., PO Box 3707, MS 67-KC, Seattle, WA 98124

In firms that produce complex products using complex processes, it is often difficult to select a set of R&D projects that produce the greatest value for the firm. We discuss project selection issues that alignment and portfolio management help resolve.

3) A Catalyst for Change: Value Engineering at Pratt & Whitney, ***Steven Holland***, Pratt & Whitney, 400 Main St., MS 162-25, East Hartford, CT 06108, hollanst@pweh.com

VE can act as the catalyst for 2 current initiatives: integrated product development and ISO 9000. We describe steps taken at Pratt & Whitney to improve team communication and product cost through the use of VE methodology within the structure of these initiatives.

TA20 Data Association for Multitarget Tracking II

Sponsor: Military Applications
Sponsored Session
Chair: Subjankar Banerjee, The Boeing Company, PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, subhankar.banerjee@boeing.com

1) Multidimensional Assignment Problems Arising in Surveillance, ***Aubrey B. Poore***, Colorado State University, Dept. of Math., Ft. Collins, CO 80523, poore@math.colostate.edu, ***Alexander J. Robertson, III, Peter J. Shea***

Multidimensional assignment problems that form the central problem of data association in surveillance will be developed. An objective is to present those features that must be exploited in the development of fast algorithms.

2) TEAM: A Code for Fast Multidimensional Assignment, ***Richard H. Burkhart***, Boeing Information & Support Services, PO Box 3707, MS 7L-121, Seattle, WA 98124-2207, richard.h.burkhart@boeing.com

We describe our new "team assignment" algorithm for solving multidimensional assignment problems (multiscan tracking), subject to a CPU time constraint. We first apply a fast auction-type bidding procedure to get good, often optimal, solutions. The resulting profits may be used in a B&B code to guarantee optimality.

3) Suboptimal Solution Approaches for the Multidimensional Assignment Problem, ***Alexander J. Robertson, III***, Logicon Geodynamics, 6304 Spine Rd., Boulder, CO 80301, alexander.robertson@lmco.com

The data association problem for multisensor multitarget tracking can be formulated as a MAP. In a tracking framework, these assignment problems are large, sparse, asymmetric and noisy. We will examine several methods to construct suboptimal solutions for these problems. Comparisons focus on both execution time and solution quality.

4) Parallel Computing for Data Association in Multitarget Multiscan Tracking, ***Subjankar Banerjee***, The Boeing Company, PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, subhankar.banerjee@boeing.com, ***Joseph W. Manke***

Data association in multitarget multiscan tracking can be formulated as a MAP. However, MAP solution algorithms are computationally intensive. We will discuss opportunities for using parallel computing methods and technologies in the development of high performance MAP solvers. Computational results will be presented.

TA22 The OCAT Approach: A Novel Data Mining Approach for Large Databases (formerly Natural Resources Mgmt. VII)

Contributed Session

Chair: Evangelos Triantaphyllou, Louisiana State University, Dept. of I&MSE, 3128 CEBA Bldg., Baton Rouge, LA 70803-6409, ietrian@lsuvm.sncc.lsu.edu http://www.imse.lsu.edu/vangelis

1) The One Clause at a Time Approach for Data Mining, ***Evangelos Triantaphyllou***, Louisiana State University, Dept. of I&MSE, 3128 CEBA Bldg., Baton Rouge, LA 70803-6409, ietrian@lsuvm.sncc.lsu.edu http://www.imse.lsu.edu/vangelis, ***T. I. Torvik***, ***R. Estrella***

The OCAT approach is a robust data mining approach whose main advantage is that it infers an accurate and compact set of decision rules from sampled observations; thus, can be appealing for practical applications. We discuss its theoretical foundations and provide empirical results when compared with linear discriminant systems, logistic regression and neural networks...

2) Optimal & Semi-Optimal Strategies for Inferring Monotone Boolean Functions with Membership Inquiries, ***T. I. Torvik***, Louisiana State University, Dept. of IMSE, 3128 CEBA Bldg., Baton Rouge, LA 70803-6409, ***Evangelos Triantaphyllou***

Monotonicity is a frequently occurring property in many real-life problems. Further, even non-monotone problems cam be converted into a sequence of monotone problems. We present the development of an optimal strategy, on the number of inquiries, for inferring a monotone Boolean function. Empirical results and extensions are presented.

3) Some Data Mining Applications in Bioinformatics, ***R. Estrella***, Louisiana State University, Dept. of IMSE, 3128 CEBA Bldg., Baton Rouge, LA 70803-6409, ***Evangelos Triantaphyllou***

Computational biology is an area of increasing interest for data mining. We discuss interesting problems in predicting protein structures by using the OCAT approach. We will present empirical results and highlight computational issues unique to these problems which can be of great interest to data mining researchers.

TA25 Scheduling Applications

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session

Chair: Marjan van den Akker, National Aerospace Lab., Informatics Div., PO Box 90502, Amsterdam, 1006 BM, The Netherlands, vdakker@nlr.nl

1) Scheduling Refueling & Maintenance Shutdowns of Nuclear Power Plants, ***Hamish Waterer***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, ***C. Beaucousin***, ***Ellis L. Johnson***, ***Martin Savelsbergh***

No abstract supplied.

2) A Column Generation, Cut & Bounding Approach to the Bandwidth Packing Problem, ***Christine Villa***, BRTRC, 8260 Willow Oaks Corp. Dr., Ste. 800, Fairfax, VA 22031, cvilla@gmu.edu, ***Karla Hoffman***

We are taking a column-bound-cut approach to optically solve the bandwidth packing problem arising from telecommunication networks. The LP relaxation of an IP formulation is solved using column generation, an LP-based heuristic and strong cutting planes.

3) An LP-Based Algorithm for the Aircraft Slot Allocation Problem, ***Marjan van den Akker***, National Aerospace Lab., Informatics Div., PO Box 90502, Amsterdam, 1006 BM, The Netherlands, vdakker@nlr.nl, ***Karl Nachtigall***

A slot allocation policy assigns a time slot for departure to each of a number of flights departing from different airports in order to avoid overload in control sectors and on runways. We present a solution method based on integer LP and heuristics.

TA26 Matrix Problems & Applications

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session

Chair: Jon Lee, University of Kentucky, Dept. of Math., Patterson Office Tower, Lexington, KY 40506-0027, jlee@ms.uky.edu

1) Randomized Algorithms for Matrix Approximations, ***R. Kannan***, Yale University, Dept. Comp. Sci., New Haven, CT 06520, kannan@cs.yale.edu, ***Alan Frieze***

We present algorithms which, by randomly choosing a small submatrix of a given matrix, are able to find singular values and vectors of the whole matrix approximately.

2) Maximum-Entropy Remote Sampling, ***J. Williams***, University of Kentucky, Patterson Office Tower, Dept. of Math., Lexington, KY 40506-0027, jdw@ms.uky.edu, ***Kurt M. Anstreicher***, ***M. Fampa***, ***Jon Lee***

We extend the methodology for maximum-entropy sampling problems to the situation in which we seek to maximize the information contained in a target set of Gaussian random variables that cannot be directly observed. We use spectral bounds and continuous nonlinear relaxations in a B&B framework.

3) Efficient Storage & Retrieval of Large Matrices with Interdependencies, ***Endre Boros***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854, boros@rutcor.rutgers.edu, ***Peter L. Hammer***, ***Federica Ricca***, ***Bruno Simeone***

We consider the combinatorial problem of finding the best and smallest generator set in a ternary Hamming space, arising from the practical problem of organizing large origin-destination matrices used in traffic models.

TA27 Search Algorithms

Cluster: Nonlinear Programming
Sponsor: Optimization
Sponsored Session

Chair: C. T. Kelley, North Carolina State University, Dept. of Math., Box 8205, Raleigh, NC 27695-8205, tim_kelley@ncsu.edu

1) Recent Progress in Pattern Search Methods for Nonlinear Optimization, ***Virginia Torczon***, College of William & Mary, Dept. of Comp. Sci., PO Box 8795, Williamsburg, VA 23187-8795, va@cs.wm.edu, ***Robert M. Lewis***

Pattern search methods comprise a large, flexible family of derivative-free, yet provably robust, optimization methods that can be used to solve a wide variety of difficult optimization problems. We will discuss analytic features that suggest new variants as well as practical implementation issues involved in the application of these methods.

2) Automated Waveform Optimization for Ink Jet Printers, ***Paul Gilmore***, Tektronix, Inc., 26600 SW Pkwy. M/S 63-424, PO Box 1000, Wilsonville, OR 97070, paulgi@pogo.wv.tek.com, ***Sharon Berger***, ***Ronald Burr***, ***Chris Greb***, ***John Wiltze***, ***John Burns***

The voltage waveform driving the piezoelectrics is fundamental to ink jet printer performance. The magnitude, direction and time span of the piezoelectric deflection determines the mass and flight time of the ink drop. For this reason, waveform optimization is fundamental to ink jet printer performance.

3) Secrets of Success of the Nelder-Mead Simplex Method, ***Margaret H. Wright***, Bell Labs, 600 Mountain Ave., Rm. 2C-462, Murray Hill, NJ 07974, mhw@research.bell-labs.com

Despite well-known flaws, the Nelder-Mead simplex method for unconstrained optimization continues to be extremely popular and to exhibit remarkable success in solving difficult problems efficiently. We analyze some possible reasons for this apparent anomaly and consider how they might be used to improve performance and reliability of the method.

4) Sampling Methods that Approximate Gradients, ***C. T. Kelley***, North Carolina State University, Dept. of Math., Box 8205, Raleigh, NC 27695-8205, tim_kelley@ncsu.edu, ***David M. Bortz***, ***Tony D. Choi***

Algorithms such as multi-directional search, Nelder-Mead and implicit filtering sample enough points to enable an approximate gradient to be constructed at very little cost. We show how that information can be used to describe convergence behavior in the presence of noise, improve performance and design termination criteria.

TA28 Global Optimization of Expensive Black-Box Functions

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: William J. Welch, University of Waterloo, Dept. of Stats., Waterloo, Ontario, N2J 3G1, Canada, wjwelch@watstat.uwaterloo.ca

1) Visualization & Problem Reduction, ***William J. Welch***, University of Waterloo, Dept. of Stats., Waterloo, Ontario, N2J 3G1, Canada, wjwelch@watstat.uwaterloo.ca

We describe a methodology for developing fast approximations to engineering computer models. These fast approximations can then be used to identify important variables and visualize the nature, i.e., linear, nonlinear, etc., of the input-output relationships. The techniques will be illustrated with several real applications.

2) Automating & Parallelizing the Solution of Engineering Optimization Problems, ***Nikolas Tzannetakis***, LMS International, Interleuvenlaan 68, Leuven, B-3001, Belgium, ntz@lmsnit.be, ***Rudi Cartuyvels***

We present an overall strategy for solving industrial optimization problems based on expensive computer simulations. The essential elements are a unique way of communicating with simulation programs, parallel execution, stochastic interpolation response surface modeling technique and NLP techniques. We demonstrate applications.

3) Efficient Selection of Search Points Using Response Surfaces Methods, ***William J. Welch***, University of Waterloo, Dept. of Stats., Waterloo, Ontario, N2J 3G1, Canada, wjwelch@watstat.uwaterloo.ca, ***Donald R. Jones, Matthias Schonlau***

The key to using response surfaces for global optimization lies in balancing the need to exploit the response surface (by sampling where the surface is minimized) with the need to improve the surface (by sampling where prediction error may be high). This gives rise to a highly efficient search strategy.

TA29 New Directions in Nondifferentiable Optimization

Cluster: Nonsmooth Optimization
Sponsor: Optimization
Sponsored Session
Chair: Ken Kortanek, University of Iowa, Coll. of Bus. Admin., 108 PBAB Rm. W272, Iowa City, IA 52242, ken-kortanek@uiowa.edu

1) Perfect Duality in Semi-Definite Programming & Semi-Infinite Programming, ***Qinghong Zhang***, University of Iowa, Dept. of Math., MacLean Hall, Iowa City, IA 52242, qzhang@math.uiowa.edu, ***Ken Kortanek***

We present new relationships between SDP perfect duality and the earlier perfect duality achieved for linear SIP. Applying the linear SIP perfect duality to SDP yields a larger feasible set than the semidefinite regularized dual.

2) Semi-Infinite Programming & Term Structure of Interest Rates, ***V. G. Medvedev***, Belorussian State University, Dept. of Opt. Cont. Meth., F. Skorina pr., 4, Republic Belarus, vmedvede@blue.weeg.uiowa.edu, ***Ken Kortanek***

The numerical treatment of measured data begins a minimax observation problem having unknown parameters under nonstochastic uncertainty governed by differential equations models for the interest rate of shortest duration, the spot rate. The models employed are analogous to some of the stochastic differential equations models appearing in the literature.

3) Algorithms of Polynomial Approximation for Solving Geometric Programming Problems, ***Andrew V. Pokatayev***, OmniCADD, Inc., 5151 S Howell Ave., Milwaukee, WI, pokataev@execpc.com

New methods and numerical experiments for solving general geometric programming problems are discussed. The approach is based on using curvilinear directions (polynomials up to 5th degree) during iterations. Application of this approach for solving nonlinear hydraulic balance equations system is discussed.

4) Replicating Thinly Traded Financial Derivatives with Semi-Infinite Programming, ***Ken Kortanek***, University of Iowa, Coll. of Bus. Admin., 108 PBAB Rm. W272, Iowa City, IA 52242, ken-kortanek@uiowa.edu, ***V. G. Medvedev***

Linear semi-infinite programming is used to formulate sub- and super-replication of contingent claims based on computed equivalent martingale probability measures. Duality interpretations are framed in terms of the ASK (the investor's) and the BID (the security issuer's) problems yielding numerical results for multiple risky assets.

TA30 Panel: Engineering Optimization Education

Cluster: Engineering Optimization
Invited Session
Chair: Simin Pulat, University of Oklahoma, Sch. of IE, 202 W Boyd, CEC 124, Norman, OK 73019, pulat@ou.edu

1) Panel: Engineering Optimization Education, ***Katta G. Murty***, University of Michigan, Dept. of IE, 1205 Beale Ave., Ann Arbor, MI 48109-2117, ***A. Ravi Ravindran***, Pennsylvania State University, Dept. of IME, 207 Hammond Bldg., University Park, PA 16802-1401, axr32@psu.edu, ***Ron Rardin***, Purdue University, Sch. of IE, W Lafayette, IN 47906, rardin@ecn.purdue.edu

There is a wide variation in the way Engineering Optimization courses are taught, from highly theoretical to very applied with case studies. Each panelist will discuss their perspective on how engineering optimization courses should be taught and share their own practices. Questions from the audience will be answered.

TA31 Tabu Search for Bin Packing, Constraint Satisfaction & Vehicle Routing

Cluster: Tabu Search
Invited Session
Chair: Paolo Toth, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 40136, Italy, ptoth@deis.unibo.it

1) Heuristics for 2-Dimensional Bin Packing Problems, ***Andrea Lodi***, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 10136, Italy, alodi@deis.unibo.it, ***Silvano Martello, Daniele Vigo***

We consider the problem of packing a given set of rectangular items into identical rectangular bins so that no 2 items overlap and the number of required bins is minimized. We present new heuristic algorithms and a TS framework and analyze their average performance through extensive computational experiments.

2) Implementation of the Constraint Satisfaction Problem Algorithms Based on Tabu Search, ***Koji Nonobe***, Kyoto University, Dept. Applied Math & Physics, Grad. Sch. of Eng., Kyoto, 606, Japan, nonobe@kuamp.kyoto-u.ac.jp, ***Toshihide Ibaraki***

Many combinatorial problems can be formulated as the CSP and an algorithm for CSP may be used as a general problem solver. Since CSP is NP-hard, however, we have implemented heuristic algorithms based on TS. We present our recent developments as well computational results.

3) Granular Tabu Search Methods for a Family of Vehicle Routing Problems, ***Paolo Toth***, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 40136, Italy, ptoth@deis.unibo.it, ***Daniele Vigo***

An effective intensification/diversification tool, based on the use of restricted or "granular" neighborhoods, is proposed within a TS framework. The approach is applied to some well-known VRPs, including the capacitated VRP and the VRP with backhauls and is experimentally tested on several instances from the literature.

TA32 Software Demonstrations

Chair: Sanjay Saigal, ILOG Inc., 1005 Terminal Way, Ste. 100, Reno, NV 89502, sanjay_saigal@modeling.com

1) Software Demonstration: Integrating the Internet into the Classroom, ***Ken Wegrzyn***, Irwin/McGraw-Hill Higher Education, 1333 Burr Ridge Parkway, Burr Ridge, IL 60521, ken_wegrzyn@mcgraw-hill.com

McGraw-Hill Higher Education will present several Web content and creation tools that will help you incorporate the Web into the classroom. Discussions will include PageOut, a web-based content and course development tool for professors; OnLine Learning Centers, McGraw-Hill's digital content; and the McGraw-Hill Learning Architecture, a complete course web-based delivery system.

2) Software Demonstration: The AMPL Plus Mathematical Modeling Environment, ***Sanjay Saigal***, ILOG Inc., 1005 Terminal Way, Ste. 100, Reno, NV 89502, sanjay_saigal@modeling.com

When released in 1995, AMPL Plus represented a major step up in ease of use over the text-based interface of AMPL. The recently released 32-bit version of AMPL Plus allows users to solve even larger "industrial strength" models faster.

We present an overview of modeling with AMPL Plus together with a discussion of its data-interface, project management and application-building capabilities.

TA33 Separation Standards & Airspace Design

Sponsor: Aviation Applications
Sponsored Session
Chair: Aslaug Haraldsdottir, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, aslaug.haraldsdottir@boeing.com

1) Separation Safety Modeling in Positively Controlled Airspace, ***Stephen B. Cohen***, FAA, 800 Independence Ave. SW, Washington, DC 20591, stephen.cohen@faa.dot.gov, ***Stephen Hockaday***

The work of a joint FAA/Eurocontrol project to model safety (collision and wake turbulence encounter risk) as a function of reduced separation minima and new technologies in positively controlled airspace is described. Claimed benefits include increased capacity, fuel efficiency and on time performance, as well as reduced controller workload.

2) Required System Performance Modeling, ***Arek Shakarian***, Boeing Commercial Airplane Group, PO Box 3707, MS 05-MK, Seattle, WA 98124-2207, arek.shakarian@boeing.com, ***Robert W. Schwab***

We present a methodological application of required system performance via a case study of air traffic in the Teterboro/Newark airspace. The focus of the analysis particularly involves an analysis of required navigation performance as it impinges primarily on issues of safety and air traffic controller workload...

3) Redesigning Flight Procedures in New York Metroplex Airspace to Capitalize on FMS/LAAS Capabilities, ***William J. Dunlay***, Leigh Fisher Associates, 160 Bovet Rd., Ste. 300, San Mateo, CA 94402, billd@leighfisher.com

We present benefits of applying FMS/LAAS technologies in redesigning instrument approach and departure procedures in the NY/NJ metroplex airspace. The purpose is to reduce runway-use restrictions due to airspace interactions between Kennedy, LaGuardia, Newark and Teterboro airports. Requirements for reduced separation/clearance standards are identified for resolving specific interactions.

Tuesday 10:00-11:00

TP40 Optimization Plenary: Optimization & Equilibrium

Plenary Session
Chair: Jong-Shi Pang, JHU, Dept. of Math. Sci., Whitehead Hall, Baltimore, MD 21218-2682, jsp@vicp1.mts.jhu.edu

1) Plenary: Optimization & Equilibrium, ***Stephen M. Robinson***, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706-1572, smrobins@facstaff.wisc.edu

Equilibrium has been a very useful modeling device in many areas, including physical science as well as economics, logistics and other fields. Further, this idea has had a close connection with optimization: optimization can furnish good models for some (but not all) equilibrium problems, and the tools and methods of optimization have contributed much to our ability to solve equilibrium problems, while the analysis and solution of those problems, has in turn, stimulated the development of new methods in optimization. We outline several kinds of equilibrium situations useful in applications and show ways of modeling these and of analyzing and solving the resulting models, using tools from optimization. In the process, we exhibit some ways in which the applications drive further theoretical and computational development. Finally, we look at some areas where further research advances would help us to deal more effectively with practical problems.

Tuesday 11:00-12:00

TO40 Omega Rho Plenary: Sequencing the Genome - A New Application for the Mathematics of Operations Research

Plenary Session
Chair: Dave Rogers, University of Cincinnati, Dept. of QAOM, CBA, PO Box 210130, Cincinnati, OH 45221-0130

1) Omega Rho Distinguished Plenary: Sequencing the Genome - A New Application Domain for the Mathematics of OR, ***Richard M. Karp***, University of Washington, Dept. of Comp. Sci. & Eng., Box 352350, Seattle, WA 98195, karp@cs.washington.edu

The hereditary information that each us passes to his offspring is encoded as genes within DNA molecules. A DNA molecule can be viewed as a long string of symbols from the alphabet {A,C,T,G} and the genes can be viewed as programs that direct the production of proteins, which in turn control chemical processes within the cells. The total content of these molecules within an organism is referred to as a genome. The Human Genome Project is dedicated to determining and interpreting the sequence of the human genome. The genomes of a growing number of other species have already been sequenced. Predicting the performance of different strategies for sequencing a genome requires stochastic models. We present one such model and describe its analysis using renewal theory. The problem of sequencing a genome leads to combinatorial problems of the following kind: a large number of fragments of an unknown sequence x are given, the relative positions of these fragments within the sequence are unknown, but partial, noisy information about the sequence of each fragment can be derived experimentally. Which of the available experiments shall we perform, and how shall we combine the results of the experiments to determine the positions of these fragments within the sequence x? This problem comes in many different forms, each of which leads to NP-hard combinatorial problems of the type often encountered in OR applications. An important difference, however, is that our goal is not to find an optimal solution according to some objective function, but rather to determine the solution that nature has selected.

Tuesday 13:00-14:30

TC01 Measurement, Management & Perception of Market Risk

Sponsor: Decision Analysis
Sponsored Session
Chair: Don N. Kleinmuntz, University of Illinois, Dept. of Bus. Admin., 1206 S 6th St., Champaign, IL 61820, dnk@uiuc.edu

1) Tutorial: Measuring & Managing Market Risk, ***Thomas J. Linsmeier***, University of Illinois, Dept. of Accountancy, 1206 S Sixth St., Champaign, IL 61820, linsmeie@uiuc.edu

This decade has seen the growing use of derivative financial instruments, occasionally associated with unprecedented losses. This tutorial will present approaches for measuring, managing and disclosing exposure to market risk, including "value at risk," which has recently become quite popular. Applications to financial risk management will be reviewed.

2) Quantitative Disclosures of Market Risk: Implications for Research & Policy, ***Don N. Kleinmuntz***, University of Illinois, Dept. of Bus. Admin., 1206 S 6th St., Champaign, IL 61820, dnk@uiuc.edu, ***J. Richard Dietrich***, ***Steven J. Kachelmeier***, ***Thomas J. Linsmeier***

Investor concern about financial derivative losses has led the US Securities & Exchange Commission to require companies to make quantitative disclosures of their exposure to market risks. Evidence on the usefulness of these disclosures for investor decision making will be presented.

TC02 Consumer Decision Making

Sponsor: Marketing
Sponsored Session
Chair: Alka Subramanian, University of South Dakota, School of Bus., 227-F Patterson Hall, Vermillion, SD 57069, alka@sunflowr.usd.edu

1) Procrastination: A Moderator Variable of Purchase Delay, ***Denis Darpy***, Universite Paris Dauphine, DMSP Research Ctr., denis.darpy@dauphine.fr

Purchase delay researches outlined situational and individual factors. We focus on consumer procrastination tendencies to integrate psychological factors. A scale is propsed to investigate effects of procrastination on buying process. Companies can also implement this scale in market surveys to develop better forecast sales based on purchase intentions.

2) Does Expertise Moderate the Reevaluation of Previously-Acquired Information in a Sequential Choice Task?, ***Gad Saad***, Concordia University, Fac. of Commerce & Admin., 1455 de Maisonneuve Blvd. W, Montreal, Quebec, H3G 1M8, Canada, gadsaad@vax2.concordia.ca, ***Peter Boyle***

We investigate the incidence of motivational distortions whenever an individual re-evaluates previously acquired information in a sequential choice task. We specifically explore whether re-evaluation further increases the attractiveness of the brand favored at that point and whether expertise moderates that distortion.

3) Methodological Issues in Internet Feedback Studies, ***Binshan Lin***, Louisiana State University, Dept. of Mgmt. & Mktg., One University Place, Shreveport, LA 71115-2399, blin@pilot.lsus.edu

http://www.lsus.edu faculty/~blin, ***Chang-tseh Hsieh***

Many firms are beginning to tap into internet feedback as a source for customer involvement and quality information. We reassert the importance of studying internet feedback studies and clarify and illuminate some of the methodological problems in practice.

4) Attributes of Products & Consumer Outshopping Behavior, ***Alka Subramanian***, University of South Dakota, School of Bus., 227-F Patterson Hall, Vermillion, SD 57069, alka@sunflowr.usd.edu, ***Raymond A. Marquardt***, ***Tim Burkink***

Products and services have been classified as high on search, experience or credence attributes. We investigate how the existence of these attributes impacts a particular aspect of the consumer purchase decision, namely whether the product/service will be purchased in-town or out-of-town. Data are collected and analyzed with preliminary results reported.

TC03 Panel: News from the Front Lines of MBA Education

Sponsor: Education
Sponsored Session
Chair: Patrick S. Noonan, Emory University, Goizueta Bus. Sch., Atlanta, GA 30322, patrick_noonan@bus.emory.edu

1) Panel: News from the Front Lines of MBA Education, ***Dana R. Clyman***, University of Virginia, Darden School, PO Box 6550, Charlottesville, VA 22906-6550, clymand@darden.gbus.virginia.edu, ***James S. Dyer***, University of Texas, MSIS Dept., CBA 5.202, Austin, TX 78712, ***Patrick S. Noonan***, Emory University, Goizueta Bus. Sch., Atlanta, GA 30322, patrick_noonan@bus.emory.edu, ***George Wu***, University of Chicago, Grad. School of Bus., 1101 E 58th St., Chicago, IL 60637, george.wu@gsb.uchicago.edu

Recent years have seen major changes in the role of OR/MS in MBA programs. This panel picks up the discussion of various issues from previous meetings. Has the upheaval continued or abated? Are the "new models" of OR/MS education still succeeding? What emerging threats and opportunities do we face?

TC04 System Dynamics in Operations & Service Management

Sponsor: MSOM
Sponsored Session
Chair: Edward Anderson, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edanderson@mail.utexas.edu

1) Resource Dependence in Product Development Improvement Efforts, ***Nelson Repenning***, MIT, 50 Memorial Dr., E53-339, Cambridge, MA 02139, nelsonr@mit.edu

Interdependence in product development is created when scarce resources must be allocated between competing projects in different areas. Interdependence, coupled with locally rational decision making leads to an undesirable allocation of resources between competing activities. A policy is proposed that increases the organization's robustness to this problem.

2) Structural Determinants of Preferred Responses to Imbalances Between Service Demand & Capacity, ***Rogelio Oliva***, Harvard University, Harvard Bus. School, Grad. School of Bus. Admin., Boston, MA 02163, roliva@hbs.edu

This work evaluates the intensity and timing of 3 responses to imbalances between demand and capacity in a service delivery process, along with their long-term impact on productivity, quality and profitability. Empirical research shows how the structural elements of the delivery process determine the preferred response and the observed long-term behavior of core measures of performance.

3) A System Dynamics Model for Benchmarking the Effectiveness of Made- to-Order Channel Assembly Decisions Against Made-to-Stock, ***Nitin R. Joglekar***, Digital Equipment Corp., 30 Ransom Rd., Newton, MA 02090, joglekar@wrksys.enet.dec.com, ***Haydee Saffari***

We model a mixed mode system in which products can be delivered to end customers from either a made-to-order channel assembly mechanism or in-house made-to-stock inventory. The model explores trade-offs between material and information delays, discount structure and assembly quality differentials in the MTO and MTS alternatives.

4) Project Development Manageability & Its Relationship to Dynamic Process Concurrence, ***David N. Ford***, University of Bergen, Dept. of IS, Bergen, N 5020, Norway, davidford@ifi.uib.no

Does reducing cycle time by increasing concurrence always decrease project manageability? We use work queues to quantify manageability and dynamic concurrence relationships to investigate the impacts of concurrence on project manageability with a dynamic simulation model. Results indicate that eased concurrence can increase manageability and suggest improved process designs.

5) Optimal Management of Knowledge Workers Under Growth in the Information Technology Industry, ***Edward Anderson***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edanderson@mail.utexas.edu

We use dynamic programming techniques to solve the staffing problem for knowledge workers under demand growth. A policy is developed which trades-off the costs of workforce capacity shortfalls against training costs for new workers. An illustration of the policy is developed in the setting of implementing enterprise requirement planning systems.

TC05 Investing in Capacity & New Technology

Sponsor: MSOM
Sponsored Session
Chair: Candace A. Yano, University of California, IEOR Dept., 4135 Etcheverry Hall, Berkeley, CA 94530, yano@ieor.berkeley.edu

1) Forest Operations: Landing Locations & the Harvest Layout, ***Russell D. Meller***, Auburn University, Dept. of ISE, 308 Dunstan Hall, Auburn, AL 36849-5346, rmeller@eng.auburn.edu

The US Forest Service supported a project with the goal of applying OR models to forest harvest operations. We focus on a model to determine landing locations and the harvest layout. This model and other research with the Forest Service will be described.

2) Technology Maturity Model: A Framework for Rapid Development & Deployment of Technologies, ***Manpreet S. Khaira***, Intel Corp., JFT-104, 5200 NE Elam Young Pkwy., Hillsboro, OR 97124-6497, manpreet_khaira@ccm.jf.inte.com, ***Medini R. Singh***

The transition from novel concept to new product is susceptible to numerous technological uncertainties. This is particularly true for fast-cycle R&D such as microprocessor development. How can we assess the viability of projects in the R&D pipeline? We present a framework for measuring the relative risk and maturity of various technologies.

3) Capacity Planning in a Chemical Testing Laboratory, ***Sampath Rajagopalan***, University of Southern California, Marshall School of Bus., 400 Bridge Hall, Los Angeles, CA 90089-1421, srajagopalan@sba.usc.edu

We describe a capacity planning problem in a chemical testing laboratory, where lead times are critical in satisfying customers. We present a model for capacity planning which incorporates congestion effects and their impact on lead time. This is a non-linear integer program which is solved using a series of approximations.

4) Capacity Planning & Scheduling in Biotechnology Operations, ***Candace A. Yano***, University of California, IEOR Dept., 4135 Etcheverry Hall, Berkeley, CA 94530, yano@ieor.berkeley.edu, ***Osama Qasem***

The process steps involved in determining the sequence of the human genome resemble manufacturing processes with random rework, where some of the randomness is due to biological factors. We describe some quantitative modeling efforts to aid in capacity planning and scheduling to improve throughput while limiting investments in expensive equipment.

TC06 Statistical Experimental Design for Quality Improvement

Cluster: Statistics/Quality Control
Invited Session
Chair: Bruce A. Ankenman, Northwestern University, IE/MS Dept., 2225 N Campus Dr., Evanston, IL 60208-3119, ankenman@iems.nwu.edu

1) Designed Experiments for Process & Product Development: Some Examples, ***Douglas C. Montgomery***, Arizona State University, Dept. of IE, Tempe, AZ 85287-5906, doug.montgomery@asu.edu

Engineers and physical/chemical scientists play an important role in industry in designing and developing new products and manufacturing processes as well as improving the performance of existing ones. Statistical methods are an important aspect of these activities and, specifically, statistically designed experiments are often vitally important to the successful completion of a design/development project...

2) A Comparison of Multiresponse Optimization: Sensitivity to Targets, Bounds & Weights, ***Robin C. Wurl***, Rutgers University, Dept. of IE, PO Box 909, Piscataway, NJ 08855-0909, wurl@rci.rutgers.edu, ***Susan Albin***

Optimization methods exist which find conditions at which product quality is optimal for products evaluated by multiple characteristics. These methods use different optimizing criteria and require parameters: targets, acceptability bounds and weights. Effects of selecting reasonable parameter alternatives are investigated; results indicate that some alternatives produce considerably different optima.

3) Experimental Design for Estimating a Response Surface with Variance Components, ***Bruce A. Ankenman***, Northwestern University, IE/MS Dept., 2225 N Campus Dr., Evanston, IL 60208-3119, ankenman@iems.nwu.edu

In many experiments, response is affected by the experimental factors and by random effects of sampling procedures. Response surface methodology studies the effects of the factors. The random effects of sampling procedures are variance components. We provide experimental designs for estimating both response surface effects and variance components.

4) Industrial Experimental Design since BH^(2), ***C. F. J. Wu***, University of Michigan, Dept. of Stats., 1440 Mason Hall, Ann Arbor, MI 48109-1027, jeffwu@stat.lsa.umich.edu

There have been several major advances in industrial experimenal design since the 1978 publication of the influential book by Box, Hunter & Hunter. The most obvious was brought about by the work of Taguchi on robust parameter design and his style of doing practical industrial work...

TC07 European Developments in Quality Management & Information Systems

Cluster: Global Partnership, Information Systems & Quality
Invited Session

Chair: Peter Chamoni, Gerhard-Mercator-Universitaet-GH Duisburg, MIS & MS, Lotharstr. 65 LF221, Duisburg, D-47048, Germany, chamoni@uni-duisburg.de www.uni-duisburg.de/fb5/bwl/wi/home.html

1) Integrated Quality Management for Information Technology-Based Applications, ***Christine Strauss***, University of Vienna, Inst. of MS, Bruenner Strasse 72, Vienna, A-1210, Austria, strauss@pom.bwl.univie.ac.at

We outline a framework to design and implement measures to ensure a desired quality level in business environments depending on IT. An interactive heuristic approach is introduced that supports the decision process of selecting and evaluating adequate measures according to various objectives.

2) Linear Programming for Sausage Blending - A Case Study, ***Gerhard Waescher***, Martin-Luther-Universitaet Halle-Wittenberg, Inst. of Bus. Admin., Prod. & Logs., Halle, D-06099, Germany, waescher@wiwi.uni-halle.de

A traditional OR technique, LP, has been joined with modern IT in order to develop a planning system for sausage blending. This system, which is used on the shop floor by a non-specialist of OR, has not only contributed significantly to cost reduction but also to quality improvement.

3) Information Management & the Deregulation of the German Electricity Industry, ***Manfred Esser***, Stadtwerke Duesseldorf AG, Luisenstr. 105, Duesseldorf, D-40215, Germany

Today, enterprises often have to adapt themselves to the changes in their environment, i.e., markets, legislation, etc. To fulfill this task, information is an important factor of success. In this point of view, the information management has to "produce" the needed information in the right way to support this process.

TC08 Theory & Applications of Correlated Stochastic Systems

Sponsor: Applied Probability Section
Sponsored Session

Chair: Susan H. Xu, Pennsylvania State University, Dept. of MS/IS, Smeal Coll. of Bus. Admin., University Park, PA 16802, shx@psu.edu

1) Analysis of Random Polling System with an Infinite Number of Coupled Servers & Correlated Input Process, ***Yew Sing Lee***, University of Illinois, Dept. of IDS, MC 294, 601 S Morgan St., Chicago, IL 60607-7124, ysleey@uic.edu

We introduce a simple approach for modeling and analyzing a random polling system with infinite servers. We assume that the infinite number of servers is coupled together and they visit the queues as 1 processing unit. Two classes of service disciplines, exhaustive and gated, are considered. We will derive several performance measures of the system...

2) Optimal Parallel Processing of Random Task Graphs, ***Rhonda Righter***, Santa Clara University, Dept. of OMIS, Santa Clara, CA 95053, rrighter@mailer.scu.edu, ***Zhen Liu***

We consider scheduling program tasks on parallel processors and give conditions under which a simple scheduling policy is optimal. Tasks have precedence relations and synchronization points but successors to a task only become known when the task is executed, i.e., scheduling at run time rather than compile time.

3) Majorization of Weighted Trees: A New Tool to Study Correlated Queueing Systems, ***Susan H. Xu***, Pennsylvania State University, Dept. of MS/IS, Smeal Coll. of Bus. Admin., University Park, PA 16802, shx@psu.edu, ***Haijun Li***

Stochastic models with correlated arrivals arise naturally in areas such as synchronized communication networks, reliablity, assembly systems, etc., with a wide variety of interpretations. The difficulty of analyzing such systems stems from the statistical dependence of joint system performance measures. We introduce the notion of majorization with respect to weighted trees...

4) On the Dependent Structure of a Shock Model with Correlated Arrivals of Multiple Types of Shocks, ***Haijun Li***, Washington State University, Dept. of Pure & Applied Math., Pullman, WA 99164, lih@haijun.math.wsu.edu, ***Susan H. Xu***

We study a general shock model with correlated arrivals of multiple types of shocks. We show that the notion of majorization with respect to a weighted tree can be used to examine how such a shock system responds to the different degrees of dependencies of the shock arrival correlations. Some bounds for the joint life distribution of components will be discussed.

5) Several Results on Finite Buffer Queues with Batch Arrivals & Batch Services, ***Xiuli Chao***, NJIT, Dept. of IE, Newark, NJ 07102

We present several relationships on truncating blocking probabilities for finite buffer queues with batch arrivals and batch services. These results are further extended to models with arbitrary vacation policies. Other properties of the blocking probability with respect to the interarrival time, service time and batch size distributions are also discussed.

TC09 Panel: Do Management Scientists & Economists Think about Auctions Differently, & if so, Can Both be Right?

Cluster: Competitive Bidding
Invited Session

Chair: Michael H. Rothkopf, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu http://rutcor.rutgers.edu/~rothkopf/

1) Panel: Do Management Scientists & Economists Think About Auctions Differently, and if so, Can Both Be Right?, ***Paul Klemperer***, Oxford University, England, UK, ***Richard Steinberg***, University of Cambridge, Judge Inst., Trumpington St., Cambridge, CB2 1AG, UK, ***Ronald M. Harstad***, Rutgers University, RUTCOR & FOM, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, harstad@rutcor.rutgers.edu, ***Shmuel S. Oren***, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, shmuel@euler.berkeley.edu

No abstract supplied.

TC10 Network Design Problems Arising in Telecommunications III

Sponsor: Telecommunications
Sponsored Session

Chair: Luis Gouveia, University of Lisbon, DEIO-CIO Fac. of Sci., Bloco C/2-Campo Grande, Lisbon, 1700, Portugal, lgouveia@fc.ul.pt

1) Designing Private WANs Using Heterogeneous Telco Services, ***June Park***, University of Iowa, Dept. of MS, Iowa City, IA 52242-1000, ***Larry LeBlanc***, ***Byung Ha Lim***

We show that a private WAN can be designed using a mix of different telco services with the effect of reducing the telecom budget for the enterprise. The cost savings come from exploiting tariff structures of different services. We

present the network design model, algorithm and computational results.

2) Optimal Microsegmentation of Shared Ethernet Local Area Networks, ***Frederick Kaefer***, Indiana University, Dept. of Op. & Dec. Tech., 10th & Fee Ln, Bloomington, IN 47405-1701, fkaefer@indiana.edu

Microsegmentation of LANs using Ethernet switches increases the bandwidth available to individual users that are currently using shared Ethernet LANs. Mathematical models are developed for microsegmenting existing shared Ethernet LANs using Ethernet switches.

3) An Augmented Lagrangean Dual Algorithm for Large-Scale Multicommodity Routing, ***Di Yuan***, Linkoping Institute of Technology, Div. of Optimization, Linkoping, S-581 83, Sweden, diyua@mai.liu.se

We study an augmented Lagrangean dual method for solving large-scale multicommodity routing problems in telecommunication networks. It is a combined relaxation and penalty approach and often has nice convergence characteristics. We describe the basic properties of the method and present computational results.

4) Network Flow Models for the Expansion of Local Access Networks, ***Luis Gouveia***, University of Lisbon, DEIO-CIO Fac. of Sci., Bloco C/2-Campo Grande, Lisbon, 1700, Portugal, lgouveia@fc.ul.pt, ***Margarida Goncalves***

We discuss network flow models, single and multicommodity flow models, for planning the expansion of a LAN model (Balakrishnan, Magnanti & Wong, 1995). We show that such models can be seen as the generalization of a model discussed in Bousba & Wolsey (1991). Computational results are also reported.

TC11 Collaborative Industry/Academic Research on Technology Management: A Report of Findings

Sponsor: **Technology Management/Management of Productivity & Technology**
Sponsored Session

Chair: John Peterson, Lucent/Bell Labs., jwpeterson@lucent.com

Co-Chair: Michael Radnor, Northwestern

University, Kellogg Sch. of Mgmt., Evanston, IL 60201,

m-radnor@nwu.edu

1) Needs/Benefits/Methodologies for Collaborative Technology Management Industry/Academic Research & Application: A Model Case Study, ***Whitey Augis***, Rockwell Automation, waugis@ra.rockwell.com, ***Michael Gnam***, ***Michael Radnor***

For the past 2 years, several companies, consultants and universities have worked together under the auspices of the National Center for Manufacturing Sciences to study various critical issues in the technology management field. We report on the history, unusual collaborative working processes and exceptional results achieved in the MATI project...

2) Technology Roadmapping: A New State-of-the-Art, ***Richard E. Albright***, Lucent Technologies, 600-700 Mountain Ave. Rm 3D574, PO Box 636, Murray Hill, NJ 07974-0636, ralbright@lucent.com, ***Thomas Kappel***, ***Harry Morehead***, ***John Thompson***

Findings, toolsets and pilot study experience with roadmapping will be described and used to identify lessons that can be learned as a step to upgrade practice in this important area.

3) New Perspectives on the Technology Transfer Process, ***Daniel Z. Levin***, Rutgers University, dzlevin@merle.acns.nwu.edu, ***Alec McMillian***

A new paradigm for considering critical issues and activities in intra-company technology transfer will be presented. Based on recent field work at multiple companies, we find that successful technology transfers have 4 underlying, essential elements: comfort level, common language, expertise transfer and coordination. These contrast with a sterile and anonymous view of the technology transfer process.

4) Voice of the Customer: Improving Reception & Response, ***Thomas Kappel***, Northwestern University, tkappel@nwu.edu, ***Ed Ostrowski***

We will report on the field studies and roundtable discussions devoted to this topic during the MATI project.

TC12 Technology Issues in a Chaotic Environment

Sponsor: **Technology Management/Management of Productivity & Technology**
Sponsored Session

Chair: Glenn Dietrich, University of Texas, Div. of Acct. & IS, San Antonio, TX 78249, gdietrich@utsa.edu

1) Chaos, Complexity & Information Technology Strategies, ***Marcus Shipley***, USAA, San Antonio, TX, ***Glenn Dietrich***

We develop a strategic framework based on the physical and biological principles of the chaos and complexity theories. This chaos and complexity strategic framework will then be applied to evaluate leading IT strategies and structures. General conclusions to technology transfer will be presented.

2) Temporal Influences in Sustaining Technology Alliances, ***Victoria Mitchell***, University of California, 31 Whitman Ct., Irvine, CA 92612, vmitchel@gsm.uci.edu

This study focuses on the temporal effects of IT investments among cooperative players in telecommunications and computer industries. An empirical examination of technology strategies demonstrates how the nature of IT infrastructure investments can shape industry structure and alter the configuration of strategic groups in related industries.

3) Entrepreneurial Process in a Chaotic Environment, ***Glenn Dietrich***, University of Texas, Div. of Acct. & IS, San Antonio, TX 78249, gdietrich@utsa.edu

Chaos theory suggests that systems behave in an unpredictable manner. However, this theory also suggests that there are patterns of behavior that repeat themselves. This research examines the impact of chaos theory on the start-up firm.

TC13 Session Withdrawn

Cluster: **Soft Computing**
Invited Session

Chair: Augustine O. Esogbue, Georgia Institute of Technology, Sch. of ISyE, Intell. Systems & Controls Lab, Atlanta, GA 30332-0205, augustine.esogbue@isye.gatech.edu

Co-Chair: Janet M. Twomey, Wichita State University, Dept. of Ime, Wichita, KS 67226, twomey@ie.twsu.edu

1) Improving Simulation Engineering Practices, ***Randy Allenbach***, Boeing Commercial Airplane Group, Wichita Division, Simulation & Decision, Wichita, KS 67277

2) Knowledge Management in Manufacturing Organizations, ***John Huffman***, Boeing Commercial Airplane Group, Wichita Div., 8303 E Grail, Wichita, KS 67207

3) The Geometric Structure of Positional Tolerance Evaluation, ***Mark J. Kaiser***, Wichita State University, IME Dept., Wichita, KS 67260, kaiser@ie.twsu.edu

A general geometric framework is developed to quantify the structure of positional tolerance evaluation. The data graph, overlay graph and configuration framework of a feature set are defined and used in the evaluation of positional tolerance for a complex manufactured artifact. Generalized quality measures are defined through a geometric optimization problem and computed.

4) Neural Network Strategy for Drilling When Data is Sparse, ***Janet M. Twomey***, Wichita State University, Dept. of IME, Wichita, KS 67226, twomey@ie.twsu.edu

5) An Optimization Approach to 3-D Positional Tolerance Verification, ***S. Hossein Cheragi***, Wichita State University, IME Dept., Wichita, KS 67226

TC14 Issues in Supply Chain Management

Contributed Session

Chair: Javad Seyed, Deyes II, Inc., 1933 Amity Hill Ct., Raleigh, NC 27612, javad@deyes.com

1) The Supply Chain Challenge, ***Slim Saidi***, CN-Supply Chain Logistics, 7450 Torbram Rd., Mississauga Ontario, L4T 1G9, Canada, saidi@cn.ca

Whether we are in manufacturing or in service, the challenge is to reduce order-to-delivery lead time. In order to fulfill this objective, all partners in the supply chain must agree to collaborate in the effort of streamlining the system process which complicates the problems to be solved while requiring a fast pace of implementation...

2) Where is Research in Supply Chain Management Going? An Assessment, ***Serkan B. Celtek***, University of Texas - Pan American, Coll. of Bus. Admin., Dept. of Mgmt., Edinburg, TX 78539, sceltek@panam.edu, ***Hale Kaynak***

We review the literature on supply chain management in order to determine the current state of research and to identify future research directions. The literature is evaluated in terms of topics studied and levels of models and theories.

3) Operational & Managerial Efficiency in the Supply Chain: A Method for Identification & Separation, ***Anthony Ross***, Texas A&M University, Mays Coll. of Bus., College Station, TX 77843-4217, aross@acs.tamu.edu

Firms can freqently improve supply chain management efficiencies at the outbound distribution segment. Consideration should be given to the allocation of logistics resources since they indirectly impact operations performance. Performance is also influenced by programmatic inefficiencies. The measurement of managerial and programmatic efficiency is accomplished using a non-parametric approach...

4) The Impact of Planar Customization on IBM PSG's Supply Chain Performance, ***Grace Lin***, IBM, TJ Watson Research Ctr., PO Box 218, Yorktown Heights, NY 10598, ***Markus Ettl***, ***Rob Allan***, ***Kerry Kim***

Our objective is to better understand the impact of implementing different operational supply chain management policies and strategies on IBM PSG's total supply chain inventory and serviceability. These strategies include allowing resellers to sustom configure computers, imposing 14 days of supply inventory and increasing part's commonality...

5) Operational, Tactical & Strategic Issues in Supply Chain Management, ***Javad Seyed***, Deyes II, Inc., 1933 Amity Hill Ct., Raleigh, NC 27612, javad@deyes.com

We introduce supply chain system/ERP, SCS and SCM. The use of ERP, SCS and SCM in operational, tactical and strategic challenges in businesses are reviewed. In operational issues, optimization across the supply chain will be discussed in every module and overall. Instances of tactical decision making will be presented...

TC15 Approximation Algorithms via Linear Programming

Tutorial Session

Chair: Leslie Hall, JHU, Math. Sci. Dept., Baltimore, MD 21218, leslie@noether.mts.jhu.edu

1) Tutorial: Approximation Algorithms via Linear Programming, ***David B. Shmoys***, Cornell University, Sch. of OR/IE, Rhodes Hall, Ithaca, NY 14853, shmoys@cs.cornell.edu

LP has been the basis for solving hard combinatorial optimization problems for over 40 years. One of the oldest strategies for finding a good solution is to formulate the problem as an integer problem, find an optimal solution to its LP relaxation and round it to an integer solution that is (hopefully) nearly as good and nearly as feasible...

TC16 Travel Demand Modeling

Sponsor: Transportation Science
Sponsored Session

Chair: Chandra Bhat, University of Texas, Dept. of Civil Eng., ECJ Hall 6.806, Austin, TX 78712, bhat@mail.utexas.edu

1) Network Equilibrium with a Nested Logit Demand Function & Nonconvex Costs, ***Maria P. Boile***, Lafayette College, Dept. of Civil & Environ. Eng., Easton, PA 18042-1775, maria@athena.cadlab.lafayette.edu

We present the formulation of an intermodal network equilibrium model with a nested logit demand function and a decreasing performance function for transit. The model is formulated as a mathematical program with a nonlinear objective function and linear constraints.

2) Solving a Nonadditive Traffic Equilibrium Problem with New Path Storage Techniques, ***Kelley Scott***, Princeton University, Dept. of Civil Eng. & OR, Princeton, NJ 08544, kscott@dragon.princeton.edu, ***David Bernstein***

We consider a version of the (static) TEP in which the cost on a path consists of a toll attribute and a time attribute, and drivers are assumed to have a nonlinear value of travel time function. We present an algorithm for solving this nonadditive TEP using a variational inequality formulation and illustrate enhanced efficiency derived from new path storage techniques.

3) On the Equivalence Between Stationary Link Flow Patterns & Traffic Network Equilibria, ***Ding Zhang***, SUNY, Sch. of Bus., Oswego, NY 13126-2529, zhang@oswego.edu, ***Anna B. Nagurney***, ***Jiahao Wu***

We consider static and dynamic transportation networks and prove that, under a cost-responsive route choice mechanism, a stationary link flow pattern is equivalent to traffic network equilibria. This equivalence suggests that the monitoring and analysis of traffic patterns can be conducted on the level of the links, rather than the paths...

4) Accommodating Variations in Responsiveness to Level-of-Service Variables in Travel Mode Choice Modeling, ***Chandra Bhat***, University of Texas, Dept. of Civil Eng., ECJ Hall 6.806, Austin, TX 78712, bhat@mail.utexas.edu

An individual's responsiveness to level-of-service variables affects travel mode choice for a trip. In general, this will vary based on observed (to an analyst) and unobserved (to an analyst) individual characteristics. We formulate a travel mode choice model that accommodates variations in responsiveness to level-of-service measures due to observed and unobserved individual characteristics in a comprehensive manner.

TC17 Logistics Fleet Operations

Sponsor: Logistics
Sponsored Session

Chair: Lloyd Clarke, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, lloyd.clarke@isye.gatech.edu

1) Combinatorial Auctions for Transportation Procurement, ***Chris Caplice***, The SABRE Group, 3200 Patterson Ave., Richmond, VA 23221, chris_caplice@ptcg.com

We address how SABRE uses combinatorial auctions to assist shippers in procuring transportation services for their operational needs. Combinatorial auctions allow carriers to submit more complex conditional bids that capture their inherent economies of scope. We discuss underlying theory and lessons learned in applying the concept to practice.

2) Experience & Productivity: The Case of Less-Than-Truckload Motor Carriers, ***Peter Swan***, University of Michigan, Ann Arbor, MI 48109-1234, peter_swan@ccmail.bus.umich.edu, ***Stephen V. Burks***

We use moderated regression to show that productivity is affected by experience when LTL motor carriers change their operations. We measure productivity as the ratio of cost predicted by a translog cost function of total operating cost. Experience is measured by firm factors related to the use of intermediate terminals.

3) Optimizing Intermodal Rail Operations, ***Alexandra Newman***, University of California, Dept. of IEOR, Berkeley, CA 94720, newman@ieor.berkeley.edu, ***Candace A. Yano***

We propose a model to increase the operational efficiency of intermodal trains. Using specialized procedures, we obtain near-optimal solutions. We contrast these solutions with those obtained from heuristics designed to mimic current operational procedures and conclude that substantial savings and an increase in the quality of service can be realized.

TC18 Mathematical Models for Diagnosis & Treatment

Sponsor: Health Applications
Sponsored Session

Chair: Sandra Potthoff, University of Minnesota, Carlson Sch. of Mgmt. Rm 3-140, 321 19th Ave. South, Minneapolis, MN 55455, potth001@tc.umn.edu

1) Breast Cancer Prognosis Without Lymph Node Status, ***Paul S. Bradley***, University of Wisconsin, Comp. Sci. Dept., 1210 W Dayton St., Madison, WI 53706, paulb@cs.wisc.edu, ***Olvi L. Mangasarian***, ***Nick Street***, ***William H. Wolberg***

Distinct survival and disease-free curves for breast cancer patients are obtained based on nuclear perimeter of cells from an easily obtained fine needle aspirate plus size of the surgically removed tumor. Our results explicitly avoid using the number of metastasized lymph nodes, eliminating the need for potentially debilitating additional surgery.

2) Minimum-Support Solutions to the Radiotherapy Treatment Planning Problem, ***Janine M. Kennedy***, University of Colorado, Math. Dept. CB 170, PO Box 173364, Denver, CO 80217-3364, jmkenned@math.cudenver.edu

We consider the problem of planning radiation treatment which is cost effective, i.e., which involves a minimum number of radiation beams and provides optimal therapy. To address this, we apply Mangasarian's successive linearization algorithm to an LP formulation of the radiotherapy treatment

planning problem.

3) The Multiple Intervention Problem, ***Amy R. Wilson***, University of California, Dept. of IE/OR, 4172 Etcheverry Hall, Berkeley, CA 94720, amy@ieor.berkeley.edu

Allocating resources among several intervention programs for a given condition raises several issues. Some individuals may benefit from multiple interventions. Should they be applied in series or in parallel? Should we spend money to better target the interventions? We propose a general framework to address these issues.

TC19 Applications for Results

Cluster: **Partnering Value Methodology, Theory of Constraints & DA Invited Session**

Chair: Dave Snyder, The Boeing Company, PO Box 3797, MS 43-19, Seattle, WA 98214, david.g.snyder@boeing.com

1) Application of the Theory of Constraints, Value Analysis & Other Tools in a Captive Printed Circuit Board Manufacturing Environment, ***Michael Wagoner***, The Boeing Company, PO Box 3707, MS 88-01, Seattle, WA 98124, michael.t.wagoner@boeing.com

Severe manufacturing problems created both the pressure to improve and the threat of shutdown. TOC and VA tools were used to develop a coherent improvement strategy around seemingly insurmountable conflicts. We explore how the use of the tools leads to dramatic improvements and an expanded influence in the business activity.

2) Application of Theory of Constraints (Thinking Process) to a Manufacturing Center, ***Dave Snyder***, The Boeing Company, PO Box 3797, MS 43-19, Seattle, WA 98214, david.g.snyder@boeing.com

Manufacturing managers realize current improvement methods are not producing expected results; something is missing. With the promise of focus on the core problem, 4 students begin learning and implementing the thinking process in the facory environment with the guidance of a TOC-trained student learning how to teach the thinking process.

3) Process Analysis at Pratt & Whitney, ***Joseph F. Otero, Jr.***, Pratt & Whitney, 23 Westernview St., Springfield, MA 01108-1615, oterojf@pweh.com

FAST is generally applied to "hard" applications such as aircraft component redesign or building construction. However, its intuitive logic makes it an effective and powerful tool for designing processes. Examples include purchasing processes and root cause analysis. Several case studies demonstrate its potential.

TC20 Modeling & Simulation

Sponsor: **Military Applications**
Sponsored Session

Chair: R. Kevin Wood, Naval Postgraduate School, Dept. of OR, Monterey, CA 93943, kwood@wposmtp.nps.navy.mil

1) Maximizing a Shortest Path, ***Eitan Israeli***, Naval Postgraduate School, Dept. of OR, Monterey, CA 93943, eisraeli@nps.navy.mil, ***R. Kevin Wood***

How should an indictor, with limited resources, destroy arcs in a network so as to maximize the shortest path between 2 distinguished nodes? Two decomposition algorithms for this bi-level problem are derived and tested. The algorithms are extended to generalized system interdiction and tri-level system defense problems.

2) Techniques in Using DEA to Model US Army Recruiting, ***Gene Piskator***, US Army PERSCOM, ATTN: DCSOPS Training/Analysis, 200 Stovall St., Alexandria, VA 22332-0411, ***James T. Moore***, ***Jack M. Kloeber, Jr.***

DEA is enjoying growing popularity throughout the service/non-profit sectors for evaluating efficiency. Regardless of which model is selected, an important part of analyzing, selling and implementing results based on a DEA model is its applicability. We recommend techniques for avoiding misspecification of the DEA model and its input/output variables to improve the real-world usefulness and defensibility...

3) Cost Tools for Operations Other Than War, ***Dean Hartley, III***, Oak Ridge National Lab., 1099 Commerce Park, Oak Ridge, TN 37830, dhx@ornl.gov

USPACOM and MORS workshops have identified the need for tools to support the costing of OOTW and defined the general types of tools needed. At least one type is under development for OSD Comptroller by IDA. Recommended augmentations and additional tools will be discussed.

TC21 Teaching/Learning in Cyberspace: Internet-Based Virtual Global Ed: New Approaches, Skills, Corporate-Academic Partners

Sponsor: **Social Science**
Sponsored Session

Chair: Rena Paloff, Crossroads Consulting Group, 206 Lagunaria Lane, Alameda, CA 94502

Co-Chair: Keith Pratt, Crossroads Consulting Group, 1001 S Cedar, Box 56, Ottawa, KS 66067

1) Facilitating Learning in Cyberspace: New Approaches, New Skills, ***Rena Paloff***, Crossroads Consulting Group, 206 Lagunaria Ln, Alameda, CA 94502, ***Keith Pratt***

Successful teaching in cyberspace classrooms requires moving beyond old models of pedagogy into new facilitative practices. Two leaders in international online education review a case study of successful approaches for design, development and evaluation of facilitation of electronic workshops, classes and meetings.

2) Towards a Unified View of Working, Learning & Living in the Knowledge Economy, ***Bruce La Rue***, The Fielding Institute, 2112 70th Ave., West #3, Tacoma, WA 98466

How can we credential online advanced learning for knowledge workers who need higher education previously reserved for a small number of managers? Educators and organizations are jointly developing new paradigms to meet these cultural and organizational challenges.

3) Information Literacy in a Distributed Learning Graduate School, ***Leslie Kent Kunkel***, The Fielding Institute, Learning & Info. Literacy, 2112 Santa Barbara St., Santa Barbara, CA 93105

The Fielding Institute's students are adult professionals seeking graduate degrees; both students and faculty are geographically dispersed throughout the world. Our unique community demands a non-traditional learning model - one which is competency-based, integrative and learner-centered. To support such a model, we've developed an Information Literacy Program to help community members become "information literate"...

TC22 Scheduling Applications

Cluster: **Scheduling Applications**
Invited Session

Chair: Rasaratnam Logendran, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, logendrr@ccmail.orst.edu

1) The Impact of Minor Setups on the Sizing of Transfer Batches, ***Ronald G. Askin***, University of Arizona, Dept. of SIE, Tucson, AZ 85721-0020, ron@sie.arizona.edu http://www.sie.arizona.edu/faculty/askin.html

The use of multiple transfer batches per process batch (lot-splitting) can reduce cycle times by permitting parallel scheduling of operations in discrete parts manufacturing. We examine the effect of minor setups and manual batch transfers. Models for deterministic flow lines and general flow systems with random arrivals are presented.

2) Overhaul Maintenance Scheduling of Trains in a Transport Organization, ***Chelliah Sriskandarajah***, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, chelliah@mie.utoronto.ca, ***Andrew K. S. Jardine***, ***C. K. Chan***

We use a GA-based procedure to schedule the overhaul maintenance requirements of various units of trains as closely as possible to their due dates at the Hong Kong Mass Transit Railway Corporation. The schedules obtained are shown to be significantly better than those established manually at the MTRC.

3) A Methodology for Scheduling the Placement of Components in Circuit Board Assembly, ***Rasaratnam Logendran***, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, logendrr@ccmail.orst.edu, ***Carlos H. Capps***

A GA-based methodology is presented to minimize the mean flow time in placing the components in circuit board assembly, consisting of a high-speed placement machine and a multi-function placement machine. Setup reduction is achieved by simultaneously improving the part mix in each machine and the board sequence on each assembly line.

TC25 Mixed Integer Programming

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: Martin Savelsbergh, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, martin.savelsbergh@isye.gatech.edu http://akula.isye.gatech.edu/~mwps

1) Using EMOSL: A Combined Modeling & Optimisation Language for MIPs, ***L. A. Wolsey***, CORE, Voie Du Roman Pays 34, Louvain-La-Neuve, 1348, Belgium, wolsey@core.ucl.ac.be, ***G. Belvaux***, ***F. Ortega***

We discuss using EMOSL, an extended modeling and optimisation subroutine library, to develop a specialised modeller/optimiser for a class of production planning problems, a specialised modeller/optimiser for MIPs with disjunctions, as well as facilitating the development of problem-specific MIP heuristics and large-scale applications integrating various optimisation problems.

2) A Network Approach to 0-1 Programming, ***Warren Adams***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-1907, wadams@clemson.edu, ***Paul Hadavas***

Using a decomposition method on the level-1 rlt formulation, we show how tight LP bounds can be computed for mixed 0-1 linear and quadratic programs. A linear transformation is employed to cast the formulation into a variable space with a network substructure. Preprocessing is discussed and computational results presented.

3) Mixed Conflict Graphs in Integer Programming, ***Martin Savelsbergh***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, martin.savelsbergh@isye.gatech.edu http://akula.isye.gatech.edu/~mwps, ***A. Atamturk***, ***George L. Nemhauser***

The use of conflict graphs, i.e., vertex packing relaxations, has significantly improved our ability to solve certain classes of 0-1 integer programs. Motivated by these successes, we study mixed conflict graphs, which are useful for various resource allocation models. We study the polyhedral structure of these relaxations and present computational results.

TC26 Packing, Covering & Partitioning

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: Craig Tovey, Georgia Institute of Technology, School of ISyE, Atlanta, GA 30332, ctovey@isye.gatech.edu

1) Facets with Fixed Defect of the Stable Set Polytope, ***Laszlo Liptak***, 10 Hillhouse Ave., PO Box 208283, New Haven, CT 06520-8283, liptak@pascal.math.yale.edu, ***Laszlo Lovasz***

To any facet of the stable set polytope, we associate an integer, called the defect. We show that for any delta there is a finite basis such that any graph with a facet of defect delta can be obtained from one of these graphs by a simple subdivision operation.

2) Exact Algorithms for the Set Covering Problem, ***Paolo Toth***, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 40136, Italy, ptoth@deis.unibo.it, ***Alberto Caprara***, ***Matteo Fischetti***

The set covering problem is a main model for several important applications, including crew scheduling and vehicle routing. A B&B algorithm is proposed, based on effective Lagrangian, surrogate and LP lower bounds. Extensive computational results on instances from the literature, comparing the most effective enumerative algorithms, are presented.

3) Quality of Local Optima for Different Neighborhoods of the Partition Problem, ***Craig Tovey***, Georgia Institute of Technology, School of ISyE, Atlanta, GA 30332, ctovey@isye.gatech.edu, ***Noga Alon***

Selecting a good neighborhood for local search algorithms depends substantially on knowing the quality of local optima. Such results are rare. For the partition problem, we find the asymptotic expected value of a local optimum with regard to neighborhoods of small Hamming distance, e.g., swapping is Hamming distance 2.

TC27 Numerical Methods for Optimal Control

Cluster: Nonlinear Programming
Sponsor: Optimization
Sponsored Session
Chair: John T. Betts, The Boeing Company, PO Box 3707, MS 7L-21, Seattle, WA 98124-2207, john.t.betts@boeing.com

1) Very Low Thrust Trajectory Optimization, ***John T. Betts***, The Boeing Company, PO Box 3707, MS 7L-21, Seattle, WA 98124-2207, john.t.betts@boeing.com

The application of collocation methods to low thrust trajectory design results in very large sparse NLPs. We present solutions for NLPs with over 250,000 variables and approximately 150,000 extremely nonlinear constraints.

2) DynoPC: A Dynamic Optimization Tool for Process Engineering, ***Lorenz T. Biegler***, Carnegie Mellon University, Chemical Eng. Dept., Pittsburgh, PA 15213-3890, biegler@cmu.edu, ***A. Cervantes***, ***Y-D Lang***

We describe an implementation of a collocation-based, NLP strategy for challenging dynamic process systems. These DAE systems have unstable modes as well as state variable constraints. We describe DynoPC, a software tool that integrates a number of dynamic optimization and user interface features within a Windows environment.

3) Affine-Scaling Interior-Points Methods for Degenerate Bound Constrained Optimization Problems, ***Matthias Heinkenschloss***, Rice University, Dept. of Comp. & App. Math., 6100 Main St., Houston, TX 77005-1892, heinken@caam.rice.edu, ***John Dennis***, ***L. Vicente***, ***M. Ulbrich***, ***S. Ulbrich***

Optimal control problems with pointwise control constraints lead to large scale minimization problems. Interior-point methods are attractive for solving such problems; however, convergence may suffer from problem degeneracy. We will study a class of affine-scaling interior-point methods and present enhancements which maintain fast local convergence.

4) Applications of Numerical Optimization & Control in the Financial Markets, ***Ekkehard W. Sachs***, Universitat Trier, FB IV - Mathematik, Trier, D-54286, Germany, sachs@msun3.uni-trier.de

We consider various aspects of applications of optimization to problems in financial mathematics. The emphasis lies in the transfer from the modeling phase to an efficient numerical solution of the models. The applications are in the areas of forecasting and option pricing.

TC28 Discrete & Nonconvex Optimization in Chemical Engineering

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: Costas D. Maranas, Pennsylvania State University, 112A Fenske Lab., University Park, PA 16802, cdm8@psu.edu

1) Agile Manufacturing of Specialty Chemicals, ***Matthew J. Realff***, Georgia Institute of Technology, Sch. of Chem. Eng., Atlanta, GA 30332-0100, matthew.realff@che.gatech.edu, ***Ken Kirschner***

Pipeless batch plants are an emerging technology for the manufacture of specialty chemical products such as paints, lubricants and adhesives. They comprise stations to which materials are piped and AGVs that carry vessels between stations. Optimization of the layout, station choice and scheduling is important to ensure full utilization.

2) Global Optimization for the Pooling Problem, ***Mohit Tawarmalani***, University of Illinois, Dept. of MIE, 1206 W Green St., Urbana, IL 61801, tawarmal@uiuc.edu, ***Nilanjan Adhya***, ***Nick Sahinidis***

Pooling problems frequently occur in petrochemical industries where production requires the mixing of streams of varying qualities. We incorporate a Lagrangian lower bounding scheme within the branch and reduce framework. The algorithm provides globally optimal solutions to the corresponding nonconvex NLPs with deterministic guarantee. Computational results will be presented.

3) Global Optimization for Identification of MIMO Transfer Functions, ***Lorenz T. Biegler***, Carnegie Mellon University, Chemical Eng. Dept., Pittsburgh, PA 15213-3890, biegler@cmu.edu, ***George Staus***, ***Erik Ydstie***

Transfer function identification leads to a large nonconvex NLP that can be addressed successfully with spatial B&B methods. For the MIMO problem, a number of simplifications can be made; this tends to improve performance, especially for larger problems. A number of examples will demonstrate performance.

4) Decomposition Approaches in Semicontinuous Process Planning, ***Costas D. Maranas***, Pennsylvania State University, 112A Fenske Lab., University Park, PA 16802, cdm8@psu.edu,

Anshuman Gupta

A number of decomposition approaches are explored for solving midterm semicontinuous planning problems. The special structure of the problems is exploited to derive Lagrangean relaxation-based heuristics for obtaining good solutions with performance guarantees for large-scale problems.

TC29 Eigenvalue Optimization

Cluster: Nonsmooth Optimization
Sponsor: Optimization
Sponsored Session
Chair: Michael L. Overton, Courant Institute, 251 Mercer St., New York, NY 10012, overton@cs.nyu.edu

1) Eigenvalues, Hyperbolic Polynomials & Convexity, ***Adrian S. Lewis***, University of Waterloo, Dept. of Combinatorics & Opt., Waterloo, Ontario, N2L 3G1, Canada, aslewis@orion.uwaterloo.ca, ***H. Bauschke, O. Guler, H. Sendov***

The positive semidefinite cone is a "hyperbolicity cone" defined by positivity of all "eigenvalues" corresponding to a certain "hyperbolic" polynomial, namely the determinant. Such cones admit promising interior-point barriers. We show that any symmetric convex function of the "eigenvalues" is itself convex and outline some duality theory.

2) Variational Properties of Eigenvalues, ***Michael L. Overton***, Courant Institute, 251 Mercer St., New York, NY 10012, overton@cs.nyu.edu, ***James V. Burke, Julio Moro***

We discuss perturbation theory for eigenvalues of general real or complex matrices, not restricted to be symmetric or Hermitian. Generically, multiple eigenvalues are not Lipschitz functions of perturbations in the matrix, but nonetheless precise perturbation results can derived. Much of this work was done originally by Lidskii in 1965.

3) Subdifferentials of Eigenvalue Functions, ***James V. Burke***, University of Washington, Dept. of Math., Seattle, WA 98195, burke@math.washington.edu, ***Michael L. Overton***

We derive formulas for the subdifferential of certain eigenvalue functions, including the spectral abscissa and the spectral radius. The underlying matrix space of interest is the set of real or complex matrices, not restricted to be symmetric or Hermitian; consequently, the eigenvalue functions are not Lipschitz.

4) Eigenvalue Optimization: Numerical Tools, Examples & Applications, ***Francois Oustry***, Courant Institute, 251 Mercer St., Ste. 526, New York, NY 10012, oustry@cs.nyu.edu

We discuss a basic example from control theory, the stability analysis of linear time-varying systems, to illustrate the theoretical and numerical difficulties arising in eigenvalue optimization, including nonsmoothness and numerical instabilities. We also discuss other applications of the subject, including large-scale problems.

TC30 Reliability & Maintainability Engineering Optimization

Cluster: Engineering Optimization
Invited Session
Chair: Kailash C. Kapur, University of Washington, IE Program, Box 352650, Seattle, WA 98195-2650, kkapur@u.washington.edu http://weber.u.washington.edu/ukkaput/

1) Robust Reliability Design Using Environmental Stress Screening, ***Kai Yang***, Wayne State University, Dept. of IME, Detroit, MI 48202, kyang@mie.eng.wayne.edu

Robust design strategy is developed which integrates DoE with environmental stress testing in order to make product design insensitive to environmental stresses. Reliability is related to performance degradation and several reliability models are developed based on performance under environmental stresses.

2) Proactive Maintenance Policy Evaluation & Implementation, ***Jan Shi***, University of Michigan, Dept. of IOE, 1815 IOE Bldg., Ann Arbor, MI 48019-2117, shihang@engin.umich.edu

We present a framework and methodology for integrated proactive maintenance. It goes beyond the traditional maintenance related research and practice by developing a theoretical basis for the science of proactive maintenance, with emphasis on the integration of advanced statistics, engineering technologies and MS.

3) Preventive Maintenance & Opportunistic Maintenance Planning for Transient Multiunit Systems, ***O. Geoffrey Okogbaa***, University of South Florida, Dept. of IMSE, 4202 E Fowler Ave., Tampa, FL 33620-5250, okogbaa@eng.usf.edu, ***Xia Peng***

We examine recent efforts in developing analytical models that consider the transient issue as well as the economic dependency issue in the development of maintenance plans. Transient conditions require that the planning horizon is finite and exponential distribution is not appropriate.

4) Techniques for Multistate Reliability Models, ***Russell Brunelle***, University of Washington, IE Program, Box 352650, Seattle, WA 98195-2650, sfpse@u.washington.edu, ***Kailash C. Kapur***

Traditional reliability models allow 2 states of functioning for a system or component. Recent papers have proposed more flexible models. The utilization of these models has been hindered by a lack of practical tools for implementing and analyzing them. We suggest several techniques for non-binary reliability analysis and assessment.

TC31 New Advances in Tabu Search

Cluster: Tabu Search
Invited Session
Chair: James P. Kelly, University of Colorado, Coll. of Bus., Boulder, CO 80309, james.kelly@colorado.edu

1) Application of Tabu Search, Scatter Search & the Unconstrained Quadratic Binary Program, ***Bahram Alidaee***, University of Mississippi, Dept. of Mgmt. & Mktg., School of Bus. Admin., University, MS 38677, alidaee@bus.olemiss.edu, ***Mohammad M. Amini, Gary Kochenberger***

Considerable work has been carried out in recent years developing new approaches for solving the unconstrained quadratic binary program, QP. We highlight some innovative applications of the model and give computational experience with our work on both TS and scatter search heuristics applied to various combinatorial problems that have been recast in the form of QP.

2) A Tabu Search-Based Algorithm for the Multiple Resource-Constrained Project Scheduling Problem, ***Balu Rangaswamy***, US WEST Advanced Technologies, Inc., 4001 Discovery Dr., Boulder, CO 80303, ***Fred Glover, Anant Singh Jain***

A TS-based algorithm is developed for the computationally intractable multiple-resource constrained project scheduling problem. The approach uses successive filtration and sequential fan candidate list strategies at different phases of the search. Results of comparative studies with other approaches on moderately large benchmark problems demonstrate the effectiveness of the procedure.

3) Simulation Optimization, ***James P. Kelly***, University of Colorado, Coll. of Bus., Boulder, CO 80309, james.kelly@colorado.edu, ***Fred Glover, Manuel Laguna***

A metaheuristic hybrid algorithm that utilizes TS, scatter search, neural networks and GAs, intitled OptQuest, is used to effectively address the general simulation approach problem. New advances in capability and efficiency are discussed and demonstrated. A commercially available product is briefly discussed.

TC32 Software Demonstrations

Chair: David Krahl, Imagine That, Inc., 6830 Via Del Oro, Ste. 230, San Jose, CA 95119, davek@imaginethatinc.com

1) Software Demonstration: XPRESS-MP - A Fully Integrated Modeling & Optimization System, ***Sebastian Ceria***, Dash Optimization Inc., 115 River Rd., Ste. 1203, Edgewater, NJ 07020

XPRESS-MP is a state-of-the-art software solution for modeling and optimization. We will show how XPRESS-MP can be used to model and solve complex problems arising from a wide variety of applications. We will introduce our new product EMOSL which allows users to integrate modeling and optimization into any program...

2) Software Demonstration: Extend Simulation Software, ***David Krahl***, Imagine That, Inc., 6830 Via Del Oro, Ste. 230, San Jose, CA 95119, davek@imaginethatinc.com

Come see why Extend is the acknowledged standard for discrete event/continuous/combined simulation in top universities and corporations alike. With top-down, button-up hierarchy, built-in activity-based costing, customizable animation, 1-click output analysis, automatic confidence intervals, sensitivity analysis, control panel interface, interactive model execution, etc...

TC33 Airline Schedule Evaluation & Optimization

Sponsor: Aviation Applications
Sponsored Session

Chair: Matthew Berge, The Boeing Co., PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, matthew.e.berge@boeing.com

1) Airline Schedule Explorer, ***Esmond Devun***, The Boeing Company, MS 7L-20, PO Box 3707, Seattle, WA 98124-2207, esmond.e.devun@boeing.com, ***Nicholas J. Walker***

We introduce a tool which uses database technology to explore and evaluate airline schedules. Evaluation measures are derived from the Boeing decision window model and include market coverage and competitive density. A brief description of the tool along with study results will be given.

2) Incremental Airline Schedule Design, ***Cynthia Barnhart***, MIT, Center for Trans. Studies, Rm. 1-229, Cambridge, MA 02139, cbarnhar@mit.edu, ***Monoj Lohatepanont, Nirup Krishnamurthy***

The flight schedule design problem involves selecting and scheduling the flight legs that an airline will include in its service network. Fleet assignment involves assigning an aircraft type to each leg. We present an integrated schedule design/fleet assignment model and solution approach to determine improvements to a given schedule.

3) Fleet Assignment in Passenger Origin-to-Destination Simulator, ***Matthew Berge***, The Boeing Co., PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, matthew.e.berge@boeing.com, ***Sharon Filipowski, Craig A. Hopperstad***

The Boeing PODS is currently being used to explore the effectiveness of alternative assumptions and strategies for fleet assignment. An overview of the study approach, ground rules and issues will be given along with preliminary results.

Tuesday 14:45-16:15

TD01 Decision & Risk Analysis in the Management of Faster-Better-Cheaper Space Missions

Sponsor: Decision Analysis
Sponsored Session
Chair: Robin Dillon, Stanford University, Dept. of IE, Stanford, CA 94305, dillon@leland.stanford.edu

1) Probability Elicitation for Faster-Better-Cheaper NASA Space Missions, ***Ralph Miles Jr.***, Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91109, ralph.f.miles@jplnasa.gov

Probability elicitation for risk assessment on FBC NASA space missions must focus on only the major contributors to risk. A significant risk list is prepared jointly by the risk analyst and the mission engineer for incorporation into a probabilistic fault tree. A 90-minute protocol is employed for CDF elicitation that has both training and elicitation parts.

2) Risk Analysis & System Trades in the Mars Sample Return Mission, ***Robert Shishko***, Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91109, robert.shishko@jpl.nasa.gov

DA and risk models provide the framework for calculating risk-based MoEs. We describe the framework for calculating risk-based MoEs for the Mars Sample Return mission planned for the early part of the next decade. The integrated models include Mars environments models, rover operations simulations, reliability models and simulations and precision landing models.

3) Analytical Tools for the Management of Faster-Better-Cheaper Space Missions, ***Robin Dillon***, Stanford University, Dept. of IE, Stanford, CA 94305, dillon@leland.stanford.edu, ***Elisabeth Pate-Cornell***

The FBC management of NASA's unmanned space program requires explicit management of tradeoffs between risks, costs and schedule. We will present several tools based on risk analysis, DA, optimization and warning systems models that help set priorities, quantify tradeoffs and optimize the allocation of resources to minimize risk.

TD02 Distribution Strategy & Marketing Partnerships

Sponsor: Marketing
Sponsored Session
Chair: Hao Zhao, Rutgers University, Fac. of Mgmt., 180 University Ave., Newark, NJ 07102, haozhao@andromeda.rutgers.edu

1) Sharing the Box-Office Pie: The Impact of Contract Terms on Distribution Channels, ***Chuck Weinberg***, University of British Columbia, Fac. of Comm. & Bus. Admin., 2053 Main Mall, Vancouver, BC V6T 1Z2, Canada, chuck.weinberg@commerce.ubc.ca, ***Sanjeev Swami, Eunkyu Lee***

Each week, motion picture exhibitors share a (typically varying) portion of a movie's box-office receipts with its distributor based on a fixed contract. The current study empirically examines the profit impact and channel coordination implications of different types of contracts found in the literature and industry practice.

2) Distribution Intensity, Choice & Price: Insights from Transaction Data for New Car Sales, ***Randolph E. Bucklin***, UCLA, The Anderson Sch., 110 Westwood Plaza, Los Angeles, ca 90095, randy.bucklin@anderson.ucla.edu, ***Jorge Silva-Risso***

Based on point-of-sale transaction data, we develop an empirical model of the effects of distribution intensity on new car choice, selling prices and dealer margins. We construct measures of the effective distribution intensity that confronted each new car buyer. Preliminary analyses indicate that intensity is predictive of those outcomes.

3) Forecasting New Product Success Before Developing the New Product Concept, ***Steven M. Shugan***, University of Florida, 212 Bryan Hall, Gainesville, FL 32611-7155

We provide very early forecasts for new products before the development of new product concepts or when concepts are poor predictors of success. We use data on prior projects involving different individual members of the current product development team and provide an application with motion picture industry data.

4) Advertising Agency Compensation: Principal-Agent Approach, ***Hao Zhao***, Rutgers University, Fac. of Mgmt., 180 University Ave., Newark, NJ 07102, haozhao@andromeda.rutgers.edu

We investigate the issue of advertising agencies' compensation for their services provided to advertisers. The advertising agency's action is unobservable to the advertiser, giving rise to moral hazard in their relationship. Using the principal-agent theory, we construct a model to analyze the agent's behavior under different compensation methods.

TD03 Teaching Service Operations Management

Sponsor: Education
Sponsored Session
Chair: Scott E. Sampson, Brigham Young University, Marriott Sch. of Mgmt., 689 TNRB, Provo, UT 84602, scott_sampson@byu.edu

1) Education Tutorial: Teaching Service Operations Management, ***Scott E. Sampson***, Brigham Young University, Marriott Sch. of Mgmt., 689 TNRB, Provo, UT 84602, scott_sampson@byu.edu

Most operations management curricula focus on manufacturing, yet the service sector holds most industry and job growth in the developed economies. This tutorial format session highlights both principles and quantitative tools for effective service operations management courses. These ideas can also be effectively used in standard operations management curricula.

TD04 Quantitative Approaches to Quality

Sponsor: MSOM
Sponsored Session
Chair: Susan A. Slotnick, SUNY, 317 Harriman Hall, Harriman Sch. for Mgmt. & Pol., Stony Brook, NY 11794-3775, slotnick@pegasus.har.sunysb.edu

1) withdrawn - author request of 9/14, ***Kathy Paulson Gjerde***, Butler University, Coll. of Bus. Admin., 4600 Sunset Ave., Indianapolis, IN 46208-3485, kpaulson@butler.edu, ***John M. Barron***

2) Dynamic Management of New Product Extensions in the Product Development Process, ***Dinesh Wadhwani***, University of Minnesota, Dept. of OMS, Carlson School of Mgmt., Minneapolis, MN 55455, wadhwani@msi.umn.edu, ***Shantanu Bhattacharya***

The performance of a new product can be improved by delaying its launch. However, the potential demand of the product could be reduced owing to the decreased utility to consumers from delayed comsumption. We characterize the optimal timing of introduction and pricing strategies under constrained capacity conditions after launch.

3) Customer Service Quality: An Empirical Assessment in a Manufacturing Environment, ***Diane H. Parente***, University of Mississippi, Dept. of Mgmt. & Mktg., Sch. of Bus. Admin., Tupelo, MS 38801, dparente@olemiss.edu

Customer service is an important performance measure in a manufacturing environment. We evaluate the construct at the product level of analysis. Performance level desired by the customer is compared against the emphasis

demonstrated by the supplier on each attribute. Variance is also analyzed by product level characteristics.

4) Quality Tradeoffs Between Customers & Firms, ***Susan A. Slotnick***, SUNY, 317 Harriman Hall, Harriman Sch. for Mgmt. & Pol., Stony Brook, NY 11794-3775, slotnick@pegasus.har.sunysb.edu, ***Kathy Paulson Gjerde***, ***Subimal Chatterjee***

Customers respond to various dimensions of quality. We develop a profit-maximization model in which delivery dates and processing times are set by a multi-stage sequential game between customer and seller. Customers' utility functions depend on performance quality, price and delivery. We identify conditions under which a "high-quality" strategy is the equilibrium.

TD05 Product Variety Management

Sponsor: MSOM
Sponsored Session
Chair: Jayashankar M. Swaminathan, University of California, Haas Sch. of Bus., Berkeley, CA 94720, msj@haas.berkeley.edu

1) Product Variety, Market Strategy & Process Flexibility: An Empirical Study of the US Bicycle, ***Taylor Randall***, University of Pennsylvania, The Wharton Sch., 1300 SH-DH, Philadelphia, PA 19104, randal01@opim.wharton.upenn.edu, ***Karl Ulrich***

We explore connections among product variety, market strategy and process flexibility. We examine the US bicycle industry and report on an empirical study of product offerings and production/distribution systems.

2) The Impact of Product Substitution on Profitability, ***Kumar Rajaram***, UCLA, Op. & Tech. Mgmt. Area, Los Angeles, CA 90095-1481, ***Christopher S. Tang***

We develop a framework to analyze the impact of demand substitution on profitability. We also conduct an experiment to generate data and estimate the parameters inherent to the framework. Our analysis suggests that product substitution could increase profit significantly. However, this gain is accrued more from inducing product substitution than optimal inventory planning.

3) Stocking Assortments Under Dynamic Consumer Substitution, ***Siddharth Mahajan***, University of Pennsylvania, Wharton Sch., Dept. of OPIM, Ste. 1300 SH-DH, Philadelphia, PA 19104, mahajan@opium.wharton.upenn.edu, ***Garrett J. van Ryzin***

We analyze a stochastic inventory model in which customers dynamically substitute among product variants within a retail assortment when inventory is depleted. Customers chose based on a utility maximization criterion. Using a sample path analysis, we analyze structural properties of the expected profit function and develop a stochastic gradient algorithm...

4) Substitution of Products Under Dynamic Customer Arrivals, ***Jayashankar M. Swaminathan***, University of California, Haas Sch. of Bus., Berkeley, CA 94720, msj@haas.berkeley.edu, ***J. George Shanthikumar***

Substitution of demand with an alternative product is becoming an important aspect of demand management. We consider the problem of substitution for a firm where customer demands are random and the decision has to be made in a dynamic fashion. We provide properties on the optimal substitution policy.

TD06 Panel: Emerging Issues & Directions in Quality Improvement

Cluster: Statistics/Quality Control
Invited Session
Chair: Jan Shi, University of Michigan, Dept. of IOE, 1815 IOE Bldg., Ann Arbor, MI 48019-2117, shihang@engin.umich.edu

1) Panel: Emerging Issues & Directions in Quality Improvement, ***Susan Albin***, Rutgers University, Dept. of IE, PO Box 909, Piscataway, NJ 08855-0909, salbin@rci.rutgers.edu, ***Tsong-how Chang***, University of Wisconsin, Dept. of IME, PO Box 784, Milwaukee, WI 53201, ***Douglas C. Montgomery***, Arizona State University, Dept. of IE, Tempe, AZ 85287-5906, doug.montgomery@asu.edu, ***C. F. J. Wu***, University of Michigan, Dept. of Stats., 1440 Mason Hall, Ann Arbor, MI 48109-1027, jeffwu@stat.lsa.umich.edu

This invited panel will address the panelists' understanding of "Emerging Issues & Directions in Quality Improvement." Topics include multivariate SPC and analysis, designed experiments, in-process quality improvement, joint research of SPC and OR/MS, etc. The panel will include short presentations by each panelist and Q&A discussions.

TD07 Quality Management Through Global Partnership: Japanese Practices

Cluster: Global Partnership, Information Systems & Quality
Invited Session
Chair: Yutaka Umezawa, University of Tokyo, Faculty of Econ., 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan, umezawa@e.u-tokyo.ac.jp

Co-Chair: Hirokuni Tamura, University of Washington, Dept. of MS, Sch. of Bus. Adm., Box 353200, Seattle, WA 98195-3200, htamura@u.washington.edu http://weber.u.washington.edu/~mgtsci

1) Hewlett-Packard Case of Developing Intra-Company Global Total Quality Management, ***Kenzo Sasaoka***, Hewlett-Packard Japan, Takaido-Higashi 3-chrome, Suginiami-ku, Tokyo, 168-8585, Japan, kenzo_sasaoka@om.jpn.hp.com http://www.jpn.hp.com

Systematic process improvement, TQC, verified its revolutionary effects first by Japanese joint venture and transferred to HP. HP's common practice, QMS, was developed by global contributors. Response center, international procurement or order fulfillment becomes global networking. Global competition imposes more strategic planning and quicker implementation...

2) Partnering for Quality Management: A Case of Toyota Group, ***Yutaka Umezawa***, University of Tokyo, Faculty of Econ., 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan, umezawa@e.u-tokyo.ac.jp

How does Toyota Group improve quality? Various aspects of intra-inter firm promotion of quality management at Toyota Group are discussed.

3) A Study of Science SQC for Improving the Principle of TQM at Toyota, ***Kakuro Amasaka***, Toyota Motor Corp., TQM Prom. Div., 1, Toyota-cho, Toyota Aichi, 471-8571, Japan, 1120662@tmail.toyota.co.jp http://www.toyota.com.jp/

We outline a new SQC concept, Science SQC, as a propose and demonstrative-scientific method, which enables the principle of TQM to improve systematically.

TD08 Queueing

Sponsor: Applied Probability Section
Sponsored Session
Chair: Hayriye Ayhan, Georgia Institute of Technology, Sch. of IsyE, Atlanta, GA 30332-0205, hayhan@isye.gatech.edu

1) Analysis of Mixed Queueing Networks, ***Douglas Down***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, ddown@isye.gatech.edu

A mixed queueing network is one in which there are both permanent and exogenous customers, i.e., the network has an open and closed component. These networks may be used to model manufacturing systems with breakdowns, communications networks under window flow control, etc. The stability and performance of such networks will be examined.

2) Fluid Models of Queues with Setups, ***Tava Lennon Olsen***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, tlennon@engin.umich.edu

We examine the analysis and control of queueing systems with setups using fluid models. Fluid models of systems with and without setups behave fundamentally differently and these differences will be outlined. We also outline how fluid models may arise as asymptotic limits of systems with setups.

3) Expansions for Steady State Characteristics in (Max,+) Linear Systems, ***Hayriye Ayhan***, Georgia Institute of Technology, Sch. of IsyE, Atlanta, GA 30332-0205, hayhan@isye.gatech.edu

We give an expansion formula for the joint Laplace transform of waiting times in open (max,+)-linear stochastic systems with Poisson input process. Such (max,+)-linear systems are known to allow one to represent a class of discrete event networks called stochastic event graphs. Examples of such event graphs pertaining to queueing theory are given.

4) Multiserver Scheduling on Priority Queues with Varying Connectivity, ***Christopher G. Lott***, University of Michigan, 1301 Beal Ave., Rm. 4212, Ann Arbor, MI 48109, clott@engin.umich.edu http://www-personal.engin.umich.edu/~clott, ***Demosthenis Teneketzis***

We consider scheduling problems in systems of N priority parallel queues with M ($1 <= M < N$) servers, varying binary connectivity and iid Bernoulli service success at each queue. Under various assumptions on arrivals and connectivity,

we derive conditions sufficient, but not necessary, to guarantee the optimality of an index policy...

TD09 Transportation Forecasting

Cluster: Forecasting Applications
Invited Session

Chair: Kenneth Lawrence, NJIT, Sch. of Mgmt., Newark, NJ 07102-1982, lawrence@testa.njit.edu

1) Distribution of Demand for Airline Travel, ***Richard H. Zeni***, The SABRE Group, 2345 Crystal Dr., Arlington, VA 22227, rzeni@usair.com

The distribution assumption of demand for airline travel underlies an airline's yield management system. We investigate the validity of some common assumptions. We also test the sensitivity of unconstrained methods when the actual distribution differs from the assumed distribution.

2) Modeling Freight Transportation Demand on State & Regional Levels, ***Maria P. Boile***, Lafayette College, Dept. of Civil & Environ. Eng., Easton, PA 18042-1775, maria@athena.cadlab.lafayette.edu, ***Lazar N. Spasovic***

We present a methodology for developing a regional freight transportation demand model. The model is implemented in a GIS environment, predicting flow of certain commodity groups of particular importance to the economy of the region over the regional network. Implications of the model results on transportation policy are discussed.

3) Modeling the Interstate Flow of Freight by Truck in the Continental US, ***Gary Kleinman***, NJIT, Sch. of Mgmt., Newark, NJ 07102, kleinman@admin.njit.edu, ***Kenneth Lawrence***

We focus on the development of forecasting of freight by trucks within the continental US. Our research is based on the development of an extended gravity model structure, which includes socio-economic explanatory variables.

TD10 Network Modeling & Control I

Sponsor: Telecommunications
Sponsored Session

Chair: H. Michael Chung, California State University, Dept. of IS, College of Bus. Admin., Long Beach, CA 90840-8506, hmchung@csulb.edu

1) Transient Behavior of Real-Time Self-Similar Sources & its Impact on Best-Effort Traffic, ***R. Srikant***, University of Illinois, Coord. Sci. Lab./Gen. Eng., 1308 W Main St., Urbana, IL 61801, rsrikant@uiuc.edu, ***S. Kunniyur***, ***R. Ravikanth***

We study the impact of multiplexing real-time and best-effort sources (ATM ABR or TCP sources in the Internet) when real-time sources are long-range dependent. We consider M/G/infinity and ON-OFF models for the long-range dependent sources and show that once the long-range dependent sources reach a heavily-congested state...

2) Computing Network Signatures in Polynomial Time & Its Applicability to Network Routing, Modeling & Capacity Planning, ***Paul Wang***, MITRE Corp., 600 Maryland Ave. SW, Ste. 740, Washington, DC 20024, pwang@mitre.org, ***Leone C. Monticone***

Network signatures are a new concept that capture all possible path routing information from a single node to all other nodes in a graph. A polynomial-time algorithm has been identified to compute all network signatures of a given network for studying alternative routes, network availability, modeling and capacity planning. It may also resolve the computational complexity of Hamiltonian paths, TSP.

3) Data Network Analyzer: Performance Analysis of Data Networks, ***Yasutaka Hirasawa***, University of North Carolina, Chapel Hill, NC 27514, hirasawa@or.unc.edu, ***Vidyadhar G. Kulkarni***

DNA is a hybrid analytic simulation tool for the performance analysis of data networks using frame and ATM virtual circuit traffics. The traffic streams are characterized by 4 parameters: peak rate, mean rate, mean burst length and mean squared burst length. DNA provides numerical characterizations of interactions among traffic streams and other performance measures.

4) An Upper Bound on Overflow Probability in Transient Source Systems, ***Thomas F. Reid***, AFIT, 2950 P St., Bldg. 640, WPAFB, OH 45433-7765, treid@mustang.afit.af.mil, ***Vidyadhar G. Kulkarni***

Effective bandwidth has been used in admission control for telecommunication networks, but assumes that sources are permanent. We propose a control which explicitly models the transient nature of sources in a single-buffer system where Markovian sources arrive according to a Poisson process and leave after an exponentially distributed random time.

TD11 Models for Management of Technology

Contributed Session

Chair: Jeffrey L. Ringuest, Boston College, Carroll Sch. of Mgmt., Chestnut Hill, MA 02167, jeffrey.ringuest@bc.edu

1) Decision Making Under Sequential Innovation, ***Laura J. Kornish***, Stanford University, 85-A Escondido Village, Stanford, CA 94305, lkorn@stanford.edu

We explore the consumer's "buy or wait" decision problem when facing a quickly changing technology. We show that higher variability in the technological process is actually good for the consumer and show that consideration of the technological trend's end changes the entire purchase strategy.

2) Modeling the Innovation Implementation Process, ***Shekhar Jayanthi***, University of Cambridge, 7 George Nuttal Close, Cambridge, CB4 1YE, UKf, sj215@eng.cam.ac.uk

Innovation implementation is the least understood aspect of the overall innovation process. We develop an analytical model of the innovation implementation process in the context of high-technology manufacturing, which is a natural setting for multiple and ongoing innovation implementations. The model identifies the optimal "time window" for implementing innovations.

3) Technology Management in a Real Options Framework, ***Thomas Murphy***, Mid-America Commercialization, 1500 Hayes Dr., Manhattan, KS 66502, tmurphy@kansas.net

Technology licensing and commercialization activities are examined using a real options framework. Proprietary technologies are modeled as combinations of flexibility and growth options. This real option model is tested using case histories and current practice inside an advanced technology incubation center.

4) R&D Project Selection via Conditional Stochastic Dominance, ***Jeffrey L. Ringuest***, Boston College, Carroll Sch. of Mgmt., Chestnut Hill, MA 02167, jeffrey.ringuest@bc.edu, ***Samuel B. Graves***, ***Randolph H. Case***

We describe a methodology for the selection of R&D projects to add to or remove from an existing portfolio. The analysis uses the criterion of conditional stochastic dominance. We apply the methodology to the portfolios of 2 actual companies and find consistency with observed decision maker behavior.

TD12 Strategic Technology Management

Sponsor: Technology Management/Management of Productivity & Technology
Sponsored Session

Chair: George A. Geistauts, University of Alaska, Coll. of Bus., 3211 Providence Dr., Anchorage, AK 99508

1) From Idea to Production: Technology Management Challenges in the US Automotive Industry, ***Charlette A. Geffen***, Pacific Northwest National Lab., 902 Battelle Blvd., PO Box 999, MSIN. K1-50, Richland, WA 99352, ca.geffen@pnl.gov

Suppliers are an increasingly important source of technology innovation in the automotive industry. Integrating new designs effectively into a complex manufacturing environment, however, remains a challenge. Strategic management of technology for competitive advantage will require partnerships along the technology supply chain. We illuminate approaches used to identify and implement innovations in automotive assembly plants.

2) Strategic Management of the Painting Robotics Technology in the Mexican Automotive Industry, ***Alfonso Lopez***, University of Texas, MOT Program, 4523 Temple Hill, San Antonio, TX 78217

We present a survey of the emerging robotics technology adoption in Mexico. Interviews within providers and adopters of this technology will help to understand their strategic management practices. Some problems faced during the transfer process will be described. We track sites where this new production technology has been selected.

3) International Technology Alliances in Global Economy, ***R. Ray Gehani***, University of Akron, Akron, OH

Technical standards play an important role as the cross-links for corporate interface in global markets for emerging technologies. We will discuss the strategies for using technical standards as the source of competitive advantage, either as a barrier to entry for new competitors, or as the links for collaboration among interested participants.

4) No Title Supplied, ***George A. Geistauts***, University of Alaska, Coll. of Bus., 3211 Providence Dr., Anchorage, AK 99508

No abstract supplied.

TD13 Soft Computing in Diagnosis

Cluster: Soft Computing
Invited Session

Chair: Oscar Kipersztok, The Boeing Company, Info. & Support Services, PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, oscar.kipersztok@boeing.com

Co-Chair: Mihaela Ulieru, University of Calgary, Manufacturing Engineering, 2500 University Dr.NW, Calgary, Alberta, T2N 1N4, Canada, ulieru@enme.ucalgary.ca http://www.acs.ucalgary.ca/~ulieru/Ulieru.htm

1) Automated Inference for Decision Support, ***Eric Horvitz***, Microsoft Research, One Microsoft Way, Redmond, WA 98052, horvitz@microsoft.com

Automated probabilistic and decision-theoretic reasoning systems hold promise for assisting human decision makers with challenging diagnostic reasoning and situation-assessment tasks in a variety of domains. I will highlight developments in diagnostic systems that have leveraged advances in methods for assessing harnessing graphical probabilistic models and influence diagrams...

2) QUALYNTEL: A Holonic Diagnosis & Quality Control System for Manufacturing, ***Mihaela Ulieru***, University of Calgary, Manufacturing Engineering, 2500 University Dr. NW, Calgary, Alberta, T2N 1N4, Canada, ulieru@enme.ucalgary.ca http://www.acs.ucalgary.ca/~ulieru/Ulieru.htm

A measure of the success of the manufacturing industry is certainly defined on one side by the quality of the production, measured by the extent to which the final product meets the customer's requirements and on the other by the continuity of the production, measured by a maximal run-time, thus, by the extent to which machine breakdown can be avoided...

3) An Expert Machine Approach to Fault Diagnosis, ***Dongping D. Zhu***, ZAPTRON Systems, Inc., 1055 Valencia Ave., Ste. 4, Sunnyvale, CA 94086, dan@zaptron.com http://www.zaptron.com

An expert network approach is proposed to the automated diagnosis of machine fault. Based on the factor space theory and neuro-fuzzy methodology, it builds KB by fusion of numeric and linguistic data and offers real-time diagnosis. Applications include web-based diagnosis in factory automation.

4) The 777 Onboard Maintenance System, ***Richard J. Reuter***, The Boeing Company, Seattle, WA, richard.reuter@pss.boeing.com

The Boeing 777 is a very complex and highly integrated airplane. Effects of faults in one system can propagate through many systems, making diagnoses very difficult. In addition, the environment in which the airplane operates is very highly schedule driven. To provide the capability for airlines to effectively maintain the plane, Boeing developed the Onboard Maintenance System...

5) Explanation Capability in Neural Networks, ***Don Wunsch***, Texas Tech. University, Lubbock, TX, dwunsch@aol.com

Neural network decision making has established itself in diagnostic and forecasting applications of major significance. However, a major barrier to more widespread acceptance has been the limitation of their explanation capability. It is often not enough that the decisions be correct but that they also be understandable by humans...

TD14 Service Industry I

Contributed Session

Chair: Sergei Savin, University of Pennsylvania, The Wharton Sch. 1300 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104, savin@opim.wharton.upenn.edu

1) Network Flows in Hotel Yield Management, ***Dietrich Chen***, Cornell University, 292 Rhodes Hall, Sch. of ORIE, Ithaca, NY 14853, didi@orie.cornell.edu http://www.orie.cornell.edu/~didi

Taking a common LP formulation for maximizing revenue in the hotel industry based on demand forecasts, we show that integrality comes for free giving an equivalent network flow formulation and use the latter to solve for optimal room allocation in a typical hotel. Computational requirements are such that these decisions could be made in real-time...

2) Setting Fees for University Courses, ***Donald N. Stengel***, California State University, Dept. of IS/DS, 5245 N Backer St., Fresno, CA 93740-8001, don_stengel@csufresno.edu

We discuss an application of benefit-cost analysis to a problem of setting fees for non-academic year classes in a university program. This analysis considered the critical uncertainty on price sensitivity of students, impacts on enrollment-based state funding and net benefits to all major stakeholders in the decision.

3) Optimal After-Sale Service Levels & Manufacturing Technology Decisions for Profit Maximization, ***Leslie O. Morgan***, University of Utah, Dept. of Mgmt., 1645 E Campus Ctr. Dr., Salt Lake City, UT 84112-9304, mgtlm@business.utah.edu www.business.utah.edu, ***Alysse R. Morton***

Investment in part commonality influences after-sale service costs for a portfolio of durable products. After-sale service influences future purchase behavior. The relationship between the timing of investment decisions and the optimal level of after-sale service offered by a firm is captured in a multi-period pfofit maximizing model.

4) Service Capacity Management Decisions for Rentals & Leasing, ***Sergei Savin***, University of Pennsylvania, The Wharton Sch. 1300 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104, savin@opim.wharton.upenn.edu, ***Morris A. Cohen***, ***Noah F. Gans***, ***Ziv Katalan***

Many rental and leasing businesses face the problem of optimizing and controlling their service capacity subject to non-stationary demand. We develop a modeling framework, which combines service fleet sizing and capacity management decisions in the multiperiod environment. We propose a set of buying/selling/controlling policies and evaluate their performance for various demand patterns.

TD15 Data Mining & Knowledge Discovery in Databases I

Tutorial Session

Chair: Kristin P. Bennett, RPI, Math. Sci. Dept., Troy, NY 12180-3590, bennek@rpi.edu

1) Tutorial: Data Mining & Knowledge Discovery in Databases I, ***Usama Fayyad***, Microsoft Research, 1 Microsoft Way, Redmond, WA 98052-6399, fayyad@microsoft.com, ***Paul S. Bradley***

This 2-session tutorial presents the basics of this new and emerging area and emphasize relations to constituent fields including statistics, databases, pattern recognition, learning, optimization and visualization. We provide a basic overview of the KDD process and cover the basics of each step in the process. Continued in Session TE15...

TD16 Highway Traffic Flow Theory

Sponsor: Transportation Science
Sponsored Session

Chair: H. Michael Zhang, University of California, Dept. Civil & Environ. Eng., 1 Shields Ave., Davis, CA 95616

1) Identification of Surface Relations of Traffic Variables & Its Application for Traffic Monitoring, ***Seung-min Kang***, University of California, Civil & Environ. Eng., Irvine, CA 92697, skang@translab.its.uci.edu, ***R. Jayakrishnan***

It is hypothesized that the traffic variables, speed, flow and occupancy show a surface relationship (not necessarily a catastrophe surface), as opposed to the fundamental diagram showing a 3-dimensional curve connecting speed, flow and density. We attempt to identify the relations based on short-term measurements and apply it for traffic...

2) Prediction of Freeway Traffic with Higher Order Statistics, ***Seung-min Kang***, University of California, Civil & Environ. Eng., Irvine, CA 92697, skang@translab.its.uci.edu, ***R. Jayakrishnan***, ***Stephen G. Ritchie***

Traffic prediction is vital for advanced traffic management systems and time series approaches have been applied in the past. Traditional time series approaches have utilized a rather strong assumption that the errors are normal distributed. We develop a traffic prediction model with higher order statistics such as cumulants without the normality assumption on errors...

3) Further Experimental Evidence of Traffic Flow Hysteresis, ***H. Michael Zhang***, University of California, Dept. Civil & Environ. Eng., 1 Shields Ave., Davis, CA 95616

Since Treiterer & Myers observed hysteresis phase, i.e., flow-density-speed, transitions in real traffic flow, many later empirical studies on flow-occupancy-speed relationships have revealed this phenomenon. These sets of results, however, are not fully consistent. We show examples that this inconsistency derives from data processing procedures rather than traffic flow itself...

TD17 Vehicle Routing

Sponsor: Logistics
Sponsored Session
Chair: Ann Campbell, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, ann@isye.gatech.edu

1) Dynamic Assignment & Load Acceptance in Local & Long-Haul Pickup & Delivery Operations, ***Amelia Regan***, University of California, Dept. of Civil & Environ. Eng., Engineering Gateway E4151, Irvine, CA 92697, aregan@uci.edu http://www.its.uci.edu/~aregan/, ***XiuBin Wang***

We examine several real-time operational strategies, including load acceptance and assignment and their application to both long distance and local commercial vehicle operations under the assumption of strict time windows. Performance of strategies with recourse including enroute diversion and reassignment of previously assigned loads are compared to those without.

2) A Branch Cut & Price Algorithm for the Capacitated Vehicle Routing Problem, ***Ann Bixby***, Northwestern University, Dept of IE & MS, Evanston, IL 60208-3119, abixby@iems.nwu.edu, ***Collette Coullard***, ***David Simchi-Levi***

The VRP is an important problem in logistics. We formulate it as a set-partitioning model and develop a B&C&P algorithm for its solution. In particular, we model the pricing problem as an IP, for which we develop a B&C algorithm. Computational results are discussed.

3) Routing & Scheduling in a Vendor Managed Inventory Environment, ***Ann Campbell***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, ann@isye.gatech.edu, ***Lloyd Clarke***, ***Martin Savelsbergh***

Under a vendor managed inventory policy, the vendor must decide which customers to visit each day, how much to deliver and the precise routing and scheduling of vehicles. We use both integer programming and heuristics to solve this problem in 2 stages and show results from real-world data.

TD18 Evaluating Knowledge Management & Electronic Collaboration Technology

Sponsor: Health Applications
Sponsored Session
Chair: Doug Samuelson, PUMA Systems Inc., 8711 Chippendale Ct., Annandale, VA 22003-3807, dsamuel@seas.gwu.edu

1) Panel: Advances in Information Systems Technology, ***Doug Samuelson***, PUMA Systems Inc., 8711 Chippendale Ct., Annandale, VA 22003-3807, dsamuel@seas.gwu.edu

We will review recent advances in IS technology, with particular emphasis on tools to facilitate collaboration among dispersed work groups. We will present new, improved methods to assess technology requirements and evaluate expected and realized benefits to the organization, using specific activity-based measures.

TD19 Keys to Success

Cluster: Partnering Value Methodology, Theory of Constraints & DA
Invited Session
Chair: Patricia Juetten, The Boeing Company, PO Box 3707, MS 7W-28, Seattle, WA 98124, patricia.juetten@boeing.com

1) How to Cut Project Execution in Half in Multi-Project Environments, ***James Holt***, Washington State University, 429 SE 13th Ct, Gresham, OR 97080, holt@vancouver.wsu.edu http://vancouver.wsu.edu/fac/holt/holt_home.htm

The systemic and behavioral issues that extend individual projects beyond their expected completion times are magnified in multi-project environments. Through a selection of strategic constraint, activity buffering, use of optimistic estimates, elimination of milestones, reduction of multi-tasking and improved communication, multi-projects can cut their duration in half.

2) Addressing the Human Factors in a Rapidly Changing Printed Circuit Manufacturing Environment, ***Michael Wagoner***, The Boeing Company, PO Box 3707, MS 88-01, Seattle, WA 98124, michael.t.wagoner@boeing.com

TOC, VA and other tools can help leverage the human capacity for logical thinking and effective action. We explore our "human factors" learning along with tool application within the PCB facility. We now consider this knowledge a vital part of our future.

3) Integrated Computer Tools for Value Engineering Events: Value Management Software Tools Set, ***Joseph F. Otero, Jr.***, Pratt & Whitney, 23 Westernview St., Springfield, MA 01108-1615, oterojf@pweh.com

Pratt & Whitney has developed a set of computerized tools for VM events. They prompt a standard methodology, allowing for interactive input, create charts that are presentation ready and form an electronic archive of the events. They facilitate continuous improvement.

TD20 Estimation of Performance Measures

Sponsor: Military Applications
Sponsored Session
Chair: Harry Newton, US Air Force Academy, 2354 Fairchild Dr., Ste. 6D2F Academy, CO 80840, newtonhn.dfms@usafa.af.mil

1) Estimating Shipyard Employment Levels Using Structural Modeling, ***Titus L. Fortner***, US Naval Academy, PO Box 11297, Annapolis, MD 21412

Current models for predicting the total employment of naval shipyards are inadequate. An econometric modeling approach is used by NAVSEA, which utilizes the ship contracts and start dates as inputs and forecasts the predicted employment as its output. The problem with their model is that it allows for more variation in the workforce than actually exists in the real world.

2) Analysis of the Validity of Target Availability Figures for Aircraft (G-OCA/G-SEA), ***Ray Jebsen***, USCGA, 15 Mohegan Ave., New London, CT 06320

The Coast Guard uses a minimum aircraft availability target of 71% to meet readiness requirements. This project reviews the methodology used to specify the standard. The effect of this standard on the aviation system as a whole is investigated by constructing a reliability structure function using each individual aircraft and air station as components...

3) Quality Control Models for Aircraft Comparisons, ***Ben Gates***, USCGA, 15 Mohegan Ave., New London, CT 06320

We utilize statistical techniques to highlight significant differences between selected performance measures regarding individual aircraft, aircraft types and air stations. Comparisons are made with regard to a number of measures of effectiveness, especially availability, with special emphasis on the operational effectiveness, inventory management and maintenance support of air assets...

TD21 Managing Trust & Communication in Geographically Dispersed Virtual Work Teams

Sponsor: Social Science
Sponsored Session
Chair: Diane Bandow, AT&T, 1200 Peachtree, Promenade II, Rm. 6W43, Atlanta, GA 30309, dbandow@att.com

1) Making Connections: Defining & Using Trust in Geographically Dispersed Work Groups, ***Diane Bandow***, AT&T, 1200 Peachtree, Promenade II, Rm. 6W43, Atlanta, GA 30309, dbandow@att.com

This doctoral research explores the development of trust in a systems development organization. Members of technical professions define trust and discuss how trust evolves, is lost and impacts the output of work groups. Participants provide advice for managers of geographically distributed work groups and insight on the future of dispersed work.

2) Models that Address Intercultural Communication & Barriers to Trust Within Global On-Line Teams, ***M. Beth Myers***, The Fielding Institute, 22 Ashland St., First Fl., Somerville, MA 02133-3202

We present doctoral research that focuses on the face-to-face small group process that works in support of team-building within the context of global, online teams.

3) Social Construction of Identity in Geographically Dispersed, Electronically Network Organizations, ***Bruce Bonnevier***, The Fielding Institute, 126 Cherry Tree Ln, Cherry Hill, NJ 08002-1008

Global competition requires geographically distributed individuals to quickly, often transiently, connect electronically in response to threats or opportunities. Doctoral research by a manager of networked teams that considers the effects of hyper-connectivity on the identities of these organizational members is presented.

TD22 Keynote: Benefitting From Information Technology

Keynote Session

Chair: Al Maimon, The Boeing Company, PO Box 3707, MS 74-11, Seattle, WA 98124-0346, albert.maimon@pss.boeing.com

Co-Chair: Marisa Altschul, The Boeing Company, PO Box 3707, MS 2T-20, Seattle, WA 98115, marisa.altschul@boeing.com

1) Keynote: Benefitting from Information Technology, *Albert M. Erisman*, The Boeing Company, PO Box 3707, MC 7L-69, Seattle, WA 98124

Information technology is touching every corner of the processes and products of many businesses today. When technology is used to automate an old process, it often adds cost and falls short of its goals, but when it is used to enable new ways of doing things it can transform both products and work often with tremendous benefit to the business. This close linkage to the business suggests that the major benefits of technology come when the technology development is done in close collaboration with business needs. I will discuss some recent and emerging technologies and show their impact in airplane design and support, and some ideas for getting technology out of the research environment and put to work.

TD25 Computational Approaches for Scheduling

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session
Chair: Charu C. Aggarwal, IBM, TJ Watson Research Ctr., Box 704, Yorktown Heights, NY 10598, charu@watson.ibm.com

1) Minimizing Total Completion in the Two-Machine Flow Shop, *Steef Van De Velde*, Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR, The Netherlands, s.velde@fac.fbk.eur.nl, ***Han Hoogeveen***

We present an optimization algorithm for the 2-machine flow shop problem of minimizing total completion time. The algorithm employs LP bounds obtained by using a formulation based upon the concept of positional completion times. Computational experiments show that the algorithm is superior to the best one thus far.

2) Column Generation for Hard Machine Scheduling Problems, *Zhi-long Chen*, University of Pennsylvania, Dept. of Systems Eng., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu

We present an exact solution method based on set partitioning type formulation and column generation for a wide class of hard machine scheduling problems. The method gives extremely tight lower bounds and is capable of solving medium- to large-sized problem instances.

3) Scheduling Issues for Multimedia Systems, *Charu C. Aggarwal*, IBM, TJ Watson Research Ctr., Box 704, Yorktown Heights, NY 10598, charu@watson.ibm.com, ***Joel Wolf***, ***Philip S. Yu***

We present some results in optimization of scheduling issues in multimedia systems. In particular, we study how better optimization models can substantially improve the I/O requirements for video on demand systems.

TD26 Novel Applications of Combinatorial Optimization

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: Robert A. Bosch, Oberlin College, Dept. of Math., Oberlin, OH 44074, bobb@cs.oberlin.edu

1) Using Integer Programming to Solve Problems in Recreational Mathematics, *Robert A. Bosch*, Oberlin College, Dept. of Math., Oberlin, OH 44074, bobb@cs.oberlin.edu

We present a brief overview of the ways in which integer programming can be used to tackle problems in the field of recreational mathematics. Among the problems we discuss are problems related to Conway's game of life, problems concerning polyominoes and a problem arising in the recent card game set.

2) Protein Folding: Complexity & Approximation, *Vijay Chandru*, Indian Institute of Science, Comp. Sci. & Auto., Bangalore, 560012, India, chandru@csa.iisc.ernet.in, ***V. S. Anilkumar***, ***Abhi Dattasharma***

The protein folding problem is to predict the 3-dimensional fold of a sequence of amino acids. A simplified version of this problem looks for a minimum energy embedding of the sequence in the 3D integer lattice. We will present results on the complexity (and approximation) of protein folding.

3) Solving Location & Routing Problems, *Collette Coullard*, Northwestern University, Dept. of IE/MS, Evanston, IL 60208-3119, coullard@iems.nwu.edu, ***Rosemary T. Berger***, ***Mark Daskin***

We consider the problem of optimally locating distribution centers and routing deliveries through them to customers. We focus on perishable products, leading to restrictions on route lengths. We present computational results for general problems, as well as efficient methods and polyhedral results for special cases.

TD27 Large-Scale Nonlinear Programming

Cluster: Nonlinear Programming
Sponsor: Optimization
Sponsored Session
Chair: Stephen G. Nash, George Mason University, OR & Eng. Dept., Fairfax, VA 22030, snash@gmu.edu

1) Fast & Reliable Interior Point Methods for Nonlinear Programming, *Jorge Nocedal*, Northwestern University, ECE Dept., Evanston, IL 60208, nocedal@ece.nwu.edu

Most of the interior point algorithms for large-scale NLP exhibit a trade-off between robustness and speed of convergence. We describe dynamic strategies for accelerating convergence of a new algorithm, NITRO, that preserve its global convergence properties. Numerical tests on a set of large problems are reported.

2) A Primal-Dual Trust-Region Algorithm for Minimizing a Non-Convex Function Subject to Constraints, *Andrew R. Conn*, IBM, TJ Watson Res. Ctr., PO Box 218, Yorktown Heights, NY 10598, arconn@watson.ibm.com, ***Nicholas I. M. Gould***, ***Philippe Toint***

An algorithm is proposed for non-convex minimization. The method uses a primal-dual trust-region model to ensure descent on a suitable merit function. Convergence of a well-defined subsequence of iterates is proved to a second-order critical point from arbitrary starting points. Numerical results will be presented.

3) Truncated-Newton Methods for Discretized Problems, *Stephen G. Nash*, George Mason University, OR & Eng. Dept., Fairfax, VA 22030, snash@gmu.edu

Many large optimization problems represent a family of models of varying size, corresponding to different resolutions or discretizations. We examine algorithmic modifications appropriate for such problems in the context of a truncated-Newton method.

4) withdrawn - chair request of 9/23, *Todd Plantenga*, Sandia National Laboratories, MS 9214, 7011 East Ave., Livermore, CA 94551, tdplant@ca.sandia.gov

TD28 Process Network Synthesis

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: Tamas Rapcsak, Hungarian Academy of Sciences, Comp. & Auto. Inst., PO Box 63, Budapest, H-1518, Hungary, rapcsak@oplab.sztaki.hu

1) Structural Analysis of Process Network Synthesis, *Ferenc Friedler*, University of Veszprem, Dept. of Comp. Sci., Egyetem U 10, Veszprem, H-8200, Hungary, friedler@dcs.vein.hu, ***B. Imreh***, ***Z. Kovacs***

Process network synthesis is a fundamental problem in designing any processing system, where its structural part is NP-complete. On the basis of structural analysis of process network synthesis, structural decomposition and reduction techniques are to be presented to facilitate optimization methods.

2) Heuristics for Process Network Synthesis, *Csanad Imreh*, Jozsef Attila University, Dept. of Informatics, Aradi-vertanuk 1, Szeged, H-6720, Hungary, csanad@inf.u-szeged.hu, ***Z. Blazsik***, ***Cs. Hollo***, ***Z. Kovacs***

Since the structural part of process network synthesis is NP-complete, there are unlikely to be polynomial algorithms for finding optimal solution. Consequently, heuristics providing a near optimal solution have great importance. New heuristics are presented which are equipped with both worst case and empirical analysis.

3) Integration of Combinatorial & Global Optimization Approaches for Solving Process Network Synthesis Problems, *Janos Fulop*, Hungarian Academy of Sciences, Comp. & Automation Inst., PO Box 63, Budapest, H-1518, Hungary, fulop@sztaki.hu, ***Ferenc Friedler***, ***Adam Nagy***

process network synthesis is considered with concave costs of the operating units. The integration of combinatorial and global optimization approaches is proposed to exploit the benefits of both the combinatorially accelerated B&B and the separable concave minimization methods. Computational experience is also presented.

TD29 Topics in Nonsmooth Analysis

Cluster: Nonsmooth Optimization
Sponsor: Optimization
Sponsored Session
Chair: Claude Lemarechal, INRIA, BP 105, Le Chesnay, 78153, France, claude.lemarechal@inria.fr

1) Graphical Approximation of Solution Mappings, *R. Tyrrell Rockafellar*, University of Washington, Dept. of Math., Seattle, WA 98195, rtr@math.washington.edu

Solution mappings of the kind arising from variational inequalities and optimization often have "hidden" properties of Lipschitz continuity and semidifferentiability. These relate to approximations based on set convergence of the graphs of mappings instead of pointwise convergence.

2) A Unifying Framework for Column Generation Stabilization Methods, *Danny Ralph*, University of Melbourne, Dept. of Math. & Stats., Parkville, Vic, 3052, Australia, danny@mundoe.maths.mu.oz.au, ***Phil Neame, Natashia Boland***

Column generation is an important technique for solving very large IP problems; however, it has long been known to be unstable. We provide a framework that unifies much of the theory of stabilized column generation methods, then prove finite convergence for many such methods under general conditions.

3) The Quest for Second Order, *Francois Oustry*, Courant Institute, 251 Mercer St., Ste. 526, New York, NY 10012, oustry@cs.nyu.edu, ***Claude Lemarechal, Madhu Nayakkankuppam, Michael L. Overton***

Among the various works dealing with second-order objects in nonsmooth analysis, the most promising seem to be the approaches through epigraphic and curvilinear difference quotients and the U-Lagrangians. We review some of the relations between these different approaches.

4) Dual Properties of Ballstep Subgradient Methods, *K. C. Kiwiel*, Systems Research Institute, Newelska 6, Warsaw, 01-447, Poland, kiwiel@ibspan.waw.pl, ***T. Larsson, P. O. Lindberg***

We study the recent subgradient projection methods for convex optimization that use ballstep level controls for estimating the optimal value. Via averaging, they asymptotically find optimal objective subgradients and constraint multipliers. Applied to Lagrangian decomposition of convex programs, they find both primal and dual solutions and have practicable stopping criteria.

TD31 Adapting Reasoning & Tabu Search

Cluster: Tabu Search
Invited Session
Chair: Erik Rolland, Ohio State University, Dept. of Acct. & MIS, FCOB, 1775 College Rd., Columbus, OH 43210, rolland@cob.ohio-state.edu www.cob.ohio-state.edu/~rolland

1) Survey of Implementation Choices in the Adaptive Reasoning Technique, *Raymond Patterson*, University of Texas, Sch. of Mgmt. MS JO 43, PO Box 830688, Richardson, TX 75083-0688, rpatters@utdallas.edu

The ART is a memory-based heuristic search procedure which has been implemented to solve the capacitated minimum spanning tree problem, the capacitated tree star design problem and the audit scheduling problem. ART implementation choices and their effects on solution outcomes will be explored.

2) On the Use of Heuristic Concentration & Memory-Based Search: Experiences from Location & Hierarchical Location Problems, *Erik Rolland*, Ohio State University, Dept. of Acct. & MIS, FCOB, 1775 College Rd., Columbus, OH 43210, rolland@cob.ohio-state.edu www.cob.ohio-state.edu/~rolland

Memory-based search techniques such as TS have gained enormous popularity over the past few years. We will give a summary of experiences combining memory-based and a new memory-less heuristic, known as heuristic concentration, as applied to various location problems.

3) Vehicle Routing with Field Reload Options, *Robert A. Russell*, University of Tulsa, 600 S. College, Tulsa, OK 74104, russellra@centum.utulsa.edu

We develop TS metaheuristics to solve the VRP in which optimal vehicle reload options exist at locations in addition to the depot. Computational results are reported for an application involving inventory routing for propane gas distribution.

TD32 Software Demonstrations

Chair: Michael Gilliland, Quant Systems, Inc., 1023 Wappoo Rd., #6A, Charleston, SC 29407, mgilliland@quantsystems.com

1) Software Demonstration: MPL & Optimization on the Internet, *Bjarni Kristjansson*, Maximal Software Inc., 2111 Wilson Blvd., Ste. 700, Arlington, VA 22201, info@maximal-usa.com

Over the last few years, the Internet and the WWW have become increasingly more important in the computer world as a new way of interfacing with the user. We will discuss how the MPL Modeling System is currently being developed to give the user new ways to solve optimization problems through the Internet as well as the new MPL On-line Tutorial on the Web.

2) Software Demonstration: Taking your Classroom into the 21st Century, *Michael Gilliland*, Quant Systems, Inc., 1023 Wappoo Rd., #6A, Charleston, SC 29407, mgilliland@quantsystems.com

Adventure Learning Systems software for operations management and business statistics is a software-based curriculum. It tutors and tests your students on these topics and enables instructors to effectively manage the results via a classroom management system. Learn how easy it is to integrate technology into your classroom.

TD33 Airline Passenger Choice Models

Sponsor: Aviation Applications
Sponsored Session
Chair: Ken Fox, Boeing Commercial Airplane Group, PO Box 3707, MS 64-20, Seattle, WA 98124-2207, kenneth.fox@pss.boeing.com

1) Is There A Relationship Between Customer Satisfaction & Airline Choice?, *Will Mitchell*, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109, ***King Douglas***

It is often assumed there is a strong correlation between airline choice and customer satisfaction. Examining factors that influence business travelers' choices of airlines and satisfaction with particular airlines, we test that assumption. We also provide a model to compare and contrast drivers of airline choice and airline satisfaction drivers.

2) Analysis of Acceptable Travel Windows, *Stephen P. Jones*, The Boeing Company, PO Box 3707, MS 7l-22, Seattle, WA 98124-2207, stephen.p.jones@boeing.com

When considering a travel itinerary, an airline passenger will frequently have an acceptable travel window which is defined by the earliest acceptable departure time and the latest acceptable arrival time. We will describe the analysis of survey data to understand the factors that influence this acceptable travel window.

3) Estimates of the Disutility Parameters in the Decision Window Passenger Preference Model Using Web-Based Survey Results, *Roger A. Parker*, The Boeing Co., PO Box 3707, MS 64-12, Seattle, WA 98124-2207, roger.a.parker@boeing.com

The situationality of the decision window model prohibits direct observation of disutility parameters from actual choice data. An interactive survey method, reconstructing the situationality via the Internet, addresses this issue. Results from this approach yielding estimates of disutilities associated with replanning, unfavored airline, path quality and fare-class restrictions are presented.

Tuesday 16:30-18:00

TE01 Alternate Methods of Decision Analysis: A Tutorial

Sponsor: Decision Analysis
Sponsored Session
Chair: Robert F. Bordley, General Motors R&D Center, Research Eng. Bldg. Rm 220, 30500 Mound Rd., Warren, MI 48090-9055, robert_bordley@notes.gmr.com

1) The Design of Experiments Approach to Quality Decision Making, with Comparisons to Strategic Decision Analysis, *Robert F. Bordley*, General Motors R&D Center, Research Eng. Bldg. Rm 220, 30500 Mound Rd., Warren, MI 48090-9055, robert_bordley@notes.gmr.com

Strategic DA and TQM's Taguchi/box design of experiments both simplify a decision problem by identifying the many relevant factors impacting an objective function and screening out all but the most important. We review the

design of experiments as a way to stimulate more cross-fertilization between these 2 approaches.

2) The Analytic Hierarchy Process, with Comparisons to Multiattribute Utility Theory, *Prakash Shrivastava, Robert F. Bordley*

The AHP increasingly used in marketing and decision making as an alternative to conjoint and multiattribute utility theory. We review the literature and note how the AHP can be viewed as a form of the Dyer/Sarin utility theory which uses multiple assessments to isolate a preferred reference point.

3) Using Options Theory to Estimate the Value of Information & Downstream Decisions with Comparisions to Decision Tree Analysis, *Robert F. Bordley*, General Motors R&D Center, Research Eng. Bldg. Rm 220, 30500 Mound Rd., Warren, MI 48090-9055, robert_bordley@notes.gmr.com

We review the growing application of options theory to such non-stock market problems as evaluating risky investments or the value of information.

TE02 Measuring Consumer Response to Marketing Mix Variables

Sponsor: Marketing
Sponsored Session
Chair: Dan Putler, University of British Columbia, Fac. of Comm. & Bus. Admin., 2053 Main Mall, Vancouver, BC V6T 1Z2, Canada

1) Selecting Scale Items for Managerial Measures: Making History of a Service Quality Mystery, *Adam Finn*, University of Alberta, Fac. of Bus., 3-30B Fac. of Bus. Bldg, Edmonton, Alberta, T6G 2R6, Canada

Academic work on scales for assessing service quality, e.g., SERVQUAL, has followed classic test theory and assumed item suitability is independent of the object of measurement in managerial problems. To evaluate the merit of this assumption, we compare classic and generalizability theory-based approaches to identify items for measuring retail service quality...

2) The Impact of Signals on the Contribution Decision to Service-Oriented Charities, *Sandeep Krishnamurthy*, University of Washington, Business Program, 22011 26th Ave. SE, Bothell, WA 98021, sandeep@u.washington.edu

Some non-profit institutions exist to provide specific services to a group of individuals, e.g., health-related services. Here, potential donors cannot observe the quality of the service and managers cannot use traditional mechanisms such as warranties to signal quality. We use actual contribution and experimental data to study this problem.

3) The Role of Interactivity in Persuasive Communications, *Valerie Trifts*, University of Alberta, Fac. of Bus., Edmonton, Alberta, T6G 2R6, Canada, vtrifts@gpu.srv.ualberta.ca, ***Gerald Haubl***

We present a framework for identifying the various elements of interactivity in persuasive communication. Elements of interactivity are factors that enhance the communication process between 2 parties. We argue that interactivity is not environment specific, but can vary across media environments and across messages within a particular media environment...

4) Incorporating Household Life-Cycle Constructs into Micro-Economic Models of Household Behavior, *Yong Liu*, University of British Columbia, 2053 Main Mall, Vancouver, BC V6T 1Z2, Canada, ***Dan Putler***

We develop a conceptual framework that incorporates household life-cycle constructs into a micro-economic mode of household spending behavior. By doing this, we provide a rigorous framework for understanding how demographic factors influence household spending. The framework is empirically applied to both US and Canadian household expenditure data.

TE03 Panel: The Best New OR/MS Teaching Materials

Sponsor: Education
Sponsored Session
Chair: Patrick S. Noonan, Emory University, Goizueta Bus. Sch., Atlanta, GA 30322, patrick_noonan@bus.emory.edu

1) Panel: The Best New OR/MS Teaching Materials, *Peter C. Bell*, University of Western Ontario, Ivey Bus. School, London, ON N6A 3K7, Canada, pbell@novell.business.uwo.ca, ***Thomas Grossman***, University of Calgary, Fac. of Mgmt., 2500 Univ. Dr., Calgary, Alberta, T2N 1N4, Canada, grossman@ucalgary.ca, ***Patrick S. Noonan***, Emory University, Goizueta Bus. Sch., Atlanta, GA 30322, patrick_noonan@bus.emory.edu

Educators from OR and business programs have been invited to submit examples of their newest teaching materials, including cases, textbook chapters, notes, modules and computer exercises. The panel will survey the submissions and attendees will be able to distribute and discuss their latest creations.

TE04 Manufacturing Management: Design to Operation

Sponsor: MSOM
Sponsored Session
Chair: Wilbert E. Wilhelm, Texas A&M University, Dept. of IE, 237-H Zachry Eng. Ctr., College Station, TX 77843-3131, wilhelm@tamu.edu

1) Upgrading Hi-Tech Products to Maintain Competitiveness over the Life Cycle

As technology evolves, hi-tech products must be upgraded to maintain competitiveness and thus, profit margins. We address the problem of prescribing when to upgrade and what new features to incorporate in each upgrade. A solution method based on column generation is devised and computational experience is reported.

2) Forward/Reverse Production System Design & Operation for Electronic Assembly Systems, *Jane C. Ammons*, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, jane.ammons@isye.gatech.edu, ***Matthew J. Realff***

Global supply chains for electronic assembly are evolving from unidirectional flows of materials, parts and products into more complex webs of interlinked forward and reverse arcs. We characterize forward production and distribution of parts and products and reverse flows for reuse, recycling and disposal of used products and packaging.

3) Job Sequencing & Material Flow Control in a Closed Production System, *Subhash C. Sarin*, Virginia Tech., Dept. of ISE, Blacksburg, VA 24061, ***Michael Greco***

We consider the problem of simultaneously determining a cyclic sequence of jobs as well as a policy by which to release these jobs in a deterministic flow line to achieve maximum throughput with minimum WIP. A new job release policy is proposed and shown to perform better than the others.

4) Price vs. Lead Time Competition Under Demand Uncertainty, *Sergio Chayet*, Northwestern University, Dept. of IE/MS, 2225 N Campus Dr., Evanston, IL 60208, chayet@nwu.edu, ***Wallace J. Hopp***

In industry, responsiveness is an important competitive weapon in addition to price and quality. To gain insight into the available strategies, we develop a game theoretic model to study competition under demand uncertainty. Lead times are a function of captured demand, productive capacity and logistical efficiency. Decision variables include capacity and price.

TE05 Contracts for Coordinating Supply Chains

Sponsor: MSOM
Sponsored Session
Chair: J. George Shanthikumar, University of California, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, jgshant@ieor.berkeley.edu

1) Analysis of Supply Contracts with Commitments & Flexibility, *Y. Bassok*, University of Washington, Dept. of MS, Seattle, WA 98195, bassok@u.washington.edu, ***Ravi Anupindi***

We present a general model for rolling horizon flexibility contracts, propose several heuristics and derive a lower bound. In addition, we propose 2 measures to study the effectiveness of such contracts for variability reduction and advance information. We demonstrate numerically the effectiveness of the heuristics and provide several managerial insights.

2) Design of Pricing Contracts in Supply Chains Under Risk Aversion, *Vipul Agrawal*, NYU, Stern Sch. of Bus., 40 W 4th St. Ste. 700, New York, NY 10012, vagrawal@stern.nyu.edu, ***Sridhar Seshadri***

We study the problem of designing a supply contract between a distributor and many risk averse retailers, with the objective of maximizing the distributor's expected profit. We describe how differing size of retailers and competition among distributors impact the viability of constructing efficient contracts. We also relate our work to research on non-linear pricing.

3) Review & Critical Appraisal of the Formation of Contracts for Coordinating Supply Chains, *J. George Shanthikumar*, University of California, 4135 Etcheverry Hall, Berkeley, CA 94720-

1777, jgshant@ieor.berkeley.edu

There has been a rapid growth in the analysis of the benefits of contracts for coordinating supply chains. The contracts considered are mainly between the customers and suppliers and are assumed fixed. We review and provide a critical review of this literature. We will show that in a rapidly changing business environment, one needs to consider contracts that are dynamic...

TE06 Multivariable & Correlation & Transient Analysis for Process/Quality Control

Cluster: Statistics/Quality Control
Invited Session

Chair: O. Geoffrey Okogbaa, University of South Florida, Dept. of IMSE, 4202 E Fowler Ave., Tampa, FL 33620-5250, okogbaa@eng.usf.edu

1) Signature Analysis for In-Process Quality Improvement in Sheet Metal Stamping, ***Jan Shi***, University of Michigan, Dept. of IOE, 1815 IOE Bldg., Ann Arbor, MI 48019-2117, shihang@engin.umich.edu, ***Jionghua Jin***

This research emphasizes the in-process quality improvements by focusing on the stamping tonnage signal analysis by correlating the signature changes to process variables and part quality variation. Due to the nonstationary nature of the tonnage signal, wavelet analysis was conducted and incorporated with engineering knowledge to develop process monitoring and diagnosis methodologies.

2) Failure Diagnosis for Assembly Process of Compliant Beam Structures Using Multivariate Data Analysis, ***Dariusz J. Ceglarek***, University of Michigan, Dept. of ME & Applied Mech., 1031 Dow Bldg. 2300 Hayward St, Ann Arbor, MI 48109-2136, darek@engin.umich.edu

A new fault diagnostic method is proposed for assembly processes of compliant beam-types of structures. It uses measurement data to detect and isolate dimensional faults of compliant parts and includes a pre-determined variation pattern model (the inverse stiffness matrix of the compliant structure) and a fault mapping procedure. Simulations and a case study illustrate the method.

3) Robust Design Strategy for Multiple Performance Characteristics, ***Kai Yang***, Wayne State University, Dept. of IME, Detroit, MI 48202, kyang@mie.eng.wayne.edu

Robust design strategy is well developed for single performance characteristics. However, in many product/process design cases, multiple performance characteristics are often involved. A robust design strategy is developed based on axiomatic design/TRIZ and the statistical implementation will be based on Mahalanobis distance.

4) Cost Optimal Bayesian Attribute Sequential Sampling for On-Line Control of Automated Production, ***O. Geoffrey Okogbaa***, University of South Florida, Dept. of IMSE, 4202 E Fowler Ave., Tampa, FL 33620-5250, okogbaa@eng.usf.edu, ***Patricia Zarate***

A cost-constrained Bayesian attribute sequential sampling plan useful for monitoring, inspection and adjustment decisions in the control of an automated production system is presented. The sampling and adjustment decisions are based on the tradeoffs between quality costs and quality parameters. Quality costs include inspection, repair, nonconformance and adjustment costs.

TE07 Global Partnership for Technology Management: Japanese Practices

Cluster: Global Partnership, Information Systems & Quality
Invited Session

Chair: Yutaka Umezawa, University of Tokyo, Faculty of Econ., 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan, umezawa@e.u-tokyo.ac.jp

Co-Chair: Hirokuni Tamura, University of Washington, Dept. of MS, Sch. of Bus. Adm., Box 353200, Seattle, WA 98195-3200, htamura@u.washington.edu http://weber.u.washington.edu/~mgtsci

1) Partnering Between Mitsubishi Electric Corporation & Westinghouse Electric: From Technology Transfer to Joint Project, ***Ikuo Yamada***, Mitsubishi Research Institute, Inc., 3-6, Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan, i-yamada@mri.co.jp http://www.mri.co.jp

The history of partnering between Mitsubishi Electric Corporation and Westinghouse Electric since 1930 is mentioned and partnering model for global technology management is proposed. Many cases of success and failure are described in product development and production improvement.

2) Strategic Alliance Between Sony & Philips for Joint Development of Compact Disc, ***Takashi Shibata***, Tokyo Keizai University, 819-1-3-105 Kasama-cho, Sakae-ku, Yokohama, 247-0006, Japan, tshibata@tb3.so-net.ne.jp

The compact disc was introduced to the market in 1982 as a result of joint development by Sony and Philips. It was the combination of Sony's digital audio processing and Philips' optical videodisc technology. Its outstanding feature creates new products and business such as CD-ROM and multimedia.

3) DRAM Development Alliance Between IBM, Siemens & Toshiba, ***Haru Nakatsuka***, Toshiba Corp., R&D Ctr, 1, Komukai, Toshiba-cho, Saiwai-ku, Kawasaki, 210, Japan, nakatsuka.h@tg-mail.toshiba.co.jp

Taking IBM-Siemens-Toshiba DRAM joint development alliance as a reference, the economics of the joint development of the advanced semiconductor technology will be discussed together with the management of the multi-cultural project. Issues associated with unifying the technology through the joint development will also be discussed.

TE08 Applied Probability Models in Production

Sponsor: Applied Probability Section
Sponsored Session

Chair: Liming Liu, HKUST, Dept. of IE, Clear Water Bay, Kowloon, Hong Kong, PR China, liulim@uxmail.ust.hk

1) Diffusion Approximations for Multiclass Queueing Networks Under Priority Service Disciplines, ***Hong Chen***, HKUST, Dept. of IE, Clear Water Bay, Kowloon, Hong Kong, PRC, hongchen@uxmail.ust.hk, ***Hanqin Zhang***

The diffusion approximation is proved for a class of multiclass queueing networks under priority service disciplines. This class includes the single class queueing network, the single station under any priority service discipline, the first-buffer-first-served re-entrant line, the last-buffer-first served re-entrant line and Dumas network.

2) Analysis of Service Levels in One-Supplier Multi-Retailer Systems with Interdependent Demands, ***Youyi Feng***, National University of Singapore, Dept. of ISCS, Singapore, 119260, Singapore, fengyy@iscs.nus.edu.sg, ***Frank Y. Chen***

We consider a 1-supplier multi-retailer inventory system in which retailers experience stochastic and interrelated customer demands. All retailers and suppliers apply continuous, lot-size reorder point policies. We present a method for exact evaluation of inventory-related service performances.

3) Competing Through Replenishment Policy When Future Demands Depends on Service Level, ***Siu Wa Ng***, HKUST, Dept. of IE/EM, Clear Water Bay, Hong Kong, China, iewsh@uxmail.ust.hk, ***Liming Liu***

When demands depend on service level, the replenishment policy of a firm effects not only the current profit but also the market share in future. We develop a 2-firm dynamic game model to maximize the total profit in multiple periods. The optimal replenishment policies in Nash equilibrium are derived.

4) Capacity Allocation in Unreliable Module-Based Assembly Systems with Finite Buffers, ***Liming Liu***, HKUST, Dept. of IE, Clear Water Bay, Kowloon, Hong Kong, PR China, liulim@uxmail.ust.hk, ***Xue-Ming Yuan***, ***John Liu***

We consider a module-based assembly system with unreliable assembly stations, each of which is fed by a sub-fabrication line, and finite buffers. A set of rules is developed to allocate the limited assembly capacity along the main line so that the throughput is maximized.

TE09 Applications & Methods of Forecasting

Cluster: Forecasting Applications
Invited Session

Chair: Kenneth Lawrence, NJIT, Sch. of Mgmt., Newark, NJ 07102-1982, lawrence@testa.njit.edu

1) Forecasting Baked-Good Sales & A New Measure of Relative Forecast Error, ***Ron Klimberg***, St. Joseph's University, Haub Sch. of Bus., 5600 City Ave., Philadelphia, PA 19131, klimberg@sju.edu, ***Wikoleos Tsikriktsis***

A large baked-good cafe chain desires to predict hourly cafe sales by baked goods such that these products are fresh when bought. Several forecasting approaches were tried. A novel top-down approach was adopted.

2) A Comparative Study of Two Artificial Neural Networks for Selecting Forecasting Methods, ***Muragan Anadarajan***, St. Joseph's

University, Dept. of MIS, Philadelphia, PA 19141, anadara@mailhost.sju.edu, ***Baj Arinze***

Accurate forecasts are needed to effectively plan for all organizational activities. However, selecting a forecasting method for any given function is a complex and time-consuming task. It is also important in that inappropriate use of forecasting methods may result in inaccurate forecasts that negatively affect the organization.

3) Forecasting the Demand for Cable-Modems: An Extended Analysis in New Jersey, *Joseph Wen*, NJIT, Sch. of Mgmt., Newark, NJ 07102, wen@admin.njit.edu, ***William Havlina, Kenneth Lawrence***

A most promising technology for greatly enhanced data transmission rates is that of the cable modem. A cable modem will allow for speed access to the Internet via cable TV networks. Our research focuses upon the development of a market place forecast for cable modem within the State of New Jersey.

TE10 Network Modeling & Control II

Sponsor: **Telecommunications**
Sponsored Session

Chair: H. Michael Chung, California State University, Dept. of IS, College of Bus. Admin., Long Beach, CA 90840-8506, hmchung@csulb.edu

Co-Chair: Richard Wollmer, California State University, Dept. of Is, College of Bus. Admin., Long Beach, CA 90840-8506, rwollmer@csulb.edu

1) The Frequency Assignment Algorithms Used in the Mobile Network Planning Tool: MOBINET, *Ralph Lorentzen*, Teleno R&D, Norway, ralph.lorentzen@kjeller.fou.telenor.no

Based on traffic, field strength, interference, candidate base stations, available frequencies and costs, the planning tool MOBINET proposed which base station should be established and which frequencies should be assigned to which base stations. MOBINET contains a frequency allocation module based on IP. Corresponding algorithms and underlying models will be described.

2) Design Techniques of Wireless Intelligent Networks, *Amit Mukhopadhyay*, Bell Laboratories, Lucent Technologies

WINs are growing rapidly and big players in the telecommunications industry are vying for the market leader's position. As newer services get introduced through newer types of intelligent nodes, capacity planning for WINs become more challenging. We focus on WIN design techniques.

TE11 Managing Information Technology

Contributed Session

Chair: Kyle J. Mayer, University of California, 1401 Red Hawk Circle # E-201, Fremont, CA 94538, mayer@haas.berkeley.edu

1) Managing Technological Assets & Services in a Global Telecommunications Network, *Jeffrey Smith*, California Tech., Jet Propulsion Lab., 4800 Oak Grove Dr. MS 168-522, Pasadena, CA 91109-8099, jeffrey.h.smith@jpl.nava.gov, ***Chester S. Borden***

An enabling technology for efficient, low-cost planetary telecommunications operations is an intelligent service request processor to transform requests for services into resource allocations. Extensive integration of widely dissimilar technical areas and organizations was required to implement organizational and technical linkages between service selection and resource allocation.

2) Information Technology Acquisition & Impact, *J. R. McQuaid, Jr.*, Pepperdine University, 400 Corporate Pointe, Culver City, CA 90230, bmcquaid@pepperdine.edu http://moon.pepperdine.edu/gsbm/class/bmcquaid, ***Susan E. Yager, Kellie Keeling***

Previous research has focused on managing risk in the acquisition of new technologies (Yeo, 1995) and evaluating the consequences for individuals and organizations (Agarwal & Tanniru, 1992). We tie these 2 frameworks together, examining risk evaluation and purchase justification for new technologies and their impact on individuals and organizations.

3) withdrawn - author request of 9/15, *Stephane J. Mongellaz*, University of Alaska, Residence Adonis, Val D'Isere, Savoie, 73150, France, nicolas.bertheney@wanadoo.fr, ***Ramesh Subramanian***

4) Strategic Use of Subcontractors in the Provision of Information Technology Services, *Kyle J. Mayer*, University of California, 1401 Red Hawk Cir # E-201, Fremont, CA 94538, mayer@haas.berkeley.edu

As high technology firms increase their reliance on specialized subcontractors, they must decide how to allocate projects between subcontractors and in-house personnel. Transaction cost and resource-based hypotheses are developed and tested using detailed contractual and capability data on several hundred IT projects provided by a large IT firm.

TE12 Management of Innovation & Entrepreneurship

Sponsor: **Technology Management/Management of Productivity & Technology**
Sponsored Session

Chair: Dundar F. Kocaoglu, Portland State University, Eng. Mgmt. Program, Portland, OR 97207-0751, kocaoglu@emp.pdx.edu

1) Models of Entrepreneurial Growth, *Moren Levesque*, RPI, Lally Sch. of Mgmt. & Tech., Troy, NY 12180-3590, levesm@rpi.edu, ***Kenneth R. MacCrimmon***

It is very difficult for businesses to maintain a high growth rate over multiple years. More than a million US businesses were terminated last year by their owners because of stagnation as well as failure. We model patterns of growth and use a sample from the fastest growing private companies to investigate the effect of continuous growth on profitability and productivity.

2) Technological Entrepreneurship Training: A Survey of Best Practices from the US & Other International Universities, *A. Sarfraz*, SUNY, Sch. of Bus., 1 Swetman Hall, Oswego, NY 13126, mian@oswego.edu

Successful commercialization of new technology presents entrepreneurs with a series of unique challenges that require special understanding, skills and techniques; thus, warranting the need for some formal training. These entrepreneurial training challenges often translate into multi-faceted and multi-disciplinary training needs such as how institution of higher education can help prepare aspiring entrepreneurs...

3) Balancing Technology Innovations with Market Needs, *Tugrul Daim*, Portland State University, 2529 NW Overlook Dr., Ste. 222, Hillsboro, OR 97124, tugrul@emp.pdx.edu, ***Yonca Daim***

We explore next generation product definition practices, how technology integration is accomplished and how market needs are watched concurrently. The interactions of these 3 factors that impact new product development are explored through published case studies. A conceptual model of balancing all 3 is also included.

TE13 Multiattribute Decision Making

Cluster: **Soft Computing**
Invited Session

Chair: Michael H. Smith, University of British Columbia, Vancouver, BC, Canada, mhs@mining.ubc.ca

Co-Chair: Michael Lee, INSEAD, Fontainebleau, 77300, France, michael.lee@insead.fr

1) Fuzzy Reasoning: An Approach Which Implements Approximate Human Reasoning Rather than Exact Precision, *Michael H. Smith*, University of British Columbia, Vancouver, BC, Canada, mhs@mining.ubc.ca, ***Michael Lee***

One of the major problems in building an expert system for decision making, information retrieval for the Internet or similar problems requiring combinations of different elements is the proper interpretation of the "and" connective. We illustrate the use of fuzzy logic as a potent framework for coping with this problem.

2) Soft Computing & DEA Techniques for Modeling Software Development Team Efficiency, *Jon A. Chilingerian*, INSEAD, RISE, Blvd. de Constance, Fontainebleau, 77300, France, jon.chilingerian@insead.fr

We present hybrid software computing and DEA techniques for modeling efficiency of software development teams. Results from the analysis of a multi-company software project database reveals significant correlation between team skills, tool usage and standards usage. Our analysis also reveals nonlinear relationships between customer pressure and volatility in requirements.

3) Modeling & Solving Multicriteria Scheduling Problems with Fuzzy Logic, *Yaron Klein*, Tel-Aviv University, Elec. Dept., 40 Moshe Dayan St., Tel-Aviv, 67653, Israel, klein@eng.tau.ac.il

We introduce a new method of defining, modeling and solving a multicriteria scheduling problem. The user sets its preferences and satisfaction, i.e., compare between pairs of objectives according to limited vocabulary or rank preferences and satisfaction degree in a sequenced scale of linguistic terms. We model the real-world problem using fuzzy set theory...

4) Multi-Agent System using Multiobjective Genetic Algorithms for Job-Shop Scheduling Problems, ***Thierry Galinho***, PSI-LIRINSA, Insa de Rouen, Place Emile Blondel, Mont-Saint-Aignan, France, ***Jean-Philippe Vacher***

Determining an optimal solution is almost impossible but trying to improve an existing solution can lead to a better scheduling system. We use a multi-agent system guided by a multi-objective GA to achieve this. We obtain improvements to an existing solution by crossover and mutation of agents according to their fitness function.

5) Performance Issues of a Fuzzy Routing Problem, ***Oscar Kipersztok***, The Boeing Company, Info. & Support Services, PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, oscar.kipersztok@boeing.com, ***Nicholas J. Walker***, ***Matthew Berge***

A model was developed to analyze the use of fuzzy logic to generate bomber routings through a hostile environment. A lower bound, based on straight paths and an upper bound based on optimal strategies are computed for comparison. We present the model, the fuzzy routing algorithm and some performance results.

TE14 Service Industry II

Contributed Session

Chair: Moshe B. Rosenwein, AT&T, 101 Crawfords Corner Rd., Rm. 3J-327, Holmdel, NJ 07733, rosenwein@att.com

1) Approximating Performance Measures for a Network of Demand Nodes Serviced by a Mobile Server, ***Sandeep Vasudeva***, University of Toronto, 105 St. George St, Toronto, Ontario, M5S 3E6, Canada, vasudev@mgmt.utoronto.ca, ***Oded Berman***

A mobile server provides service to customers located at nodes of the network. We wish to calculate performance measures of the system. The problem, if described exactly, involves a very large number of states. We develop approximate models which are simple and offer substantial savings in time compared to exact models.

2) Pricing Policies for a Family of Perishable Products, ***Susanna V. Mondschein***, University of Chile, PO Box 2777, Santiago, Chile, smondsch@dii.uchile.cl, ***Hernan P. Awad***, ***Gabriel R. Bitran***

We study optimal pricing policies for a family of perishable products and analyze 3 different choice models to describe the consumer's behavior when choosing a product within a family: sequential selection, maximum customer's surplus and logit model. We formulate a stochastic, DP model to determine the optimal pricing policies.

3) Learning & Turnover by Telephone Call Center Employees, ***Yongpin Zhou***, University of Pennsylvania, OPIM Dept., The Wharton School, Philadelphia, PA 19104-6366, yongpin@wharton.upenn.edu, ***Noah F. Gans***

Telephone call centers employ service representatives who learn and turnover in a systematic fashion. Intelligent call-routing and staffing decisions are vital to their success, yet traditional queueing models are not applicable in this setting. We develop and analyze models for these systems. Results and insights will be discussed.

4) Optimization Models for Housing Location, ***Michael P. Johnson***, Carnegie Mellon University, Heinz Sch. for PP&M, Pittsburgh, PA 15213, johnson2@andrew.cmu.edu

I examine several models for location of subsidized housing which incorporate continuous service that is not "traveled to", externalities that cannot be easily proxied for by distance and significant labor and housing market impacts. An initial model focuses on single-period decisions for existing Section 8 housing; model extensions address multiple periods and construction costs.

5) Demand Forecasting for Large-Scale Call Centers, ***Moshe B. Rosenwein***, AT&T, 101 Crawfords Corner Rd., Rm. 3J-327, Holmdel, NJ 07733, rosenwein@att.com

We describe forecasting models that may predict the volume of inbound calls for a large-scale call center. Demand forecasts at, for example, half-hour increments throughout a day, are used by a call center's workforce scheduling function to efficiently service customers.

TE15 Data Mining & Knowledge Discovery in Databases II

Tutorial Session

Chair: Kristin P. Bennett, RPI, Math. Sci. Dept., Troy, NY 12180-3590, bennek@rpi.edu

1) Tutorial: Data Mining & Knowledge Discovery in Databases II, ***Usama Fayyad***, Microsoft Research, 1 Microsoft Way, Redmond, WA 98052-6399, fayyad@microsoft.com, ***Paul S. Bradley***

The second part of the tutorial focuses on scaling data mining methods to work with large databases. We then present formulations of many of the tasks of data mining as mathematical programming problems. We discuss optimality conditions and implications of the formulations, cover a sampling of successful applications and outline challenges and issues for future research.

TE16 Advanced Traffic Management Systems: Analysis & Evaluation

Sponsor: Transportation Science
Sponsored Session

Chair: TBD

1) Evaluation of ATMS for the CA/T Network Using MISTIM Laboratory, ***Mithilesh K. Jha***, MIT, Dept. of Transport. Eng., 3 Cambridge Ctr., Rm. 208, Cambridge, MA 02142, mkj@mit.edu, ***Moshe E. Ben-Akiva***, ***David Cuneo***, ***Q. Yang***

Using MITSIM laboratory, simulation experiments are performed for network level evaluation of ATMS in the CA/T network in Boston. Local and network level control strategies are integrated for efficient control design. Alternative approaches to coordinate individual control measures are investigated.

2) Evaluation of the Advanced Network Traffic Control System, ***Stephen Mattingly***, University of California, Dept. of Civil & Environ. Eng., Inst. of Transport. Studies, Irvine, CA 92697, jun@translab.its.uci.edu, ***R. Jayakrishnan***, ***Michael G. McNally***, ***James E. Moore***

We present evaluation techniques developed for network traffic control schemes field-tested in Southern California. The evaluation is based on traffic system performance as well as institutional issues that arise during implementation of a new advanced traffic control system. Network-wide traffic flow theory and decision-theory techniques are used in evaluation frameworks.

3) A Methodology for the Optimization of Signalized Networks, ***Kyriacos C. Mouskos***, NJIT, Civil Engineering, Newark Heights, Newark, NJ 07102, mouskos@megahertz.njit.edu, ***W. Sun***

A methodology for the optimization of signal settings of urban transportation networks in combination with lane configuration and left turn policies is presented as well as preliminary results on small grid-type networks. Signals are optimized utilizing NLP techniques and lane configuration and left turn restrictions using heuristic IP techniques.

4) Consistency Checking & Updating Operations for Real-Time Dynamic Traffic Assignments, ***Ying Kang***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, yingkang@mail.utexas.edu, ***Hani S. Mahmassani***, ***Yaser Hawas***, ***Athanasios Ziliaskopoulos***

No abstract supplied.

TE17 Supply Chain Planning Models

Sponsor: Logistics
Sponsored Session

Chair: Stephen Gilbert, Case Western Reserve University, Weatherhead Sch. of Mgmt., 10900 Euclid Ave., Cleveland, OH 44106-7235, smg10@guinness.som.cwru.edu

1) A Capacity Planning Model Under Uncertainty, ***Cormac Lucas***, Brunel University, Dept. of Math. & Stats., Uxbridge, Middlesex, UB8 3PH, UK, mastcal@brunel.ac.uk, ***E. Mesina***, ***Ali Mirhassani***, ***Gautam Mitra***, ***A. Nagar***

The supply chain planning problem is formulated as a resource allocation model. It is investigated as a 2-stage stochastic IP, using scenario analysis. Results from the former algorithm are used in the latter. Computational experiences are presented for serial and parallel implementations.

2) Global Supply Chain Model with Transfer Pricing & Transportation Cost Allocation, ***Marc Goetschalckx***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, marc.goetschalckx@isye.gatech.edu, ***Carlos J. Vidal***

We present a global supply chain optimization model for the maximization of after-tax profits that includes transfer prices and the allocation of transportation costs explicitly. This is a non-convex optimization problem with bilinear constraints. Based on successive LP, computational results of our heuristic show very small gaps.

3) Mind Your Ps & Qs-Optimize Price & Order Quantity, ***Larry George***, Problem Solving Tools, 1573 Roselli Dr., Livermore, CA 94550-5852, pstlarry@holonet.net

Price and order quantity to satisfy a service level requirement should be set to maximize profit. Price elasticity (assumed quadratic) is fit to retailers' prices and sales. Demand is assumed Poisson with the quadratic expected value. Demand forecast determines expected loss due to current price and quantity.

4) Supply Chain Economics Drive Price Policy, *Stephen Gilbert*, Case Western Reserve University, Weatherhead Sch. of Mgmt., 10900 Euclid Ave., Cleveland, OH 44106-7235, smg10@guinness.som.cwru.edu, ***Ronald H. Ballou***

We examine the situation faced by a steel distributor who stocks standard types of steel and performs specific finishing operations according to customer orders. We examine the effect that advance notice from customers has on operating costs and raw materials inventory. Cost reductions associated with this reduced uncertainty can be used to guide price incentives...

TE18 Analytical & Policy Implications of the Government Computer-Based Record Initiative

Sponsor: Health Applications
Sponsored Session

Chair: Doug Samuelson, PUMA Systems Inc., 8711 Chippendale Ct., Annandale, VA 22003-3807, dsamuel@seas.gwu.edu

1) Panel: The Government Computer-Based Patient Record Initiative, *Doug Samuelson*, PUMA Systems Inc., 8711 Chippendale Ct., Annandale, VA 22003-3807, dsamuel@seas.gwu.edu

In February, the US government announced a major initiative to specify and develop a standard computer-based patient record to be used by all government providers. Major participants in this initiative are the DoD, the Department of Veterans' Affairs, the Indian Health Service and the State of Louisiana...

TE19 Panel: Partnering VM, TOC & DA

Cluster: Partnering Value Methodology, Theory of Constraints & DA
Invited Session

Chair: Marlo Stebner, Boeing CAG, PO Box 3707, MS 6H-TE, Seattle, WA 98124-2207, w.stebner@pss.boeing.com

1) Panel: Partnering VM, TOC & DA

A panel discussion will conclude with presenters drawn from the previous sessions, providing their views on using VM, TOC & DA as complementary methodologies. Significant audience interaction will be encouraged.

TE20 Statistical Analysis & Forecasting

Sponsor: Military Applications
Sponsored Session

Chair: Harry Newton, US Air Force Academy, 2354 Fairchild Dr., Ste. 6D2F Academy, CO 80840, newtonhn.dfms@usafa.af.mil

1) Search & Rescue Performance Analysis (G-OPR), *Erich Stein*, USCGA, 15 Mohegan Ave., New London, CT 06320

The SAR program has historically published yearly profiles of SAR demand, e.g., COMDTPUB P16107.6. These allow us to assess why, where and when SAR cases occur. However, they do not provide insight as to why some cases are successful and others aren't. We include a statistical analysis of SARMIS data to identify potentially causal factors that lead to the success or failure of SAR cases.

2) Aids to Navigation Team Staffing Standards (G-OCS), *Jeffrey W. Kuck*, USCGA, 15 Mohegan Ave., New London, CT 06320

Over 580 personnel at 61 ANTs maintain approximately 40% of the Coast Guard's Aids to Navigation inventory. Created in the 1970's, the personnel complement of each ANT has developed independently, resulting in a mismatch between available resources and workload. In addition, the nature of work at ANTs is projected to evolve as the new buoy tender fleet comes on line.

3) ENT Federal Credit Union: Finding a Better Cash Ordering Procedure, *Justin L. Joffrion*

ENT Federal Credit Union, the largest credit union in southern Colorado, required assistance in developing a more cost-effective means of replenishing their vaults. Using a collage of techniques including inventory theory, forecasting and statistical analysis, we were able to develop an ordering procedure that reduced personnel, delivery and holding costs...

4) Forecasting USAFA Natural Gas Usage, *Phillip Mallory*, *Branden Ray*

The USAFA relies on 2 systems to produce heat. They are interruptible and firm gas. In the middle of each month, the Civil Engineering squadron approximates the amount of gas it will need for the next month (interruptible and firm). This nomination is sent to Colorado Springs Utilities, which orders the gas from Colorado Interstate Gas...

TE21 Building Virtual Communities: Cultural, Economic & Organizational Issues in Design, Development & Management

Sponsor: Social Science
Sponsored Session

Chair: Cyd Strickland, The Fielding Institute, PO Box 208, El Prado, NM 84529

1) Access to the Internet for Diverse Cultural & Ethnic Populations: Ethnographic Research In Taos, Santa Fe & Los Alamos, New Mexico, *Cyd Strickland*, The Fielding Institute, PO Box 208, El Prado, NM 84529

Access issues, different in each culture, include user interface, education, training, economics, personal support, etc. Access is balanced with affordability, diversity, training reflecting cultural, information and learning needs and community involvement.

2) Building Place in Cyberspace: How Places are Established on the Web, *Craig Nathanson*, The Fielding Institute, 990 Almanor Ave., Sunnyvale, CA 94086

We offer doctoral research exploring differences between place and non-place on the Web and in the physical world, focusing on application to net-based commerce. Cyberspace merchants utilize this knowledge to create business places that provide access, quality of goods and price.

3) How Do On-Line Support Groups Help/Hinder Women Facing Personal Issues?, *K. C. Bump*, The Fielding Institute, 4735 Glen Rosa, Prescott Valley, AZ 86314-7202

We discuss the pros and cons associated with using Internet technology as a means for addressing women's concerns as they reach menopause. We offer general medical literature as additional resources.

4) Building On-Line Networks for Emerging Professions: Diversity & Medical Interpretation, *Cheryl Allison*, The Fielding Institute, 1314B Center Dr., Ste. 418, Medford, OR 97501, ***Niels Agger-Gupta***

We discuss an analysis of international initiatives to build online coalitions of diversity workers and medical interpreters. We explore differences and similarities in network development, ownership succession and transfer, development of professional standards and the impact of network initiatives on service delivery.

TE22 Stochastic Modeling with Deterministic & Stochastic Petri Nets

Tutorial Session

Chair: Kathryn E. Stecke, University of Michigan, Sch. of Business Admin., Tappan Rm. 5206, Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) Tutorial: Stochastic Modeling with Deterministic & Stochastic Petri Nets, *Christoph Lindemann*, University of Dortmund, Dept. of Comp. Sci., Dortmund, 44227, Germany, cl@cs.uni-dortmund.de

Deterministic and stochastic Petri nets are a graphical modeling formalism for the specification of discrete-event stochastic systems with exponentially distributed and deterministic delays. We give an overview of the numerical analysis of deterministic and stochastic Petri nets (DSPN) for their application to stochastic modeling...

TE25 Algebraic Algorithms for Integer Programming

Cluster: Scheduling & Integer Programming
Sponsor: Optimization
Sponsored Session

Chair: Rekha Thomas, Texas A & M University, Dept. of Math., Milner Hall, College Station, TX 77843-3368, rekha@math.tamu.edu

1) A New Algebraic Geometry Algorithm for Integer Programming, *Dimitris Bertsimas*, MIT, Sloan Sch. of Mgmt., Rm. E53-359, Cambridge, MA 02139, dbertsim@aris.mit.edu, ***Georgia Perakis***, ***Sridhar Tayur***

We propose an algorithm for 0-1 IP based on algebraic geometry ideas. The algorithm generalizes Farkas lemma to 0-1 IPs, leads to a method for sensitivity analysis, offers systematic enumeration of all feasible solutions, gives structural information for the IP and computationally shows promise for problems with a

few solutions.

2) Group Relaxations I, ***Serkan Hosten***, George Mason University, Math. Sci. Dept., Fairfax, VA 22030, shosten@gmu.edu, ***Rekha Thomas***

We present structural results for extended group relaxations in integer programming. We show that these relaxations come in saturated chains. Using a family of lattice point free polytopes, we describe several invariants of the space of optimal solution; this includes the number of equivalence classes of group relaxations.

3) Group Relaxations II, ***Rekha Thomas***, Texas A & M University, Dept. of Math., Milner Hall, College Station, TX 77843-3368, rekha@math.tamu.edu, ***Serkan Hosten***

We present structural results for extended group relaxations in integer programming. We show that these relaxations come in saturated chains. Using a family of lattice point free polytopes, we describe several invariants of the space of optimal solutions. Part II will rely on Part I.

TE26 Combinatorial Optimization for IPs & LCPs

Cluster: Network & Combinatorial Optimization
Sponsor: Optimization
Sponsored Session
Chair: Andreas S. Schulz, Tech. Univ. at Berlin, Dept. of Math., Strasse des 17. Juni 136, Berlin, D-10623, Germany, schulz@math.tu-berlin.de

1) On the Existence of Short Admissible Pivot Sequences for LCPs, ***Tamas Terlaky***, Delft University of Technology, ITS/TWI/SSOR, PO Box 5031, Delft, 2600 GA, The Netherlands, t.terlaky@twi.tudelft.nl, ***K. Fukuda***

We show that for sufficient LCPs short (at most n-steps) admissible pivot sequences exist from any complementary basis to a feasible complementary basis. We make no nondegeneracy assumptions. This result might indicate the existence of a polynomial criss-cross method. Observe the contrast with the challenging d-step conjecture (Hirsch conjecture).

2) Optimization is as Easy as Augmentation, ***Andreas S. Schulz***, Tech. Univ. at Berlin, Dept. of Math., Strasse des 17. Juni 136, Berlin, D-10623, Germany, schulz@math.tu-berlin.de, ***Robert Weismantel***

Primal methods for optimization try in each iteration to find an augmenting direction. We show that the ability to efficiently solve the augmentation problem already implies any integer LP problem to be efficiently solvable as well. Our results generalize several algorithms in combinatorial optimization.

3) Inverse Optimization, ***Ozlem Ergun***, MIT, OR Ctr., Cambridge, MA 02139, ozie@mit.edu, ***Ravindra K. Ahuja***, ***Robert M. Freund***, ***James Orlin***

We consider the following metric for measuring the distance of a feasible solution x* from optimality: what is the minimum amount that one needs to perturb the objective function in order to make x* an optimal solution? We present theory, algorithms and applications for this inverse optimization problem.

TE27 Generalized Convexity & Monotonicity

Cluster: Nonlinear Programming
Sponsor: Optimization
Sponsored Session
Chair: Siegfried Schaible, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, schaible@ucrac1.ucr.edu

1) Solving the Sum-of-Ratios Problem by an Interior-Point Method, ***Roland W. Freund***, Bell Laboratories, Rm. 2C-420, 700 Mountain Ave., Murray Hill, NJ 07974-0636, freund@research.bell-labs.com, ***Florian Jarre***

We present an interior-point method for minimizing the sum of a convex function and a linear fraction subject to convex constraints. The problem is solved via a sequence of linear fractional subprograms. We outline techniques for finding starting points and for determining the necessary accuracy for the subproblem solves.

2) Relative Asymptotical Monotonicity, Exceptional Family of Elements & Complementarity, ***George Isac***, Royal Military College of Canada, Dept. of Math. & Comp. Sci., PO Box 17000 STN Forces, Kingston, Ontario, K7K 7B4, Canada, isac-g@rmc.ca

The concept of exceptional family of elements is related to the solvability of complementarity problems. If a function f is without EFE, then the problem CP(f,k) has a solution. Using this concept, we will study a class function which is more general as monoton operators.

3) Generalized Monotonicity for Equilibrium Problems, ***Siegfried Schaible***, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, schaible@ucrac1.ucr.edu

Several classical problems including mathematical programs and variational inequalities can be cast into the format of an abstract equilibrium problem. Mathematical programming with generalized convex objective functions is well-developed. We survey recent results for the considerably more general equilibrium problems which involve generalized monotone bifunctions.

4) (Phi-1,Phi-2) Monotonicity, ***Chanchal Singh***, St. Lawrence University, Dept. of Math., Canton, NY 13617, csin@music.stlawu.edu, ***Rita Pini***

General definitions of monotonocity, quasimonotonicity, pseudomonotonocity and strong monotonocity of a vector valued function are given. Some properties and characterizations are studied. A relationship between generalized monotonocity and (Phi-1, Phi-2) convexity introduced earlier by the authors, is described. Applications are studied in terms of invexity and B-vexity.

TE28 Global Optimization Problems

Cluster: Global Optimization
Sponsor: Optimization
Sponsored Session
Chair: Panos M. Pardalos, University of Florida, 303 Weil Hall, ISE Dept., Gainesville, FL 32611, pardalos@ufl.edu

1) Minimization on Stiefel Manifolds, ***Tamas Rapcsak***, Hungarian Academy of Sciences, Comp. & Auto. Inst., PO Box 63, Budapest, H-1518, Hungary, rapcsak@oplab.sztaki.hu

Global optimization problems are studied under the constraints that the feasible set is given by orthonormal vector systems introduced as Stiefel manifolds in 1935.

2) Algorithms for the Maximum Clique Problem, ***Panos M. Pardalos***, University of Florida, 303 Weil Hall, ISE Dept., Gainesville, FL 32611, pardalos@ufl.edu

We present recent algorithmic developments for solving maximum clique problems and new areas of applications.

3) On Very Large Maximum Clique Problems, ***Mauricio G.C. Resende***, AT&T Labs Research, Algorithms & Opt. Dept., 180 Park Ave., Florham Park, NJ 07932-0971, mgcr@research.att.com

A 2-stage (out-of-memory and in-memory) greedy randomized adaptive search procedure is presented for finding approximate solutions to the maximum clique problems in graphs (from telecommunications) with several millions of vertices.

TE29 Applications of Nonsmooth Optimization

Cluster: Nonsmooth Optimization
Sponsor: Optimization
Sponsored Session
Chair: Sharon Filipowski, The Boeing Company, PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, sharon.k.filipowski@boeing.com

1) Generalized Bundle Methods, ***Antonio Frangioni***, Universita di Pisa, Corso Italia 40, Dept. di Informatica, Pisa, PI 56125, Italy, frangio@di.unipi.it

Several stabilized cutting-plane methods have been proposed, with different stabilizing terms. We discuss their basic properties and give a unified convergence proof for some of them, as well as for other methods that have not been originally presented in this form. We discuss possible developments suggested by this analysis.

2) withdrawn - chair request of 9/24, ***Motakuri Ramana***, University of Florida, Dept. of ISE, 303 Weil Hall, Gainesville, FL 32611, ramana@cao.ise.ulf.edu, ***Xin Liu***, ***Donald W. Hearn***

3) A Stochastic Model of the Unit-Commitment Problem Solved by Lagrangian Relaxation, ***Claude Lemarechal***, INRIA, BP 105, Le Chesnay, 78153, France, claude.lemarechal@inria.fr, ***S. Brignol***, ***Arnaud Renaud***, ***C. A. Sagastizabal***

At each time-period of this model, several demand values are possible, to be covered by the production. Dualizing the resulting constraints yields a Lagrangian which can be optimized separately for each plant. We give numerical experiments solved via bundle methods, with up to 1000 constraints modeling the French network.

4) Using Nonsmooth Optimization to Solve Multidimensional Assignment Problems, ***Sharon Filipowski***, The Boeing Company,

PO Box 3707, MS 7L-20, Seattle, WA 98124-2207, sharon.k.filipowski@boeing.com, ***Matthew Berge***

In some multi-target tracking methods, multi-dimensional assignment problems need to be solved. A bundle related algorithm was developed to optimize the nonsmooth functions that arise when solving the problems using Lagrangian relaxation. The problem context, solution method and algorithm will be discussed.

TE31 Evolutionary Algorithms: Applications & New Developments

Cluster: **Evolutionary Algorithms: Applications & New Developments Invited Session**

Chair: Hillol Kargupta, Washington State University, Fac. of Comp. Sci., Sch. of EE & CS, Pullman, WA 99164-2752, hillol@eecs.wsu.edu http://www.eecs.wsu.edu/~hillol

1) Multiple Objective Tradeoff Analysis for Reservoir Management Using a Pareto Genetic Algorithm, ***Lance W. Vail***, Pacific Northwest Ntl. Laboratory, PO Box 999, Richland, WA 99352, lance.vail@pnl.gov

Scheduling releases from a water storage reservoir requires making tradeoffs between various objectives. Flood control, hydropower production, fisheries and recreation are several typical objectives reservoir managers must simultaneously consider when making a release decision. These multiple objective tradeoff curves are developed by linking a numerical model of the reservoir's response to management decisions...

2) Genetic Algorithm Optimized Two-Level Cascade Process Control, ***Darko Grundler***, University of Zagreb, Fac. of Textile Tech., Prilaz Baruna Filipovica 30, Zagreb, 10000, Croatia, darko.grundler@public.src.hr http://public.srce.hr/~dgrund

Multi-level coordinate control is introduced, the task of which is to coordinate and tune the control units according to the overall criterion. The optimization of the cascade process according to the overall criterion for the minimal energy consumption, that satisfies the output temperature constraints, is carried out by means of empirical methods and GA.

3) Gene Expression-Based Evolutionary Algorithms: Motivation, Foundation & Early Results, ***Hillol Kargupta***, Washington State University, Fac. of Comp. Sci., Sch. of EE & CS, Pullman, WA 99164-2752, hillol@eecs.wsu.edu http://www.eecs.wsu.edu/~hillol

The process of gene expression (production of proteins from DNA) plays an important role in natural evolution. However, little is known regarding its role in the context of evolutionary search and optimization. We will describe the recently developed GEMGA which takes motivation from the gene expression process.

4) Extensions of a Decomposition-Type Genetic Algorithm for the Multiple Objective Design of a Nature Reserve, ***Derek J. Nalle***, Oregon State University, Dept. of Stats., Kidder Hall 44, Corvallis, OR 97331-4606, nalle@stat.orst.edu, ***Jeffrey L. Arthur***

We report on some recent enhancements to a GA with decomposition for the reserve site selection problem. The trade-offs among cost, species richness, contiguity of site selection and ensuing adequate representation of physical/vegetative habitat classifications are simultaneously addressed in our approach.

Tuesday 16:30-17:15

TE32 Software Demonstration

Chair: Werner Busenius, Tecnomatix Technologies, Inc., 39810 Grand River Ave., Ste. 100, Novi, MI 48375-2108

1) Software Demonstration: SIMPLE++ Business Development Manager, ***Werner Busenius***, Tecnomatix Technologies, Inc., 39810 Grand River Ave., Ste. 100, Novi, MI 48375-2108

Tecnomatix provides Computer-Aided Production Engineering (CAPE) tools to fully computerize the industrial process and to achieve a seamless transition from design to production. SIMPLE++ from Tecnomatix, a fully object-oriented, graphical and integrated discrete events simulation environment, is used to optimize manufacturing systems as well as business processes...

Tuesday 16:30-18:00

TE33 Aviation Safety

Sponsor: **Aviation Applications Sponsored Session**

Chair: Kathleen L. McFadden, Northern Illinois University, OMIS Dept., Wirtz 209, DeKalb, IL 60115, kmcfadden@niu.edu

1) Nowhere to Run, ***Arnold Barnett***, MIT, E53-379, Cambridge, MA 02139, abarnett@mit.edu

We argue that, on nonstop routes served by competing carriers, there is almost never a reason related to safety to prefer one carrier to another. Perceptions about differences in risk depend largely on ecological fallacies and other statistical misconceptions. Variation in hazards may more reflect differences in flying environments than across airlines.

2) The Risky Business of Aviation Security, ***John E. Kobza***, Virginia Polytech. Institute & State University, ISE Dep (0118), 250 NEB, Blacksburg, VA 24061, jkobza@vt.edu http://ise.ve.edu/kobza, ***Sheldon H. Jacobson***

Designers, operators and users of multiple device, access control security systems are challenged by the false alarm, false clear tradeoff. Given a particular access control security system and a prescribed false clear standard, we develop methods to determine the optimal (minimal) false alarm rate that can be achieved.

3) Aviation Safety Analysis for Terminal Area Operations, ***Gerald Shapiro***, Logistics Management Institute, 2000 Corporate Ridge, McLean, VA 22102, gshapiro@lim.org

A methodology for analyzing the safety impacts of changes in aircraft and/or air traffic management technologies in the terminal area is presented. The method combines reliability analyses, hazard scenario simulations and a mapping of system status to simulation parameters.

4) A Framework for Studying Airline Safety, ***Kathleen L. McFadden***, Northern Illinois University, OMIS Dept., Wirtz 209, DeKalb, IL 60115, kmcfadden@niu.edu

How do we reliably model pilot-error? We present a survey of the literature on factors in airline safety and build a framework for designing safety studies using statisical modeling.

Wednesday 08:15-09:45

WA01 Decision Analysis & Managerial Perceptions

Sponsor: **Decision Analysis Sponsored Session**

Chair: James C. Felli, Naval Postgraduate School, DRMI (64FL), 1522 Cunningham Rd., Monterey, CA 93943-5201, jcfelli@nps.navy.mil

1) Rethinking Project Selection at the Monterey Bay Aquarium: A DA Perspective, ***James C. Felli***, Naval Postgraduate School, DRMI (64FL), 1522 Cunningham Rd., Monterey, CA 93943-5201, jcfelli@nps.navy.mil, ***Bruce R. Gritton***, ***Randall E. Kochevar***

Electronic outreach, EO, a business unit of the Monterey Bay Aquarium, sought to rank order competing projects based on their consistency with both EO objectives and MBAQ goals. EO developed an approach based on a multicriteria decision model. We will discuss the motivation, development and implementation of their model.

2) Decision Analysis & Project Selection: A Managerial Perspective, ***Randall E. Kochevar***, Monterey Bay Aquarium, 886 Cannery Row, Monterey, CA 93940, rkochevar@mbayaq.org, ***Bruce R. Gritton***

We employed a multicriteria decision model to help us investigate project selection at Electronic Outreach, a business initiative of the Monterey Bay Aquarium. We report our experiences in building and using that model from a managerial perspective and discuss the pros and cons of applying DA in our organization.

3) Vendor Selection for an Automation Site at Eli Lilly & Co., ***David M. Kutoloski***, Eli Lilly & Co., Lilly Corporate Ctr., Indianapolis, IN 46285, kutoloski_david_m@lilly.com

We used DA to evaluate several automation alternatives for a specific product decision. Here, we investigate how DA turned this project decision into a site-wide strategy for a manufacturing unit at Eli Lilly & Company.

4) Decision Analysis & Vendor Selection: A Managerial Perspective, ***Mark T. Hughes***, Eli Lilly & Co., Lilly Corporate Ctr., Indianapolis, IN 46285, hughes_mark_t@lilly.com

As a manager who participated in the site automation strategy at Lilly, we will discuss the strengths and opportunities for improvement of integrating a DA mindset into an organization.

WA02 Decision Analysis I

Contributed Session

Chair: Jonathan Barzilai, Dalhousie University, Dept. of IE, PO Box 1000, Halifax, Nova Scotia, B3J 2X4, Canada, jonathan.barzilai@dal.ca www.ScientificDecisions.com

1) Decision Making Under Partial Information Using Pairwise Comparisons, ***Celik Parkan***, City University of Hong Kong, Dept. of MS, 83 Tat Chee Ave., Kowloon, Hong Kong, China, mscelik@cityu.edu.hk

An approach is proposed to identify the efficient strategies of a decision-making situation where the decision makers involved declare their perceived relative likelihood of the occurrence of the states by pairwise comparisons. Examples are given where 2 and 3 decision makers offer differing views on the occurrence of the states.

2) Finding Minimum & Maximum Expected Values & Variances for Events Under Ambiguity, ***Andrew T. Langewisch***, University of Nebraska, 208 Hillcrest Ct., Seward, NE 68434, alangewisch@seward.ccsn.edu, ***F. Fred Choobineh***

Individuals may describe their ambiguous assessments of belief in a variety of ways. We suggest a classification of ambiguous probability-outcome mappings and then develop foundational results and procedures to determine maximum and minimum bounds on expected value and variance for each of the cases generated by this classification...

3) Certainty Equivalent Strategies for Discrete Lottery Portfolios, ***Peter C. Anselmo***, New Mexico Tech., Mgmt. Dept., Box 3, Speare Hall, Socorro, NM 87801, anselmo@nmt.edu

When dependent, discrete-outcome lotteries are combined to form a single, combined portfolio, the certainty equivalent of the combination is usually easy to find. We discuss methods by which individual, component lottery certainty equivalents may be determined.

4) A Comparative Study of Artificial Intelligence Techniques, ***Atish P. Sinha***, University of Dayton, Dept. of MIS & Decision Sci., 300 College Park, Dayton, OH 45469-2130, sinha@udayton.edu, ***Barin Nag***

AI literature incudes a number of techniques such as expert systems, neural networks and case-based reasoning. We address the issue of the comparative effectiveness of these techniques in decision making.

5) Preference Function Modeling: A New Methodology for Utility Measurement, ***Jonathan Barzilai***, Dalhousie University, Dept. of IE, PO Box 1000, Halifax, Nova Scotia, B3J 2X4, Canada, jonathan.barzilai@dal.ca www.ScientificDecisions.com

PFM is a new measurement methodology. It is based on a rigorous mathematical theory and advancements in the theory of measurement. In contrast to the "standard gamble" method of utility theory, PFM is intuitive, easy to use and has a built-in mechanism for reconciling inconsistent estimates.

WA03 Education I

Contributed Session

Chair: David G. Bell, Central Washington University, 6600 196th St. SW, Lynnwood, WA 98036, belld@cwu.edu

1) Hands-On Management Science Instruction Through Student Projects, ***Ken Matwiczak***, University of Texas, LBJ Sch. of Public Affairs, Drawer Y University Station, Austin, TX 78713, kmat@mail.utexas.edu, ***Alexis Takvorian***

The theory discussed in the quantitative curriculum at the LBJ School of Public Affairs is reinforced through semester-long projects that the students undertake. These real-life projects have helped provide the students with valuable hands-on experience that they will be able to use in their professional careers. We discuss the structure of these projects and the techniques used to manage them...

2) The Major Assignment Problem, ***Jay B. Ghosh***, SQU, PO Box 292439, Dayton, OH 45429-0439, jghosh@squ.edu.om, ***Hussein M. Saber***

We address the problem of assigning majors to undergraduate students in a Gulf-area business school, which is different from what one usually faces in the West. Our formulation uses performance in certain bellwether courses and trades-off student preferences against departmental constraints. We provide both exact and approximate solutions.

3) Using Group Systems for Small Group Instructional Diagnosis, ***Mari M. Heltne***, Luther College, 700 Coll. Dr., Decorah, IA 52101, heltnemm@luther.edu, ***Judith B. Nye***, ***Conrad Royksund***

SGID is an evaluation technique developed at the University of Washington's Biology Learning Center for getting student feedback by conducting small discussion groups within the class. The process has been successfully adapted for use with electronic decision systems (GroupSystems) at Luther College.

4) A New Approach to Materiels Management Education, ***David G. Bell***, Central Washington University, 6600 196th St. SW, Lynnwood, WA 98036, belld@cwu.edu

Materiel management employers are seeking people with skill sets which include the ability to understand SPC outputs, read engineering drawings, evaluate manufacturing processes and negotiate in foreign cultures. A cross disciplinary approach which integrates elements from the engineering and business school curriculums is suggested to meet the needs of industry...

WA04 Manufacturing

Contributed Session

Chair: Sheo G. Misra, Misra Associates, 5 Catalpa St., Morgantown, WV 26505-3677

1) Operation/Machine Type Assignment in Semiconductor Manufacturing, ***Bulent Catay***, University of Florida, Coll. of Bus. Admin., Dept. of DIS, 351 BUS, Gainesville, FL 32611, catay@grove.ufl.edu grove.ufl.edu/~catay, ***Selcuk S. Erenguc***, ***Asoo J. Vakharia***

We address the problem of operation/machine type assignment and machine type duplication in semiconductor manufacturing. A mathematical model is proposed which is a variation of the GAP with continuous/integer variables and fixed charges. Efficient lower bounding and heuristic methods to solve the problem are developed.

2) The Modeling of a Unique Textile Manufacturing Process, ***Michael R. Bartolacci***, Marywood University, Dept. Bus. & Managerial Sci., Scranton, PA 18509, mbartolacc@aol.com, ***Michele S. Stuart***

We have modeled a unique value-added textile process where cut fibers known as flock are added to various types of substrate textile and plastic materials. The modeling of the manufacturing process was based on traditional IE data gathering activities and utilized simulation software for the purpose of optimizing the production process.

3) Control of a Production System Where Yield Depends on Waiting Time, ***Prayoon Patana-Anake***, University of Michigan, 1205 Beal Ave., Ann Arbor, MI 48109, prayoon@umich.edu, ***Izak Duenyas***

We consider the control of a system where yield is affected by the amount of time that jobs spend waiting for services. We develop structural results for specific policies and compare the effectiveness of different control mechanisms.

4) Machine & Part Family Formations in Cellular Manufacturing Systems, ***David S. Ang***, Auburn University, Sch. of Bus. Dept. ISDS, PO Box 244023, Montgomery, AL 36124-4023, dang@monk.aum.edu

The formation of machine cells is an important task in the design of cellular manufacturing systems. We demonstrate how similarity coefficients for parts can be used in conjunction with machine similarity coefficients to associate machine cells and parts families. We call this procedure double similarity coefficient analysis.

5) The Human Role in Advanced Manufacturing Systems, ***Sheo G. Misra***, Misra Associates, 5 Catalpa St., Morgantown, WV 26505-3677

We are concerned with the conceptual design of support systems for humans in advanced manufacturing systems. A design methodology is presented. This methodology is discussed in the context of its application in aerospace and in process control and power systems, as well as its potential application in manufacturing.

WA05 Supplier Managed Inventory Systems

Contributed Session

Chair: Yossi Aviv, Washington University, CB 1133, One Brookings Dr., St. Louis, MO 63130-4899, aviv@wuolin.wustl.edu http://www.olin.wustl.edu/faculty/aviv/

1) Rationing Policies for Multiple Demand Classes in a Military Supply Chain, ***Morris A. Cohen***, University of Pennsylvania, The Wharton Sch., 1300 SH-DH, Philadelphia, PA 19104-6366, cohen@opim.wharton.upenn.edu, ***Karen Donohue***, ***Vinayak V. Deshpande***

We report on a military service parts system with multiple demand classes. Rationing policies are analyzed to achieve differentiated service level requirements in the military supply chain. Key tradeoffs between inventory costs and service levels are provided. Cost comparisons are also made with round-up

policies.

2) Capacity, Pricing & Segmentation Decisions for Heterogeneous, Time Sensitive Customers, ***Euthemia Stavrulaki***, Pennsylvania State University, 311 Beam Bldg., MSIS Dept., Smeal Coll. of Bus., University Park, PA 16802, exs37@psu.edu, ***Gregory Dobson***

We consider a monopolist serving 2 customer segments from a single distribution center. We explicitly model order processing queueing delays, transportation delays, customers' locations and waiting costs. We examine under which conditions offering segment specific prices and processing speeds is more profitable than offering a single service option.

3) Coordinated Supplier-Buyer Capacity Decisions, ***Timothy M. McClurg***, Georgia Southern University, PO Box 8152, Statesboro, GA 30460, mcclurg@gasou.edu, ***Kevin Weng***

We consider a situation in which one firm supplies another with a product for which demand is uncertain. We consider the supplier's capacity planning capacity, in which the supplier does not have first-hand knowledge of the random demand but must rely on the buyer for that information.

4) Vendor Managed Retail Assortments Under Dynamic Consumer Substitution, ***Garrett J. van Ryzin***, Columbia University, 412 Uris Hall, New York, NY 10027, gjv1@columbia.edu, ***Siddharth Mahajan***

We consider a single period stochastic inventory model in which multiple vendors stock a category of substitutable variants at a retailer. A sequence of heterogenous customers dynamically substitute among variants in the presence of stockouts. We show the existence of an equilibrium in inventory level decisions and compute stocking polcies which maximize overall channel profits.

5) The Operational Benefits of Information Sharing & Vendor Managed Inventory Programs, ***Yossi Aviv***, Washington University, CB 1133, One Brookings Dr., St. Louis, MO 63130-4899, aviv@wuolin.wustl.eduhttp://www.olin.wustl.edu/faculty/aviv/,***Awi Federgrun***

We analyze the benefits of information sharing and VMI programs in multi-retailer supply chains. Our modeling approach generates insights into the benefits of information sharing, as well as an understanding of the marginal value of VMI programs, beyond those achieved by information sharing alone.

WA06 Statistics & Quality I

Contributed Session

Chair: Derek J. Nalle, Oregon State University, Dept. of Stats., Kidder Hall 44, Corvallis, OR 97331-4606, nalle@stat.orst.edu

1) Search Designs for Highly Repeatable Experiments, ***Liyang Yu***, 210 Baker Systems, 1971 Neil Ave., Columbus, OH 43210, yu.149@osu.edu, ***Theodore T. Allen***

We introduce new design arrays derived from 2 criteria suggested by low repeatability error: the expected integrated variance and the probability of selecting the best model assuming one is a good fit. An accurate approximation to the probability calculation is proposed and applications are also discussed.

2) An Investigation of Experimental Design Strategies for the Latter Stages of Protytype Testing, ***William R. McDaniel***, Northwestern University, IE/MS Dept., 2225 N Campus Dr., Evanston, IL 60208, bmcdaniel@nwu.edu, ***Bruce A. Ankenman***

A unique experimental design problem occurs when a prototype product is developed that fails only one of many design specifications. We have investigated several experimental design strategies for finding a product modification that will meet the failed specification and not significantly degrade performance on the others.

3) Search Arrays for Taguchi Methods, ***Mikhail Bernshteyn***, 316 East 18th Ave. Apt. B, Columbus, OH 43201, bernshteyn.1@osu.edu, ***Theodore T. Allen***

Response surface, screening design methods have been suggested as alternatives to Taguchi product arrays. However, approaches based on screening arrays do not provide curvature information or permit the estimation of key control-by-control interactions. We propose a new class of "search" arrays that have several advantes in this context.

4) A PI Feedback Quality Controller with Self-Tuning & Constrained Input Variance Properties, ***Enrique del Castillo***, Pennsylvania State University, Dept. of IME, 207 Hammond Bldg., State College, PA 16802, exd13@psu.edu http://www.ie.psu.edu/people/faculty/castillo.htm

Recent research has shown how simple PI controllers provide very robust control even when the adjustments variance is constrained. A further task for the best application of these controllers is estimation of the system parameters. A self-tuning constrained PI controller with on-line estimation is analyzed.

5) A Minimum Distance Parameter Estimation for the Three-Parameter Weibull Population from Censored Samples, ***Ahmed M. Sultan***, Egyptian Air Force, 94 Wassef St. Ahmed Essmat, St. Ain Shams, Cairo, Egypt, aasultan@hotmail.com, ***Albert H. Moore***, ***Hala Mahmoud A. Khaleel***

A technique is applied to estimate the parameters of the 3 parameter Weibull distribution from censored samples. The method we used minimizes the Cramer von Mises distance from a non-parametric density and the parametric density at the order statistics. The new estimators are compared with the maximum likelihood estimators...

WA07 Quantitative Modeling in Information Systems

Invited Session

Chair: Vijay Mookerjee, University of Washington, Sch. of Bus., Seattle, WA 98195, mookerje@u.washington.edu

1) An Incremental Approach to Attribute Acquisition for Entity Matching in Heterogeneous Databases, ***Debabrata Dey***, University of Washington, Dept. of MS, Sch. of Bus. Admin., Seattle, WA 98195-3200, ***Vijay Mookerjee***

We investigate the entity heterogeneity problem that arises when the same real-world entity type is represented using different identifiers in different applications. To resolve this, we propose the necessary entity matching data be obtained in an incremental fashion. The information acquisition process stops when there is no more informative attribute to be transmitted...

2) Push & Pull Policies in Intranet & Internet Browsing, ***Vijay Mookerjee***, University of Washington, Sch. of Bus., Seattle, WA 98195, mookerje@u.washington.edu, ***Yong Tan***

We present a study for cache management with internet browsers. A dynamic policy is applied to minimize the expected loading time per document access. This introduces a policy parameter for each document that combines its loading time, size and access rate. Results show that the dynamic policy outperforms the static policies in various situations.

3) Optimal Policies for Coordination in Software Development, ***I. Robert Chiang***, University of Washington, Sch. of Bus., Seattle, WA 98195

Milestones have been commonly used as a coordination mechanism in software development. One important issue is to determine the optimal interval between milestones; coordinating too often disrupts the development, continuous development without coordinating incurs high adaptation and rework cost. We propose an optimal coordination policy based on project characteristics...

WA08 Applied Probability Models in Communication Networks

Sponsor: **Applied Probability Section**
Sponsored Session

Chair: Natarajan Gautam, Pennsylvania State University, 207 Hammond Bldg., Dept. of IE, University Park, PA 16802, ngautam@psu.edu http://www.ie.psu.edu/people/faculty/gautam.htm

1) Understanding Call Center Performance Using a New Approach to Solving Multi-Dimensional Birth-Death Equations, ***Les D. Servi***, GTE Laboratories, 40 Sylvan Rd, Waltham, MA 02254, lds0@gte.com

Several performance analysis issues related to redialing and reneging in call centers can be addressed using multi-dimensional skip-free Markovian systems. Such problems will be solved using a new numerically efficient algorithmic approach. Numerical results will be presented along with a comparison of computation time using alternative approaches.

2) Performance Analysis of a PCS Network with Markov Arrival Process & Sub-Rated Channels, ***Attahiru S. Alfa***, University of Manitoba, Dept. of MIE, Winnipeg, Manitoba, R3T 5V6, Canada, alfa@cc.umanitoba.ca, ***Wei Li***

The arrival process of new and handoff calls in a PCS network is modeled which captures correlation of the interarrival times within new calls, handoff calls, as well as between the 2 kind of calls. We obtain several performance measures when the channels are sub-rated.

3) Cooperative Flow Control in a Multiclass Queueing Network, ***Christopher M. Rump***, SUNY, Dept. of IE, 405 Bell Hall, Buffalo, NY 14260-2050, crump@eng.buffalo.edu

We consider a game-theoretic flow control model where multi-class users share common network resources. Each class seeks to choose a flow strategy that will

maximize the net benefit received. In this context, we compare Pareto optimal solutions of a cooperative environment to Nash equilibrium solutions within a competitive environment.

4) Multipriority High-Speed Networks: Buffer Sizing & Admission Control, ***Natarajan Gautam***, Pennsylvania State University, 207 Hammond Bldg., Dept. of IE, University Park, PA 16802, ngautam@psu.edu http://www.ie.psu.edu/people/faculty/gautam.htm

We consider a multipriority telecommunication network where each node processes traffic according to a static priority service policy. Based on end-to-end quality-of-service requirements, we solve buffer sizing and admission control problems at all nodes in the network using effective bandwidths, correlation and stochastic monotonicity properties.

WA09 Forecasting I

Contributed Session

Chair: Gopal Naik, Indian Institute of Management, Vastrapur, Ahmedabad, Gujarat, 380015, India, gnaik@iimahd.ernet.in www.iimahd.ernet.in/~gnaik

1) New Product Forecasting Using CART: A Case Study, ***Satish V. Vadlamani***, University of Arkansas, 1200 N University Dr. Box 4976, Sch. of Bus. & Mgmt., Pine Bluff, AR 71611, vadlamani_s@vx4500.uapb.edu, ***Brian Gray***, ***David M. Miller***

We document the efforts of a large apparel company and the Alabama Productivity Center toward forecasting of fashion products, for which there is little or no historical sales data. Time series methods have very little use in this situation. We report the results of using CART methodology for longitudinal data.

2) Valuation of a Firm: Some Chilean Cases, ***Anibal C. Irarrazabal***, University Catolica de Chile, Vicuna MacKenna 4860, Santiago, Chile, airarraz@ing.puc.cl

Valuation is a process of converting a forecast into an estimate of the value of a firm or some component of the firm. At some level, nearly every business decision involves valuation. The valuation framework and some valuation models are applied to a selected group of Chilean firms.

3) A System Theoretic Approach to Forecasting the US Long-Term Peak Load Growth, ***Hisham M. Choueiki***, Public Utilities Comm. of Ohio, Forecasting Division, 180 E Broad St., Columbus, OH 43215, puco_choueik@pucvms.decnet.ohio.gov, ***Galip Feyzioglu***

We present a system theoretical perspective and a system theoretical methodology for the analysis, assessment and forecasting of annual economic time series in general, and US system peak load growth in particular. The generalized Von Bertalanffy growth model is presented as an appropriate class of S curve spline functions that could characterize generic growth trajectories of empirical economic systems.

4) Econometric Modeling of the Indian Cotton Textile Industry, ***Gopal Naik***, Indian Institute of Management, Vastrapur, Ahmedabad, Gujarat, 380015, India, gnaik@iimahd.ernet.in www.iimahd.ernet.in/~gnaik, ***Sudhir Jain***

We develop an econometric model for the Indian cotton textile industry. The model developed helps to understand the structure of the industry, forecast major variables and simulate various policy scenarios. The estimated 24-equation model performs satisfacorily in terms of generating short- as well as long-term forecasts.

WA10 Quality Management I

Contributed Session

Chair: Samir A. Ahmed, Oklahoma State University, Sch. of Civil Eng., 207 Engineering South, Stillwater, OK 74078, samir.ahmed@okway.okstate.edu

1) Systems and Principles of Management, ***Danny Samson***, University of Melbourne, Parkville, Melbourne, Victoria, 3052, Australia, d.samson@ecomfac.unimelb.edu.au

We study the management systems and principles which we have observed to be common to leading organizations. A field study of 120 companies validated the relationship between these principles and organizational performance.

2) A Contingency Approach to Quality Management, ***Debasish N. Mallick***, Boston College, Carroll Sch. of Mgmt., Chestnut Hill, MA 02167, mallickd@bc.edu, ***Larry Ritzman***, ***Hossein Safizadeh***

We question the notion of the "one best solution" to all quality and productivity problems. Using a survey of 144 manufacturing firms, we explore effects of TQM principals in different environmental settings and propose a contingency approach to quality management.

3) Measuring Quality of a Project, ***Oya I. Tukel***, Cleveland State University, 1860 E 18th St., Cleveland, OH 44114, o.icmeli@popmail.csuohio.edu, ***Walter Rom***

We develop a measure for project quality. The measure consists of technical aspects of a project such as cost and time, as well as the customer satisfaction level. The results of an empirical study that tests the validity of the measure will be discussed.

4) withdrawn - author request of 8/21, ***Samir A. Ahmed***, Oklahoma State University, Sch. of Civil Eng., 207 Engineering South, Stillwater, OK 74078, samir.ahmed@okway.okstate.edu

WA11 Empirical Research in Technology Management

Contributed Session

Chair: Michael A. Lapre, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, mlapre@bu.edu

1) The Human Factor in Advanced Manufacturing Technology Adoption, ***Henry C. Co***, Gardner-Webb University, Broyhill Sch. of Mgmt., Boiling Springs, NC 28017, hcc2@po.cwru.edu

We empirically test our hypthesis that the management variables most associated with the human factor in automation projects alone can differentiate firms who are successful in adopting the technologies from those who are not so successful. We analyze the difference between the 2 groups of firms across 27 management variables and 6 demographic variables.

2) withdrawn - author request of 9/21, ***Rebecca Duray***, University of Colorado, 1420 Austin Bluffs Pkway, Colorado Springs, CO 80933-7150, rduray@mail.uccs.edu, ***Peter T. Ward***

3) The Effects of Organization Culture on New Product Development, ***Walid A. Belassi***, Cleveland State University, 2901 Euclid Ave. # 310, Cleveland, OH 44115, w.belassi@popmail.csuohio.edu, ***Oya I. Tukel***

We investigate the effects of organizational culture on the types of new products developed by organizations. Data from an empirical study identify the characteristisc of innovative organizations.

4) Productivity Improvement in a Network of Learning Factories: A Learning Curve Analysis, ***Michael A. Lapre***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, mlapre@bu.edu, ***Luk N Van Wassenhove***

We use a total factor productivity learning curve analysis to study the acquisition and transfer of tacit and explicit knowledge in a network of 3 factories. From the empirical evidence, we derive implications for managing the nature of shared knowledge, stability in process conditions and control over resources for experimentation.

WA12 Project Evaluation, Selection & Implementation

Sponsor: **Technology Management/Management of Productivity & Technology**

Sponsored Session

Chair: Dundar F. Kocaoglu, Portland State University, Eng. Mgmt. Program, Portland, OR 97207-0751, kocaoglu@emp.pdx.edu

1) Competitive Project Management: The New Research Agenda, ***Aaron J. Shenhar***, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07093, ashenhar@stevens-tech.edu

We develop a new framework for project management research which will focus on the competitive advantage of projects. The framework should also help practicing organizations to achieve better business results from projects. Extending our previous studies, the framework includes the concepts of style, adaptation and learning.

2) Selecting R&D Projects: Processes & Preferences in the Steel Industry, ***David M. Vislosky***, Carnegie Mellon University, 5526 Fair Oaks #2, Pittsburgh, PA 15217, visco@andrew.cmu.edu, ***Paul S. Fischbeck***

We investigate how managers make project selection and evaluation decisions within industrial R&D organizations. Organizational decision-maps are presented from in-depth case studies of R&D decision-making in US steel companies. R&D managers were also surveyed using a policy capture instrument to estimate decision-criteria preferences and risk assessments in project-selection decisions.

3) Developing Technology Evaluation & Acquisition Strategies in the Electronics Manufacturing Industry, ***Tugrul Daim***, Portland State University, 2529 NW Overlook Dr., Ste. 222, Hillsboro, OR

97124, tugrul@emp.pdx.edu, ***Dundar F. Kocaoglu***

We present a model for determining the appropriate technology evaluation and acquisition strategies in the electronics manufacturing industry. The model is based on the results from a study of the US companies.

4) Measuring & Reporting Equipment Performance in Semiconductor Industries, ***Mete Bayyigit***, Tefen USA, Pacific Northwest Operations, 7110 SW Fir Loop Plaza, # 230, Tigard, OR 97223, mete@tefen.com, ***Michael Cunningham***

As time passes, semiconductor equipment requires even higher capital investment. Therefore, it's crucial for semiconductor manufacturers to get the most out of their equipment. This necessitates having a well-designed equipment performance measurement and reporting system. Advances in IT and automation in high-tech industries make it possible to capture the majority of possible equipment states...

WA13 Project Management II

Contributed Session

Chair: James P. Clements, Towson University, Dept. of Computers & IS, Towson, MD 21252, jclements@towson.edu http://www.towson.edu/~clements

1) Minimizing Risk in Stochastic Resource Constrained Project Scheduling, ***Julia Pet-Edwards***, University of Central Florida, PO Box 162450, Orlando, FL 32816-2450, edwards@iems.engr.ucf.edu, ***Basma Selim***, ***Robert L. Armacost***, ***Abel A. Fernandez***

Recent advances in stochastic resource constrained project scheduling are briefly described. Current approaches focus on minimizing expected project duration or modeling the duration distribution. A decision stage approach for minimizing risk of extreme events using conditional expectations is proposed.

2) Uncertainty & Subcontracting Mechanisms in Project Management, ***Genaro J. Gutierrez***, University of Texas, Mgmt. Dept., CBA 4.202, Austin, TX 78712-1174, genarojg@mail.utexas.edu, ***Anand A. Paul***

The crux of the problem of designing subcontracting mechanisms for projects is risk and uncertainty. Potential contractors have incomplete information regarding project costs and the project owner has incomplete information regarding the contractors. We use analytical models to derive insights and explore issues in designing contracts for projects.

3) The Risk of Delay of a Project in Terms of the Morphology of its Network, ***L. Valadares Tavares***, CESUR Instituto Superior Tecnico, Av. Rovisco Pais, 1096, Lisboa Codex, Portugal, lavt@alfa.ist.utl.pt, ***Jose Alvaro Ferreira***

The morphology of project networks is studied in terms of a few key indicators and the risk of delay is estimated as a function of such indicators.

4) Using Group Support Systems to Enhance the Project Management Process, ***James P. Clements***, Towson University, Dept. of Computers & IS, Towson, MD 21252, jclements@towson.edu http://www.towson.edu/~clements, ***Jack Gido***

Effective and frequent communications are crucial to keep a project moving, to help identify potential problems and to decide upon ways to improve project performance. We focus on areas in which group support systems can be integrated into the project management process for improved communications and decision making.

WA14 Service Industry III

Contributed Session

Chair: Richard D. Metters, SMU, PO Box 750333, Dallas, TX 75275, rich.metters@owen.vanderbilt.edu

1) Managing the Quality of Electronic Services: A Taxonomy of Consumer Value Drivers in Electronic Food Retailing Services, ***Gregory R. Heim***, University of Minnesota, Carlson Sch. of Mgmt. # 3-140, 321-19th Ave. S, Minneapolis, MN 55455, gheim@csom.umn.edu, ***Kingshuk K. Sinha***

We develop a taxonomy for EC service operations using data from food retailing services on the WWW. We use the taxonomy to support a product-process matrix for electronic consumer services and identify groups of service processes that are potential drivers of consumer value in EC services.

2) Alternative Models for Electronic Grocery Shopping, ***Timo O. Saarinen***, Helsinki School of Economics, PO Box 1210, Helsinki, SF 00100, Finland, saarinen@hkkk.fi www.hkkk.fi, ***Ari P. Vepsalainen***, ***Jukka K. Kallio***

Different ways of organizing ordering, picking up and delivery processes for electronic grocery shopping are explored. Processes are compared based on customer shopping habits and respective cost structures. Furthermore, benefits for different customer groups are analyzed. Finnish experiments with different processes are compared and their effectiveness discussed.

3) Using ISO 9000 & Simulation to Improve Banking Service Quality in Egypt, ***Ahmed Agwa***, Oklahoma State University, Coll. of Bus., Stillwater, OK 74078, wendy@okway.okstate.edu

Most customers of state-owned banks in Egypt are dissatisfied because they must queue to submit a service request and must then join a second queue to receive the requested service. We describe an approach using ISO 9000 and simulation to improve service quality in the above environment.

4) Centralization of Back-Office Services, ***Richard D. Metters***, SMU, PO Box 750333, Dallas, TX 75275, rich.metters@owen.vanderbilt.edu, ***Vicente A. Vargas***

A prescriptive model is proposed for centralizing back-office services. The model is illustrated by a study of retail bank lending practices.

WA15 Logistics V

Contributed Session

Chair: Vaidyanathan Jayaraman, Washington State University, Coll. of Bus. & Econ., Vancouver, WA 98686, jayarama@vancouver.wsu.edu

1) A Solution Technique of the Location-Routing Problem with Time Window Constraints, ***Tomohiko Ohara***, Waseda University, Grad. Sch. of Sci. & Eng., 3-4-1 Okubo Shinjuku-Ku, Tokyo, 169-8555, Japan, tomo@yoshi.mgmt.waseda.ac.jp, ***Kazunari Hatanaka***, ***Kazuho K. Yoshimoto***

2) A Computationally Efficient Approach for Inventory Levels in a Capacitated Multi-Echelon Production-Distribution System, ***James A. Rappold***, Cornell University, 276 Rhodes Hall, Ithaca, NY 14853, rappold@orie.cornell.edu, ***John A. Muckstadt***

We develop a model and computationally efficient algorithm for setting sticking levels in one type of lean multi-echelon production and distribution system with limited production capacity at the highest echelon. We obtain an analytic lower bound on the optimal system order-up-to level which on average performed within 0.09% of optimal.

3) Competition for Parallel Resources, ***Ling Shen***, University of Arizona, SIE Dept., Tucson, AZ 85721, ishen@sie.arizona.edu, ***Pitu B. Mirchandani***

We address a parallel resource allocation problem with competing users. The feasible objective set is proven to be convex and closed. Hence, the Pareto frontier between 2 competing users is shown to be a piecewiselinear function. A polynomial algorithms is then presented to obtain the Pareto function.

4) withdrawn - author request of 9/16, ***Vaidyanathan Jayaraman***, Washington State University, Coll. of Bus. & Econ., Vancouver, WA 98686, jayarama@vancouver.wsu.edu, ***Nagesh Murthy***

WA16 Analysis of Traveler Information Systems

Sponsor: **Transportation Science**

Sponsored Session

Chair: R. Jayakrishnan, University of California, Civil & Environ. Eng., Irvine, CA 92697, rjayakri@uci.edu

1) A Zero Public Infrastructure Vehicle-Based Traffic Information System, ***Athanasios Ziliaskopoulos***, Northwestern University, Dept. of Civil Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, a-z@nwu.edu

We introduce a TIS that doesn't involve public investment. We discuss the structure of the system and perform initial analysis for an idealized freeway for various levels of market penetration and congestion. Relationships are derived between propagation speed of the information wave vs. traffic shock wave in case bottlenecks. Analysis provides insights into the model operation...

2) Evaluation of the Mobility Impacts of Alternative Advanced Information Systems Technologies, ***Srinivas Peeta***, Purdue University, Sch. of Civil Eng., W Lafayette, IN 47907, ***Kamalakar Poonuru***

Simulation experiments are conducted to analyze the mobility impacts of alternative advanced ISTs, including pre-trip information, en-route information, VMS and multiple information sources on the Borman expressway in Northwestern Indiana.

3) Long-Term Effects of Information Reliability on the Performance of ATIS, ***Jun-Seok Oh***, University of California, Civil & Environ. Eng., Irvine, CA 92697, jun@translab.its.uci.edu, ***R.***

Jayakrishnan

The reliability of information affects driver's credibility and overall compliance. This is updated by driver's day-to-day experience and directly affects the performance of ATIS. We examine long-term effects of route guidance strategies associated with information reliability using dynamic traffic simulation.

WA17 Logistics Models in Practice

Sponsor: Logistics
Sponsored Session

Chair: Geert-Jan Van Houtum, University of Twente, PO Box 217, Enschede, 7500 AE, Netherlands, g.j.j.a.n.vanhoutum@wb.utwente.nl

1) An Order Picking Scheduling System of An Integrated Logistics Distribution Center, ***Jimmy Chung-Che Huang***, National Institute of Technology, Dept. of Indus. Mgmt., Yung-Kong City, Taiwan, jchuang@nantai.ntc.edu.tw, ***Pei-Huang Lin***

We consider uncertainty associated with the "true" values of due dates, resource availability times, resource capacity constraints and process times in scheduling order picks over multiple periods in an integrated distribution center. Makespan minimization is the goal of the scheduling problem. The model uses a fuzzy neural network algorithm and can be used for obtaining solutions in real time.

2) Advanced Forecasting & Demand Planning at Sprint, ***Craig Doud***, Ernst & Young, 555 California St., Ste. 1700, San Francisco, CA 94104, craig.doud@ey.com

We discuss the development and implementation of an advanced planning system at Sprint for managing more than $4 billion materials and services. We also discuss the challenges that were faced by the project team in developing a design to integrate multiple divisions, serving customers across the US and introducing forecasting processes at Sprint.

3) A Capacity-Oriented Approach for an Inventory Routing Problem, ***Henk Zijm***, University of Twente, PO Box 217, Enschede, 7500 AE, The Netherlands, w.h.m.zijm@wb.utwente.nl, ***Geert-Jan Van Houtum***, ***Bertwin Bonenberg***

We present a research project for a supplier of liquid petroleum gas. This supplier is responsible for his customer's inventories and wanted to establish the value of additional information that may be obtained by a monitoring system for these inventories. We developed a new, capacity-oriented planning approach and established its performance by simulation.

4) On a Production Situation Having a Close Relationship with a Capacitated, Multi-Echelon Inventory Problem, ***Geert-Jan Van Houtum***, University of Twente, PO Box 217, Enschede, 7500 AE, Netherlands, g.j.j.a.n.vanhoutum@wb.utwente.nl, ***Rolf Giezenaar***

A chemical factory has one line on which multiple products are produced to stock. The products have stochastic demands and significant setup times. This problem is closely related to a capacitated, single-depot, multi-retailer inventory problem and this relationship has been used to develop a sensible production strategy.

WA18 Health Applications II

Contributed Session

Chair: Owen P. Hall Jr., Pepperdine University, 400 Corporate Pointe, Culver City, CA 90230, ohall@pepperdine.edu

1) A Mathematical Strategy to Time Screening for Diabetes, ***Stephen W. Sorenson***, Ctrs. for Disease Control, 4770 Buford Hwy NE, MS K-10, Atlanta, GA 30341, zuc7@cdc.gov, ***Theodore J. Thompson***

Early detection of diabetes may allow treatment using glycemic control or other methods. We develop a strategy to time repeated screenings by selecting an optimal screening function from a space of decision functions. The strategy incorporates population variables, the performance of screening tests and potential adverse effects of screening.

2) The Impacts of Information Technology in Hospital's Efficiency in Korea: A Time-Series Analysis, ***C. Christopher Lee***, Central Washington University, Dept. of Bus. Admin., 400 E. 8th Ave., Ellensburg, WA 98926-7485, leec@cwu.edu, ***Seoung-Ki Kim***, ***J. W. Kim***, ***Ik-Whan G. Kwon***

We develop a time-series model that analyzes the impacts of new IT in Korean hospitals' efficiency measured by the number of account receivables collected, number of errors in medical records and in pharmaceutical records. A lack of IT literature on Korea drives this study.

3) withdrawn - author request of 9/25, ***Kathryn S. Taylor***, London School of Econ. & Political Sci., OR Dept., Houghton St., London, WC2A 2AE, UK, k.taylor@lse.ac.uk, ***David C. Lane***

4) Comparison of HIV Positive Mortality Prediction Using Artificial Nueural & Bayesian Networks, ***Owen P. Hall Jr.***, Pepperdine University, 400 Corporate Pointe, Culver City, CA 90230, ohall@pepperdine.edu, ***Natalie Sanders***

Predicting outcomes for persons infected with HIV is complicated by the presence of multiple variables including age at time of infection, treatment intervention modalities and the timing of that intervention and virulence of the viral strain. Traditional epidemiologic tools have been utilized to predict survival, but the utility has been limited and inconsistent...

WA19 Topics in Nonlinear Optimization & their Applications

Cluster: Linear Programming & Related Topics
Sponsor: Optimization Section
Sponsored Session

Chair: Kees Roos, Delft University of Technology, ITS/TWI/SSOR, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@twi.tudelft.nl

1) Relationships & Properties of Condition Numbers for Convex Feasibility Problems, ***Robert M. Freund***, MIT, OR Ctr. Bldg. E40-149A, 77 Massachusetts Ave., Cambridge, MA 02139-4307, rfreund@mit.edu, ***Marina A. Epelman***

For convex feasibility problems in conic form, we study properties and relationships between a number of relevant condition numbers for such systems. We also study and analyze a family of "elementary" algorithms for the convex feasibility problem in terms of these condition numbers.

2) Perturbation Theory for Conic Systems, ***Javier Pena***, Cornell University, 657 Rhodes Hall, Ithaca, NY 14853, jpena@cam.cornell.edu

We show how some facts from perturbation theory for linear equations extend naturally to the more general context of conic systems. In particular, we show how the distance to infeasibility of a conic system is a natural generalization of the smallest singular value.

3) A Strongly Polynomial Rounding Procedure Yielding a Maximally Complementary Solution for P-*-Kappa Linear Complementarity Problems, ***Tamas Terlaky***, Delft University of Technology, ITS/TWI/SSOR, PO Box 5031, Delft, 2600 GA, The Netherlands, t.terlaky@twi.tudelft.nl, ***Tibor Illes***, ***Jiming Peng***, ***Kees Roos***

Our main result is a strongly polynomial rounding procedure for P-*-kappa LCPs. The result implies that IPMs not only converge to a complementary solution of P-*-kappa LCPs but, when furnished with our rounding procedure, they can produce a maximally complementary (exact) solution in polynomial time.

4) A Nonlinear Assignment Problem in Nuclear Reactor Fuel Management, ***A. J. Quist***, Delft University of Technology, ITS/TWI/SSOT, PO Box 5031, Delft, 2600 GA, The Netherlands, a.j.quist@twi.tudelft.nl, ***R. van Geemert***, ***J. E. Hoogenboom***, ***Tibor Illes***, ***E. de Klerk***, ***Kees Roos***, ***Tamas Terlaky***

The yearly reloading of a nuclear reactor is described as a nonlinear mixed integer optimization problem. Current solution methods cannot handle all aspects of the optimization and are very time-consuming. We show that nonlinear optimization algorithms combined with problem-specific branching methods can overcome these difficulties.

WA21 Successful Mgmt. of Strategic Change in Technologically Complex, Socially Diverse, Globally Distributed Organizations

Sponsor: Social Science
Sponsored Session

Chair: Katrina Burrus Barbey, MKB Conseil, 1253 Vandoeuvres, Geneva, Switzerland

Co-Chair: Leslie Pentland, The Fielding Institute, PO Box 987, Issaquah, Wa

1) How Managing Partners of Swiss Private Banks Lead Change Processes in Global Technological Environments, ***Katrina Burrus Barbey***, MKB Conseil, 1253 Vandoeuvres, Geneva, Switzerland

In unpredictable global technological environments, organizations navigate amid accelerating change. Case studies of Swiss banks identify behavioral changes

due to technological evolution, highlighting the Swiss style of decision-making, work, leadership and organizational structure and change theories.

2) Data That Makes a Difference: Designing Proactive ISs that Link Cognitive/Personal Development with Organizational/ Strategic Develop, ***David Drake***, The Fielding Institute, PO Box 8828, Portland, WA 97207-8828

Scholar-practitioner, doctoral research of work with MIS leaders to move information systems designed from a reactive corrective process into a proactive force for organizational development is given.

3) A Matter of Organizational Survival: Preparedness & Readiness for Effective Management of Y2K Compliance, Global Organization & Rapid.., ***Leslie Pentland***, The Fielding Institute, PO Box 987, Issaquah, WA, ***Dottie Eastman Agger-Gupta***

We simultaneously address legacy systems, globally distributed networks and virtual organizations. We examine human and organizational strategies in manufacturing, government and health care delivery systems in the US and Canada.

4) Issues & Challenges of Knowledge Management Facing Executives Today, ***Pat Brogan***, The Fielding Institute, 444 Castro St., Mountain View, CA 94041

With all the changes in today's companies, a key to successful knowledge management is necessary. Collaboration requires knowledge sharing. Managers must understand what intellectual capital the company has and how to effectively share knowledge vs. data to achieve higher productivity.

WA25 Integer Programming I

Contributed Session

Chair: Ismael R. de Farias, Jr., IBM Corporation, 3200 Windy Hill Rd., Atlanta, GA 30339, ismael@akula.isye.gatech.edu

1) Modeling Piecewise Linear Multicommodity Flows, ***Keely L. Croxton***, MIT, OR Ctr., 5 Hancock Pl., Cambridge, MA 02139, croxton@mit.edu web.mit.edu/croxton/www, ***Thomas L. Magnanti, Bernard Gendron***

Multicommodity flows with general piecewise linear costs arise in numerous problem contexts in logistics, telecommunications and transportation. We examine alternate approaches for modeling these problems, including the use of problem disaggregation. Computational experience in varied problem contexts shows that disaggregation can be a powerful construct in solving realistically sized problems.

2) A Column Generation Approach for the Multi-Period Single-Sourcing Problem, ***Dolores Romero-Morales***, Erasmus University, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, d.romero@fac.fbk.eur.nl, ***Edwin Romeijn, Albert P. M. Wagelmans***

We consider the problem of supplying a set of customers by a set of warehouses in the case of time-varying demands. For this problem, a column generation approach will be compared to an (asymptotically optimal) generalized greedy heuristic.

3) Approximate Dynamic Programming Algorithms for Large-Scale Integer Programming Problems: A Statistical Learning Approach, ***Ramazan Demir***, MIT, OR Ctr., E40-194, Cambridge, MA 02139, rdemir@mit.edu, ***Dimitris Bertsimas***

We propose an approximate dynamic programming methodology in order to solve large-scale integer programming problems. We use statistical learning techniques, both parametric and nonparametric, as well as sampling to solve IPs. We report very encouraging computational results involving thousands of variables and constraints.

4) Facets of the Multiple-Choice Knapsack Polytope, ***Ismael R. de Farias, Jr.***, IBM Corporation, 3200 Windy Hill Rd., Atlanta, GA 30339, ismael@akula.isye.gatech.edu, ***Ellis L. Johnson, George L. Nemhauser***

We study the facetial structure of the convex hull of the continuous multiple-choice knapsack polytope. We define cover inequalities and show how to lift variables outside of the cover to obtain facets. We present a B&C scheme based on these facets and computational results.

WA26 Networks & Graphs

Contributed Session

Chair: Richard D. McBride, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089-1421, mcbride@rcf.usc.edu

1) A Partitioning Problem on Bipartite Planar Graphs, ***Herman Abeledo***, George Washington Univ., Dept. of OR, 707 22nd St. NW, Washington, DC 20052, abeledo@seas.gwu.edu, ***Gary W. Atkinson***

Given a bipartite plane map, we consider a combinatorial optimization problem whose feasible solutions are partitions of the node set into edges or faces. We prove that this problem can be solved as an LP since the constraint matrix of its integer programming formulation is unimodular. This establishes the integrality of the linear relaxation polytope since the LP problem is in standard form...

2) Finding K Shortest Paths in Acyclic Networks, ***Yanjun Zhang***, The SABRE Group Inc., 1 E Kirkwood Blvd., Southlake, TX 76092, yanjun_zhang@sabre.com

A simple and efficient algorithm is presented for finding multiple shortest paths connecting a given pair of vertices in an acyclic network with no directed cycles. This algorithm is used in an airline scheduling model in which a number of shortest paths are sought between many city pairs in a large time-space network.

3) Probabilistic Polynomial Behavior of Lamda-Opt for Traveling Salesman Problems, ***Masahiro Okada***, Nara Inst. of Science & Technology, Grad. Sch. of Info. Sci., 8916-5 Takayama, Ikoma, Nara, 630-0101, Japan, masahi-o@is.aist-nara.ac.jp http://genesis.aist-nara.ac.jp/~okada/, ***Kouichi Taji, Yutaka Takahashi***

We investigate the number of iterations of lamda-opt, which is a local search method for TSPs. So far, it has been proven that the number of iterations of 2-opt is probabilistically polynomial for the problems defined as the rectilinear and the Euclidean metric. We extend those results to lambda-opt for the rectilinear metric and to general dimensions for the Euclidean metric.

4) Solving Large-Scale Network with Side Constraint Problems with Decomposition Pricing, ***Richard D. McBride***, University of Southern California, Marshall Sch. of Bus., Los Angeles, CA 90089-1421, mcbride@rcf.usc.edu

Implementation issues for a new pricing procedure for large-scale network problems with side constraitns will be discussed. This procedure interactively solves a relaxed sub-problem to identify potential entering basic variables. Computational experience on a variety of problems (including multicommodity flow problems) will be presented.

WA27 Linear Programming

Contributed Session

Chair: Kwang-Soo Lee, Indiana State University, Sch. of Bus., SDS Dept., Terre Haute, IN 47809, sdkwang@befac.indstate.edu

1) The Implicit LX Method & Applications to the LP Problem, ***Emilio Spedicato***, University of Bergamo, Piazza Rosate 2, Bergamo, 24129, Italy, emilio@ibguniv.unibg.it, ***Zunquan Xia***

ABS methods unify and generalize many literature methods for linear and nonlinear equations and optimization. The implicit LX method is a linear solver with same overhead but less storage than the LU method. It leads to a reformulation of the simplex method for the LP problem, which has 1 order less overhead and storage than the classic one using the LU method for problems with many equality constraints.

2) Polytopes of Large Diameter, ***Fred B. Holt***, The Boeing Company, PO Box 3707, MS 71-21, Seattle, WA 98124-2207, fred.b.holt@boeing.com, ***Kerstin Fritzsche***

In 1957, W. M. Hirsch conjectured that an optimal vertex of any LP-problem of n constraints on d variables could be reached in at most n-d clairvoyant pivots from any starting vertex. We will present systems which meet this bound (n-d) starting with d=8.

3) On the Convergence Rate of the Fictitious Play Method, ***Kenneth Peterson***, Kean University, Dept. of Math. & CS, 1000 Morris Ave., Union, NJ 07083, kenp2@idt.net, ***Pablo Zafra, Saul I. Gass***

We present empirical results on the convergence rate of Brown's fictitious play method. We look at the rates when different matrix sizes are used and compare with the theoretical result which provides lower bound on the convergence rate. We also look at the comparison with Robinson's modification of this iterative method.

4) A Graphical Illustration of the Right Hand Side Sensitivity in Linear Programming, ***Kwang-Soo Lee***, Indiana State University, Sch. of Bus., SDS Dept., Terre Haute, IN 47809, sdkwang@befac.indstate.edu

Extending a graphical representation of the LP extreme point theorem, we graphically demonstrate that the effects of increasing the right-hand side of a constraint on the basic variables are the same as the effects of decreasing the value of the slack variable in that constraint.

WA28 Nonlinear Programming I

Contributed Session

Chair: Bala Shetty, Texas A&M University, Dept. of Bus. Analysis, College Station, TX 77843-4217, shetty@tamvm1.tamu.edu

1) Quasi-Newton Hessian Approximations in Nonlinearly Constrained Optimization, ***Meredith Goldsmith***, Stanford University, Dept. of EES/OR, Terman Eng. Ctr., Stanford, CA 94305-4023,mgold@leland.stanford.eduhttp://keywest.stanford.edu/~mgold/, ***Walter Murray***

When approximating the Hessian of the Lagrangian, the common approach has been to apply the BFGS quasi-Newton update exactly as for unconstrained optimization, and to enforce positive definiteness of the matrix. Other options on how to extend the quasi-Newton update will be discussed.

2) Globally Convergent Iterative Algorithms for Entropy Maximization Problems & Applications in Solving Linearly Constrained Problems, ***Chuangyin Dang***, Chinese University of Hong Kong, Dept. of Sci. & Eng., Shatin NT, Hong Kong, cydang@cse.cuhk.edu.hk

A globally convergent iterative algorithm is developed for the entropy maximization problem with linear equality constraints. The algorithm is derived from the use of Lagrange multiplers which are employed to form a system of special nonlinear equations. A positive solution of the system of special nonlinear equations yields an optimal solution of the problem...

3) Conceptual Conclusion of Directionally Differentiable Functions Theory, ***Alexander E. Aban'kin***, Russian Academy of Sciences, St. Petersburg Inst. Econ/Math, Serpuchovskaya str. 38, St. Petersburg, 198013, Russia, alexander@abankin.spb.ru

The problem of selecting subsets of the family of directionally differentiable functions, allowing a constructive describing is considered. Using the notion of abstract convexity (H-convexity), a tool for constructing subsets of functions called H-quasidifferentiable is proposed. The problem of choosing H-sets guaranteeing some prescribed properties of corresponding space of H-quasidifferentiable functions is discussed...

4) A Pegging Algorithm for Nonlinear Resource Allocation, ***Bala Shetty***, Texas A&M University, Dept. of Bus. Analysis, College Station, TX 77843-4217, shetty@tamvm1.tamu.edu, ***Kurt M. Bretthauer***

We present a pegging algorithm for minimizing a separable convex function over a single convex constraint and integer variables. Performance of this algorithm is compared with multiplier search, DP and a linearization method. Our algorithm advances the state-of-the-art in methods for solving nonlinear resource allocation problems.

WA29 Dynamic Programming & Control

Contributed Session

Chair: Shelby L. Brumelle, University of British Columbia, Fac. of Commerce, Vancouver, BC, V6T 1Z2, Canada, shelby.brumelle@ubc.ca

1) Sequential Allocation Problems with Side Constraints, ***Apostolos N. Burnetas***, Case Western Reserve University, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu, ***Michael N. Katehakis***

Consider the problem of adaptive resource allocation to various projects under incomplete information and side constraints. We develop expressions and asymptotic lower bounds for the loss due to incomplete information. We propose adaptive allocation rules that attain the lower bound.

2) A Generalization of Multiple Objective Dynamic Programming with Time-Dependent Costs, ***Laura C. Lancaster***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, llancas@clemson.edu, ***Michael M. Kostreva***

Little research has been done on MODP with time-dependent cost functions. Research to date required restrictions on the cost functions in order to satisfy the principle of optimality of dynamic programming. A method which handles time-dependent cost functions with fewer restrictions is described.

3) Reachability Analysis of Petri Nets & Its Applicability, ***Parthasarathy Ramachandran***, Oklahoma State University, Ctr. for CIM, Sch. of IE, Stillwater, OK 74078, pramach@okstate.edu, ***Manjunath Kamath***

The reachability problem of a general Petri net is introduced. The necessary and sufficient conditions for reachability in general Petri nets are discussed. A new algorithm to test the reachability of one state from another is presented. Finally, the applicability of reachability analysis of Petri nets to manufacturing systems analayis and design is discussed.

4) Dynamic Allocation of an Airline Seat Inventory with Batch Arrivals, ***Darius Walczak***, University of British Columbia, Fac. of Comm., Vancouver, BC, V6T 1Z2, Canada, walczak@phdlab.commerce.ubc.ca, ***Shelby L. Brumelle***

When a customer requests a discount fare, the airline must decide whether to sell the seat at the requested discount or to hold the seat in the hope that a customer will arrive later who will pay more. We anayze a single leg model with semi-Markov batched arrivals and multiple fare classes.

5) Optimal Burn-In Time Under Capacity Constraint, ***Nahoya Takezawa***, University of California, Dept. of IE/OR, Berkeley, CA 94720, takezawa@ieor.berkeley.edu, ***J. George Shanthikumar***

Burn-in time for new products are usually decided based on a cost-benefit analysis and the capacity needed for such burn-in is then chosen. If the products for burn-in arrive uniformly over time, one may use the optimal burn-in time chosen. If, on the other hand, the arrivals are random, then adjusting the burn-in time as a function of the number of items waiting for burn-in can be very beneficial...

WA31 Heuristic Programming

Contributed Session

Chair: Robert A. Ruben, New Mexico Tech, Dept. of Mgmtm., Socorro, NM 87801, ruben@nmt.edu

1) Metaheuristics for the Bus-Driver Scheduling Problem, ***Helena R. Lourenco***, Universitat Pompeu Fabra, R. Trias Fargas 25-27, Barcelona, 08005, Spain, ramalhin@upf.es, ***Jose P. Paixao***, ***Rita Portugal***

We present heuristics for solving real crew scheduling problems in a public transportation bus company. In practice, there exists the need for efficient methods to solve large-scale instances in real-time. We propose metaheuristics based on GRASP, TS and GAs that present some innovation features based on the structure of the crew schedulng problem...

2) Adaptive Improvement in Boltzmann Machines, ***Camille C. Price***, Austin State University, Dept. of Comp. Sci., Nacogdoches, TX 75962, camille@cs.sfasu.edu, ***John D. Knapp***

Boltzmann machines have been applied successfully to combinatorial optimization problems but the conventional model does not lend itself to adaptive improvement in performance. By using a training layer and a production layer, we provide a mechanism for modifying the weights connecting neural units. Results of the training regimen are reported.

3) Mixed Assembly Line Balancing by Task Grouping, ***Alejandro G. Del Valle***, University of La Coruna, Mendizabal, s/n, Ferrol La Coruna, 15403, Spain, agvalle@udc.es http://pc_agvalle.eps.cdf.udc.es/, ***Delfina Merlano***, ***Javier Faulin***

A method to solve the ALB2 problem for the mixed assembly line balancing problem is presented where multiproduct batch size is equal to one. The efficiency obtained is acceptable and the multiplicity is 0. This method can be adapted to solve the ALB1 problem in mixed assembly lines.

4) A Neural Networks Approach to Estimating Mean Values of Eigenvalues for a Random Matrix & Applications to Variable Subset Selection, ***Robert Pavur***, University of North Texas, Coll. of Bus. Admin., Denton, TX 76203, pavur@cobaf.unt.edu, ***Kellie Keeling***

Parallel analysis has received much attention in estimating the dimensionality of data. Regression approaches have been proposed to estimate the required mean eigenvalues by using the sample size and number of variables. A new methodology, using a neural nets approach is demonstrated to be a viable alternative to previous approaches.

5) An Efficient Heuristic for Batching Orders in a Warehouse, ***Robert A. Ruben***, New Mexico Tech, Dept. of Mgmtm., Socorro, NM 87801, ruben@nmt.edu

We present a heuristic for batching customer orders in a walk-and-pick system. The heuristic provides superior performance to the best previously reported heuristic for this problem under a variety of storage assignment strategies.

WA33 Crew Planning & Traffic Management

Sponsor: Aviation Applications

Sponsored Session

Chair: Srinivasan Ramaswamy, United Airlines Corporate R&D, 1200 E Algonquin Rd., Elk Grove Village, IL 60173, srini.ramaswamy@ual.com

1) Identifying Requirements for Good Network Decomposition

Methods, ***Michelle R. Hribar***, NASA, NASA Ames Research Ctr., M/S T27A-2, Moffett Field, CA 94035, hribar@nas.nasa.gov, ***Valerie E. Taylor***, ***David E. Boyce***

Many transportation applications are complex, requiring the use of parallel processing. One computationally-intense step of such applications is the generation of shortest path trees. We describe the use of statistical analysis to identify the characteristics of the network decomposition that must be considered to achieve good performance for distributed parallel shortest path algorithms.

2) The Stochastic Ground-Holding Problem, ***Robert Hoffman***, University of Maryland, Rm 2255 AVW, College Park, MD 20742, hoff@isr.umd.edu, ***Ryan Rifkin***, ***Michael Ball***, ***Amedeo R. Odoni***

Currently, a constrained arrival capacity situation at an airport in the US is alleviated by holding inbound aircraft at their departure gates. In this presentation, the stochastic nature of arrival capacity is modeled by an integer program that provides the optimal trade-off between ground delay and airborne delay.

3) What Is So Different About Long-Haul Scheduling?, ***Andrew Vakhutinsky***, United Airlines Corporate R&D, 1200 Algonquin Rd., Elk Grove Village, IL 60173, andrew.vakhutinsky@ual.com, ***Eric Gelman***, ***Srinivasan Ramaswamy***

Long-haul crew pairing problems are known to be difficult to solve. We will describe the difference between short- and long-haul operations. We will also present our long-haul ACRUZER model and computational results.

Wednesday 10:00-11:30

WB01 Decision Analysis in Project Management

Sponsor: Decision Analysis
Sponsored Session

Chair: Zvi Covaliu, George Washington University, Monroe Hall, Ste. 402E, 2115 G St. NW, Washington, DC 20052, covaliu@gwis2.circ.gwu.edu

1) A Software Prototype for Modeling Dependence in Project Management, ***Ali Jenzarli***, University of Tampa, Coll. of Bus., 401 W Kennedy Blvd., Tampa, FL 33606, ajenzarli@alpha.utampa.edu

We describe the prototype of a new project management software for modeling dependence in project management. This software implements new advances in project management, namely PERT belief network models and PERT influence diagram models. Managerial implications for using such software and future enhancements are discussed.

2) withdrawn - author request of 9/24, ***David Rios Insua***, U. Rey Juan Carlos, Sch. of Eng. Independencia, Mostoles, 12 28936, Spain, drios@escet.urjc.es, ***Miguel Virto***, ***Jacinto Martin***

3) Bayes Learning & Decision Making in Project Management, ***Zvi Covaliu***, George Washington University, Monroe Hall, Ste. 402E, 2115 G St. NW, Washington, DC 20052, covaliu@gwis2.circ.gwu.edu, ***Refik Soyer***

We propose and illustrate a framework for optimal, sequential decisions on scheduling and crashing of activities in PM. It explicitly models dependence among uncertain resources and activities, and makes Bayesian inference about future activities based on accumulated observations. Graphical tools are used to model several typical PM situations.

WB02 Decision Analysis II

Contributed Session

Chair: Vicki M. Bier, University of Wisconsin, 1513 University Ave., Mech. Engineering Bldg., Madison, WI 53706-1572, bier@ie.engr.wisc.edu

1) Dynamic Enrollment Target Control in College Admissions Procedures, ***Yi He***, University of Toronto, Fac. of Mgmt., 105 St. George St., Toronto, Ontario, M5S 3E6, Canada, yihe@mgmt.utoronto.ca, ***Oded Berman***, ***Dmitry Krass***

After formulating a basic DP model for controlling enrollment targets, some assumptions are adjusted or relaxed so as to generate different scenarios. We present theoretical results for analyzing each scenario, algorithms for making decisions in each scenario and numerical experiments for evaluating the analytical results and algorithms.

2) Decision Analysis & Conceptual Decision Model, ***Gao Jun***, Ordnance Engineering College, Dept. of Mgmt., Hebei, Shijiazhuang City, 050003, PRC, gaolei@public.sj.he.cn

First, a general process of making decisions is discussed. Next, we put forward the concept of the conceptual decision model, as well as its contents and methods based on the above. A practical example of conceputal decision model is raised.

3) Motivated Reasoning: Normative Violations & Debiasing with Accountability, ***Lindsley G. Boiney***, George Mason University, MSN 5F4, Enterprise Hall, Fairfax, VA 22030-4444, lboiney@som.gmu.edu, ***Pete Nye***, ***Jane Kennedy***

Our earlier research showed that motivated reasoners are instrumental, biasing the decision process enough to justify the desired outcome. Here, we attempt to demonstrate that motivated reasoners will bias the decision process even to the extent of violating normative rules. We also investigate whether process accountability will debias instrumental reasoning.

4) Using a Multi-Attribute Utility Model to Rank Environmental & Health Risks, ***Kara M. Morgan***, Carnegie Mellon University, 1800 R St., NW #206, Washington, DC 20009, km6w@andrew.cmu.edu, ***Paul S. Fischbeck***, ***Michael L. DeKay***

Individual-participant multi-attribute models are used to rank 22 risks (not risk-management options). Participants are encouraged to use their inferred MAUT rankings to revise their individual holistic rankings of the same risks. Convergence of the holistic judgments of different individuals resulting from the MAUT exercise is investigated.

5) The Use of Default Values in Risk-Based Regulation, ***Vicki M. Bier***, University of Wisconsin, 1513 University Ave., Mech. Engineering Bldg., Madison, WI 53706-1572, bier@ie.engr.wisc.edu

Regulators often specify default values acceptable for use in risk analyses that serve as input to regulatory decisions. We will discuss the implications of varying degrees of conservatism in those defaults and how the level of conservatism interacts with other aspects of the regulatory system, e.g., regulatory incentives.

WB03 Education II

Contributed Session

Chair: Alexis Takvorian, Motorola, MD TX18/SP1 MMS/Meridian, 2150 Woodward Bldg. F, Austin, TX 78744, atak@pobox.com http://www.pobox.com/~atak

1) Science Education at US Secondary Schools & Global Technology Competitiveness, ***Yun Wang***, NJIT, 405 Franklin Tpk. # 26, Mahwah, NJ 07430, ywang@ramapo.edu

The US is the leading nation of global technology, though its science education standard at secondary schools ranks below international average. We aim to explore possible ways of modifying the current science curriculum system to meet global challenges and analyze what other countries do by utilizing some statistic methods to collect educational data.

2) Engineering Management Discipline Bridges Competency Gaps in Engineering Practice, ***Yildirim Omurtag***, University of Missouri, Eng. Mgmt. Dept., Rolla, MO 65401, omurtag@umr.edu

A growing concern is being expressed by industry sources that our engineering education system may not be delivering the right product for the modern work environment. After a thorough review of this, we examine how the engineering management/management of technology discipline is responding to the perceived competency gaps.

3) Government-University-Industry Cooperates to Establish Research Capability at Sultan Qaboos University in Oman, ***Saeed Al-Araimi***, Sultan Qaboos University, ME Dept., PO Box 33, Al-Khodh, 123, Sultanate of Oman, alaraimi@squ.edu.om, ***Hilal A. Al-Hinai***, ***Yildirim Omurtag***

We explain how the only university in Oman is creating a research capability through a cooperative effort among the sectors of government, university and industry in the Sultanate of Oman. Their model benefits from what is done elsewhere with some special characteristics unique to Omani culture. The emphasis is on organizational effectiveness with harmony and concensus among all parties involved in research.

4) Software Engineering Education at Motorola, ***Alexis Takvorian***, Motorola, MD TX18/SP1 MMS/Meridian, 2150 Woodward Bldg. F, Austin, TX 78744, atak@pobox.com http://www.pobox.com/~atak

These days, more and more of the functionality of a product is provided by the embedded software, rather than by the included hardware components. As a world-wide leader in several industries, Motorola has recognized the need for increased focus on software engineering expertise among its engineers. We describe ways in which Motorola is encouraging and promoting software engineering education throughout the corporation.

WB04 Manufacturing Strategy
Contributed Session

Chair: Lingxiu Dong, Stanford University, IEEM Dept., Stanford, CA 94305-4024, dlingxiu@leland.stanford.edu

1) Suppliers Base Management: Selection, Control & Idiosyncratic Investments, ***Mordechai Levi***, University of Pennsylvania, The Wharton Sch., 1341 SH-DH, Philadelphia, PA 19104-6366, moti@opim.wharton.upenn.edu, ***Paul R. Kleindorfer***

In the past few years, there has been a trend towards a reduced supplier base and long-term relationships (Dyer, 1995). Transaction cost economics (Williamson, 1996) emphasizes idiosyncratic investments as an important factor in determining hierarchical structure. We build on Seshdari (1995) to model selection and control of suppliers but for idiosyncratic investments rather than costs.

2) Multi-Attribute Methods in Supply Chain Management, ***Handanhal V. Ravinder***, University of New Mexico, Anderson Sch. of Mgmt., Albuquerque, NM 87131, ravinder@anderson.unm.edu, ***Carl R. Schultz***

We review applications of multiattribute methods, MAUT, AHP and multiobjective math programming, in the diverse areas that constitute supply chain management. We focus on papers appearing in the POM nd DA literature. Recent applications are discussed in detail and promising areas of research are explored.

3) Should You Target the Laggards in a High Technology Market with Short Product Life Cycles?, ***Hirofumi Matsuo***, University of Texas, Dept. of Mgmt., Austin, TX 78712, matsuoh@mail.utexas.edu, ***Nikhil Jain***, ***Vijay Mahajan***

The customers of a product can be sgemented into early adopters, majority and laggards. We evaluate a manufacturing policy of neglecting laggards from the target segments. We shall demonstrate that this policy leads to higher expected profit and less risk in spite of lower expected revenue.

4) Distribution Channel Structures & Supply Chain Performance, ***Lingxiu Dong***, Stanford University, IEEM Dept., Stanford, CA 94305-4024, dlingxiu@leland.stanford.edu, ***Hau L. Lee***

We compare 4 distribution channel structures practiced in industries such as personal computer manufacturing. We investigate the cost drivers of each structure and conditions under which one structure is most cost effective. We also consider differential impacts of the structures to both manufacturer and distributors.

WB05 Variability in Manufacturing
Contributed Session

Chair: Peruvemba Ravi, Washington University, Olin Sch. of Bus., CB 1133, St. Louis, MO 63117, ravi@wuolin.wustl.edu

1) The Effect of Capacity & Variability of Final Demand on Safety Stock, ***Gary W. Clendenen***, University of Texas, 3900 University Blvd., Tyler, TX 75799, gclenden@mail.uttyl.edu

A Monte Carlo study is used to look at the interaction of capacity and variability of final demand on safety stock levels. The study looks both at a serial lne and a line with parallelism. Results show a subtle, but important, relationship between safety stock, capacity and variability of final demand.

2) Process Design for Reducing the Variability of Production Volumes for Products in Highly Segmented Markets, ***Anand A. Paul***, University of Texas, Mgmt. Dept., CBA 4.202, Austin, TX 78712-1174, abraham@uts.cc.utexas.edu, ***Nikhil Jain***

Reducing the variability of production volumes in intermediate stages is an important objective in designing a process, particularly in an environment characterized by high product variety and demand uncertainty. We develop formalized models that provide insights into reducing such variability, thereby improving the performance of the manufacturing system.

3) Effects of Component Commonality on Inventory & Service Level in a Multi-Stage Assembly System, ***Wei Wang***, HKUST, Dept. of IEEM, Clear Water Bay, Kowloon, Hong Kong, PRC, iewwx@uxmail.ust.hk, ***Mitchell M. Tseng***, ***Liming Liu***

Two models with and without component commonality, respectively, are introduced, formulated and analyzed for a multi-stage assembly system. Our interest is to quantify the effects of adopting common components at different stages of an assembly line. The challenge involved is to solve a mixture inventory problem with a service level constraint.

4) Does a Level Demand Pattern Always Minimize Manufacturing Costs?, ***Peruvemba Ravi***, Washington University, Olin Sch. of Bus., CB 1133, St. Louis, MO 63117, ravi@wuolin.wustl.edu, ***Meir J. Rosenblatt***

It is often assumed that the multiple demand levels resulting from promotions and seasonalities always have an adverse impact on manufacturing costs. We show that this is not always true and that a level demand pattern is not necessarily optimal.

WB06 Statistics & Quality II
Contributed Session

Chair: Derek J. Nalle, Oregon State University, Dept. of Stats., Kidder Hall 44, Corvallis, OR 97331-4606, nalle@stat.orst.edu

1) A Modeling Framework for Usability Assessment & Prediction, ***Kwang-Jae Kim***, Postech, Dept. of IE, Pohang Kyungbuk, 790-784, ROK, kjk@postech.ac.kr, ***Sung Han***, ***Myung Hwan Yun***

Usability is becoming increasingly important as a factor determining the ovall quality and, thus, the success probability of a product. We develop a framework for assessing and predicting the usability of a product based on multivariate statistical techniques. A case study using A/V systems will also be presented.

2) The Future of Optimal Experimental Design, ***Theodore T. Allen***, Ohio State University, 210 Baker Systems, 1971 Neil Ave., Columbus, OH 43210-1271, allen.515@osu.edu http://128.146.114.14/~facultyp/allen.htm

Computers and heuristics are rapidly increasing the relevance of optimal experimental design by making it possible to definitely address its historical problems, including model dependence. The challenge becomes to formulate new problems, that building on previous results, more directly address business objectives, including reducing the number of runs and increasing the expected dollar value of the experiment.

3) Equipment Selection for Process Monitoring, ***Sung-Jin Lee***, University of California, Dept. of IE/OR, Berkely, CA 94720, sungjin@ieor.berkeley.edu, ***J. George Shanthikumar***

Consider a production process that needs to be monitored for excursions using measurements taken from the products produced by the process. The measurements taken on the poducts lead to a partial information on the state of the process. Suppose we have 2 different types of monitoring equipment available for taking these measurements. The statistical nature of the measurements are different...

4) Extended Trend Rules, Supplementary Runs Rules & Average Run Length Properties, ***Richard W. Taylor***, University of Akron, Mgmt. Dept., Akron, OH 44325-4801, taylorr@uakron.edu, ***James J. Divoky***

Extended trend rules are used in conjunction with supplementary runs rules to increase the sensitivity of a control chart to process changes. We examine the impact of trend rule inclusion on various properties of ARL. A comparative metric is developed based on these distributional data.

5) Economic Design of Process Control Systems when the Testing Equipment Deteriorates, ***Jie Ding***, Rider University, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648, ding@rider.edu, ***Linguo Gong***, ***Kwei Tang***

We study economic design of a process control system with testing equipment that deteriorates and subsequently, makes errors in identifying nonconforming products. We formulate and solve the problem as a cost optimization model. Through computational experiments, we find that deterioration in testing equipment significantly affects system performance.

WB08 Stochastic Processes
Contributed Session

Chair: Jerry Evans, US Army Aviation & Missile Command, AMSAM-RD-AS-PL, Redstone Arsenal, AL 35898-5242, evans-jm@redstone.army.mil

1) Stochastic Processes Dominate Presidential Performance, ***Stephen S. T. Kao***, Ctr. for Rating the Presidents, 30 Illinois St., Racine, WI 53405, stkao@we.net

The professional and family background is interacted mathematically. The stochastic processes dominate Clinton's presidential performance.

2) Reliability Analysis of a Multiserver Queueing System, ***Diwakar Pandey***, Meerut University, C-9 University Campus, Meerut, UP 250004, India, vks@commerce.delhi.nic.in, ***Shephali Tyagi***

In multiserver queueing systems, service channels may fail due to the absence of human server/failure of service machines. The absence of remedial measures

may bring an explosive situation due to an increase in traffic intensity. This creates the need to study queueing system reliability. We study reliability characteristics of M/M/c queueing systems.

3) Mistake Analysis in the Human-Computer Interface Design Process, ***Jerry Evans***, US Army Aviation & Missile Command, AMSAM-RD-AS-PL, Redstone Arsenal, AL 35898-5242, evans-jm@redstone.army.mil

Previous work has shown that HCI designs can be improved using embedded data collected during testing. Mistakes committed while working with a prototype HCI should follow a Markov process and this can be used to quantify differences between and within prototypes. Experiment details, analysis, results and recommendations will be detailed.

4) withdrawn - author request of 9/17, ***Joni K. Evans***, 113 Athens Blvd., Madison, AL 35758, j3tevans@aol.com, ***Jerry Evans***

WB09 Forecasting II

Contributed Session

Chair: Dilek Onkal-Atay, Bilkent University, Fac. of Bus. Admin., Ankara, 06533, Turkey, onkal@bilkent.edu.tr

1) A Dummy Variable Regression Model for Short-Term Forecasting, ***XiaoYing Chen***, Softbank Corp., 24-1 Nihonbashi-Hakozakicho, Chuo-ku, Tokyo, 103, Japan, xchen@softbank.co.jp, ***Makoto Okazaki***

The product market is changed with a wide variety of factors, such as seasonality, product life cycle, pricing, promotions, etc. A dummy variable regression model that can reflect those influences is developed. As a result, it is confirmed that the model can improve forecasting accuracy.

2) Integrated Forecasting and Hedging, ***Robert M. Saltzman***, San Francisco State University, 1600 Holloway Ave., Coll. of Bus., San Francisco, CA 94132-1722, saltzman@sfsu.edu http://userwww.sfsu.edu/~saltzman/, ***Paul Rech***, ***Paul L. Schmidbauer***

We integrate forecasting and decision making in environments similar to the newsboy problem with non-symmetric costs. The problem is to find an ordering strategy that minimizes the expected opportunity loss. We propose a simple integrated forecasting and hedging method that does not require any assumptions about the distribution of demand.

3) Improving Day-Ahead Electricity Demand Forecasts, ***James W. Taylor***, London Business School, Decision Sci. Dept., Sussex Pl Regent's Park, London, NWI 4SA, UK, jtaylor@lbs.ad.uk

Day-ahead forecasts are required for operational planning and for calculating the daily electricity pool price. One approach predicts the turning-points in the demand curve and then produces half-hourly forecasts by a smoothing procedure based on a historical demand curve. We aim to improve this method and consider alternative approaches.

4) Feedback Effects on Judgmental Extrapolations of Time Series, ***Dilek Onkal-Atay***, Bilkent University, Fac. of Bus. Admin., Ankara, 06533, Turkey, onkal@bilkent.edu.tr, ***Fergus Bolger***

We examine the effects of feedback manipulations on judgmental forecasting performance. Participants were asked to provide credible intervals with confidence levels of their choice, instead of an imposed percentage, e.g., 90%. Potential effects of positive vs. negative feedback were investigated within this framework.

WB10 Quality Management II

Contributed Session

Chair: Kathryn J. Moland, Metasys Inc., PO Box 143, Newell, NC 28126, kmoland@metasys.com

1) The Relationship Between TQM Practices & Organizational Performance, ***Mile Terziovski***, Monash University, PO Box 197 Caulfield East, Melbourne, 3145, Australia, mile.terziovski@buseco.monash.edu.au, ***Danny Samson***

The relationship between TQM practices and performance are tested using a large random sample of manufacturing companies in Australia and New Zealand. The central finding is that a significant relationship exists between the "soft" practices such as people focus, compared to the "hard" practices such as information analysis, which had an insignificant relationship.

2) withdrawn - author request of 9/22, ***Zigang Zhang***, CSCE, 166 Old Mill St., Manchester, M4 6EF, UK, z.zhang@surveying.salford.ac.uk, ***Peter S. Barrett***

3) TQM in Public Post-Secondary Education, ***Danny I. Cho***, University of Northern BC, Fac. of Bus. & Mgmt., 3333 University Way, Prince George, BC, V2N 4Z9, Canada, chod@unbc.ca www.unbc.ca http://www.unbc.ca

Over the past decade, TQM practices have increased in the public sector as goernment funding declined. In post-secondary education, where government cuts have been quite severe, academics are beginning to emphasize customer focus, a major tenet of TQM. We examine the opportunities for implementing TQM in the public post-secondary education system and the potential obstacles that may be encountered.

4) Global Standards for Software Development, ***Kathryn J. Moland***, Metasys Inc., PO Box 143, Newell, NC 28126, kmoland@metasys.com, ***Victoria Baker***

The International Organization for Standardization, ISO, formed in 1946 creates a global set of business standards for quality control practices. We focus on the area of quality management as it relates to ISO. We examine the ISO guidelines as they apply to software development.

WB11 Managerial Implications of Technological Advances

Contributed Session

Chair: Fred Y. Phillips, Oregon Grad. Inst. of Sci. & Tech., PO Box 91000, Portland, OR 97291-1000, fphillips@admin.ogi.edu http://www.ogi.edu/mst

1) Technology Strategy Compatibility with Societal Norms & Forces, ***George A. Geistauts***, University of Alaska, Coll. of Bus., 3211 Providence Dr., Anchorage, AK 99508, ***Ted G. Eschenbach***

Technology developers and users both seek strategic and operating benefits through technological discovery and innovation, with the competitive market place theoretically determining winning and losing technologies. But societal norms and forces modify market mechanisms. We examine how the implementability of a technology strategy could be affected by societal preferences.

2) Trouble Management in the Dynamic Random Access Memory Fabrication Process, ***Jeffrey Kim***, University of California, Dept. of Info. & Comp. Sci., Irvine, CA 92697-3425, ykim@ics.uci.edu

DRAM chip fabrication requires high product yields. Achieving high yields is difficult because even small anomalies in nano-fabrication cause yield loss. Successful DRAM manufacturing includes evolving processes of trouble management handling heterogeneous and often conflicting opinions of experts. We describe the organizational dynamics of these processes.

3) Federal Economic Espionage Act of 1996: Implications for Technology Management, ***Jack K. Morton***, University of Montana, Sch. of Bus. Admin., Missoula, MT 59812, morton@selway.umt.edu

We analyze the technology management implications of the Federal Economic Espionage Act of 1996. The focus will be on the strengths and weaknesses as well as its impact on domestic and global business strategic planning.

4) Mass Customization in Advanced Manufacturing Environments, ***Niranjan Pati***, University of Wisconsin, Dept. of Mgmt., 418 G North Hall 1725 State St, La Crosse, WI 54601, pati@mail.uwlax.edu

Flexible processes used in advanced manufacturing environments help organizations to mass produce items at the price of mass produced and standardized alternatives. The concept is referred to as mass customization. We illustrate and identify research questions that arise when mass customization strategy is adopted in advanced manufacturing environments.

5) Technological Substitution in the Market Research Industry, ***Fred Y. Phillips***, Oregon Grad. Inst. of Sci. & Tech., PO Box 91000, Portland, OR 97291-1000, fphillips@admin.ogi.edu http://www.ogi.edu/mst

We trace more than 60 years of technologies for measuring consumer purchases and advertising exposure, and the corresponding business strategies and tactics. We illustrate technology substitution and several other socio-technical phenomena interesting to technology managers and forecasters, that are also useful as a case in a technology management or market research course.

WB12 Technology Management & Control

Sponsor: **Technology Management/Management of Productivity & Technology**

Sponsored Session

Chair: Raj Jagannathan, University of Iowa, Dept. of MS, S210 PBAB, Iowa City, IA 54442, raj-jagannathan@uiowa.edu

1) Managing Student Computing Facilities, ***Warren J. Boe***, University of Iowa, Coll. of Bus., Iowa City, IA 52240, warren-boe@uiowa.edu

Students change computers in labs. This impairs functionality for subsequent

users. There are also difficulties that require adding and changing software as the semester proceeds. Push technology is used to refresh computer images and to update and add software computers. Current and future student computing facilities are described.

2) Management Strategies for Allocation of Surgical Block Time, ***Rodney Traub***, University of Iowa, Dept. of MS, C108 PBAB, Iowa City, IA 52240, rodney-traub@uiowa.edu, ***Franklin Dexter***, ***Margaret Hopwood***

A significant portion of operating room costs are associated with labor. Effective scheduling of operating room suites helps to control these costs. We consider methods to schedule operating rooms which make effective use of the available labor resources. Our approach is tested using operating room data from a large hospital.

3) Integrated Production & Transportation Scheduling on Multi-Echelon Manufacturing Networks, ***Renato E. de Matta***, University of Iowa, 108 PBAB, Iowa City, IA 52242-1000, renato-dematta@uiowa.edu, ***Tan C. Miller***

We propose an algorithm to simultaneously schedule production at, and transportation between, an intermediate (WIP) producing plant and its linked finishing plant. This multi-echelon, short-run production and transport mode scheduling model has applications in several different industries. Computational results will be presented.

4) Developing Driver Work Schedules for an Inter-City Bus Service Company with Multiple Fleets, ***Emmanuel R. Peters***, University of Iowa, Dept. of MS, 108 PBAB, Iowa City, IA 54442, emmanuel-peters@uiowa.edu, ***Renato E. de Matta***, ***Warren J. Boe***

A company that operates multiple fleets and employs drivers with different skills must decide the mix of fleets to be driven in the driver work schedules. We model this decision as an integer LP problem and propose a column generation approach to solve the problem. Computational results are presented.

5) Improvement in Performance Measures in Internet Routing, ***Wu Huang***, University of Iowa, Coll. of Bus., Iowa City, IA 54442, wuhuang@blue.weeg.uiowa.edu, ***Raj Jagannathan***

The heterogeneous multi-server queues problem is called for with Internet routing since routers have different processing performance. We develop algorithms to choose routers in terms of performance measures such as average hop count, traffic congestion, mean queue length, etc.

WB13 Resource Allocation

Contributed Session

Chair: Lance A. Matheson, Virginia Tech., Dept. of MS & IT, Blacksburg, VA 24061, lance@vt.edu

1) A Model for Optimizing Work Groups Across Multiple Centers, ***Beth Spellman Munson***, AT&T Labs., 101 Crawfords Corner Rd., Rm. 3K-321, Holmdel, NJ 07733-3030, bsmunson@att.com, ***Hanan Luss***

Given fluctuating demands for multiple work-types to a labor resource spread across multiple centers, we propose a model for determining the optimal set of work groups, each designated to serve 1 or more work-types. Flow of work among centers is allowed at a cost. An MIP model and a heuristic algorithm are proposed.

2) An Exact Solution Method for Short-Term Capacity Allocation Problems, ***Elif Akcali***, Purdue University, Sch. of IE, 1287 Grissom Hall, W Lafayette, IN 47907-1287, akcali@ecn.purdue.edu http://gilbreth.ecn.purdue.edu/~akcali, ***Reha Uzsoy***

The short-term capacity allocation problem can be formulated as a maximum flow problem on a bipartite graph. Tooling constraints, setup considerations and differences in machine capabilities are considered. We develop an exact solution procedure and present computational results.

3) An Options-Based Model for R&D Opportunity/Project Evaluation, ***Alok Baveja***, Rutgers University, Sch. of Bus., Camden, NJ 08102, baveja@crab.rutgers.edu, ***Arun Kumaraswamy***

We describe an options-based model for use in R&D opportunity/project evaluation. Our model utilizes insights gained from a study of R&D evaluation practices prevalent in exemplar firms. It prompts decision makers to consider organizational priorities and to compare all known R&D investment opportunities at any given time.

4) Solving General Integer Allocation Problems by Global Optimization Approach, ***Yang Dai***, Tokyo Institute of Technology, 2-12-1 O-okayama, Meguro, Tokyo, 152-5882, Japan, dai@is.titech.ac.jp www.is.titech.ac.jp/labs/kojimalab/dai/dai.html

We consider general integer allocation problems: minimize a separable concave function over a feasible region defined by a single convex constraint and lower and upper bounds. We develop a B&B algorithm which solves the relaxation of the underestimation of each subproblem on the search tree. Computational results will be presented.

5) Clustering of Discrete Demand Nodes to Optimize Server Utilization with Variable Server Capacity, ***Lance A. Matheson***, Virginia Tech., Dept. of MS & IT, Blacksburg, VA 24061, lance@vt.edu, ***Raymond L. Major***

A set of demand nodes must be grouped into clusters which can be served by a single capacitated server. There is a set of servers. The demand nodes are clustered to minimize the total distance between the nodes, minimizing server travel time. A model and solution method are developed.

WB14 Service Industry IV

Contributed Session

Chair: Richard A. Reid, University of New Mexico, Anderson Sch. of Mgmt., Albuquerque, NM 87131, reid@anderson.unm.edu

1) Risk Management in Service Operations, ***Michelle M. Baron***, Victoria University, SBPM, PO Box 600, Wellington, 6015, New Zealand, michelle.baron@vuw.ac.nz

We evaluate the prospects for incorporating traditional risk analysis tools into risk management practice in service organizations. The research draws on risk management theory from disciplines including strategic management, finance and engineering. A comprehensive and cross-discipline application of available risk management processes and techniques is proposed and applied.

2) Organizing for Services Innovation, ***Rashmi Assudani***, McGill University, Fac. of Mgmt., 1001 Sherbrooke St. W, Montreal, Quebec, H3A 1G5, Canada, assudanr@management.mcgill.ca

Building a sustainable and innovative service enterprise, concentrated around a core set of service skills, involves managing and coordinating information and knowledge. We build a framework for organizing the processes between knowledge (creation and absorption) and relationships with (internal and external) customers in a hospitality industry.

3) Strategic Determinants of New Service Innovation: An Empirical Examination, ***Craig M. Froehle***, University of North Carolina, Kenan-Flagler Bus. Sch., CB 3490, Chapel Hill, NC 27599, froehlec@icarus.bschool.unc.edu, ***Aleda V. Roth***, ***Richard B. Chase***, ***Christopher Voss***

We examine the influencce of organizational structure, process design and IT choices on new service development. Several theory-based relationships are tested with a path model using data from the international service study. Findings provide general support from the literature but modifications are suggested.

4) withdrawn - author request of 9/14, ***Richard A. Reid***, University of New Mexico, Anderson Sch. of Mgmt., Albuquerque, NM 87131, reid@anderson.unm.edu

WB16 Traffic Incidents: Detection, Management & Control

Sponsor: Transportation Science

Sponsored Session

Chair: Baher Abdulhai, University of Toronto, Dept. of Civil Eng., Toronto, Ontario, M5S 1A4

1) Neural Network-Based Continuous Learning Framework for Freeway Incident Detection, ***Srinivas Peeta***, Purdue University, Sch. of Civil Eng., W Lafayette, IN 47907, ***Debjit Das***

Least squares and error back propagation are used to incorporate a continuous on-line learning capability in conventional freeway incident detection algorithms. Implemented for the California and McMaster algorithms, experimental results suggest that adding a neural net layer substantially enhances performance in operational networks without the need for additional data and/or parameters.

2) Evaluation of TRANSCOM's System for Managing Incidents & Traffic, ***Kyriacos C. Mouskos***, NJIT, Civil Engineering, Newark Heights, Newark, NJ 07102, mouskos@megahertz.njit.edu, ***E. Niver***, ***S. Lee***, ***T. Batz***, ***P. Dwyer***

The TRANSMIT system is based on the use of the E-ZPass electronic toll collection system operating in the NY/NJ/CT metropolitan area to monitor traffic conditions utilizing tag-equipped vehicles as traffic probes. Results of the evaluation of TRANSMIT's communication system, incident detection system, traffic parameters and cost/benefits are presented.

3) Development of Dynamic Control Strategies for Managing Freeway Incident Traffic, ***Omar Sawaya***, Northwestern University, Dept. of Civil Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL

60208, obo720@hecky.acns.nwu.edu, ***Athanasios Ziliaskopoulos***

Freeway incidents are a major cause of traffic delays, secondary crashes and environmental hazards. We introduce an approach that computes alternate routes around incidents, as well as other control and management strategies, in response to current traffic conditions. Several sets of experiments were conducted to test the performance in response to given incident parameters...

4) Modeling & Evaluation of the Indiana Lane Merge System, ***Andrzej P. Tarko***, Purdue University, 1284 Civil Engineering Bldg., W Lafayette, IN 47907, tarko@ecn.purdue.edu, ***Srinivasulu Kanipakapatnam***, ***Daniel Shamo***

Approaches to freeway work zones experience excessive crashes and delays. We present a concept of a new system deploying a dynamic no-pass zone. A simulation model of the new system, the model's calibration using optimization techniques and evaluation of the new system effectiveness using the simulation model are presented.

WB17 Logistics Around the World

Sponsor: Logistics
Sponsored Session
Chair: Lilian L. Barros, BP 8, St Julien Les Villas, 10800, France, barros2@univ-troyes.fr

1) Logistics of the Third Kind - Revisited, ***Ben Ostrofsky***, 14611 Carolcrest Dr., Houston, TX 77079-6405, beno@uh.edu

In logistics, problems related to supply and distribution of products have been the focus of researchers. We focus on the third logistician - the systems person concerned with providing effective support of systems in the field during their entire cycle. We further define the 3 kinds of logisticians and indicate the need to produce this "3rd kind" of logistics engineer.

2) How to Improve Supply Chain Management in the Health Care Sector? A French Case Study, ***Jean Marret***, University Institute of Technology, Dept. of Logs. Mgmt. & Trans., Montesquieu,Bordeaux, 4, France, marret@iuta.u-bordeaux.fr

Efficient operations and cost reduction have become the focus of the health care industry throughout the world. Better management of logistics, especially management of supply chain, is being viewed as the key to the survival in the health care industry. We present a case study of supply chain management at public hospitals of Bordeaux.

3) As Latin America Moves Forward...Facing the Challenges of Trade & Industry Logistics Management, ***Hans J. Peters***, World Bank/Intl. Finance Corp., 2121 Pennsylvania Ave. NW, Washington, DC 20433, hjfpeters@worldnet.att.net

More and more products are manufactured and marketed through strategic alliances combining commercial entities across many countries and regions. Efficient infrastructure support is critical to ensure sustainable economic growth in the global economy. We focus on challenges that the economies of Latin America and the Caribbean basin are facing...

4) The Strategic Role of Logistics in FMS Design, ***Lilian L. Barros***, BP 8, St Julien Les Villas, 10800, France, barros2@univ-troyes.fr

The term "logistics" has many meanings and is a discipline still in search of a broad, all-encompassing definition. We show that the design of FMS facilities requires simultaneous consideration of many aspects of logistics. Our focus is on an international interdisciplinary project funded by the European community, proposing a global model for FMS design...

WB18 Project Planning

Contributed Session
Chair: Nagesh Murthy, Georgia Institute of Technology, DuPree Sch. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, nagesh.murthy@mgt.gatech.edu

1) Tabu Search in Integrated Project Scheduling, ***Bajis M. Dodin***, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521, bajis.dodin@ucr.edu, ***A. A. Elimam***, ***Erik Rolland***

2) A General Generator of Project Networks in Terms of Their Morphological Features, ***Jose Alvaro Antunes Ferreira***, CESUR Inst. Superior Tecnico, Av. Rovisco Pais, Lisboa Codex, 1096, Portugal, ***Luis Valadares Tavares***, ***Jose Pedro Silva Coelho***

A new approach is adopted to generate project networks taking into consideration their structure of hierarchical levels and using the morphological features of the network. A set of indicators is proposed to describe such features and a method to generate project networks in terms of the prescribed indicators is presented.

3) Project Planning in a Concurrent Engineering Environment, ***Nagesh Murthy***, Georgia Institute of Technology, DuPree Sch. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, nagesh.murthy@mgt.gatech.edu

WB19 Linear & Semidefinite Optimization

Cluster: Linear Programming & Related Topics
Sponsor: Optimization Section
Sponsored Session
Chair: Kees Roos, Delft University of Technology, ITS/TWI/SSOR, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@twi.tudelft.nl

1) A Product Form Cholesky Factorization for Interior Point Methods for Linear Programs, ***Don Goldfarb***, Columbia University, IEOR Dept., 326 Mudd Bldg., New York, NY 10027-6699, gold@ieor.columbia.edu, ***Katya Scheinberg***

We present a product form Cholesky factorization method for solving the system of equations that arises in each step of an interior point method for LP. Our method is numerically stable and allows dense columns in the constraint matrix to be handled in a way that doesn't destroy the method's ability to take advantage of sparsity in the rest of the matrix.

2) New Tools for the Analysis of the Primal-Dual Newton Method for Linear Optimization, ***Kees Roos***, Delft University of Technology, ITS/TWI/SSOR, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@twi.tudelft.nl, ***Jiming Peng***, ***Tamas Terlaky***, ***Hans Nielsen***

The working horse in interior point algorithms for linear optimization is Newton's method. There is still a gap between the practical behavior of Newton's method and existing theoretical analysis results, in favor of the practical behavior. We present a new tool for the theoretical analysis that may help to close the gap.

3) A Continuation Method: Bridging Interior Point & Simplex Methods, ***Hans Nielsen***, Technical University of Denmark, IMM, Bldg. 305, Lyngby, DK 2800, Denmark, hbn@imm.dtu.dk

We present a method that has the flavour of both IPMs and simplex. Like an IPM, it has the advantage of continuous differentiability and of not being restricted to the vertices of a polytope. As the simplex, it has the possibility of cheap updates of the factorization.

4) Global Error Bounds for Convex Conic Problems, ***Shuzhong Zhang***, Erasmus University, Econometric Inst., Basrastraat 8, Rotterdam, 3000 DR, The Netherlands, zhang@few.eur.nl

We discuss error bounds for systems of linear equations and nonlinear convex conic constraints. Our results generalize some of the well-known error bound relations on convex inequality systems. For linear systems, we show some stronger results concerning the constant involved.

WB21 New Issues, Challenges, Approaches: Research & Practice in an Interdependent World

Sponsor: Social Science
Sponsored Session
Chair: Dottie Eastman Agger-Gupta, The Fielding Inst., PO Box 61122, Kensington RPO, Calgary, Alberta, T2N 4S6, Canada

1) Listening for Tomorrow: Impact of Technology on the Future, ***Carolyn Slocombe***, The Fielding Institute, 169 Berrington Rd., Leominster, MA 01453, slocombe@qntm.com

We present interviews with creators of leading technologies, i.e., software architects, medical technology developers, research scientists, etc., on the multiple ways technological innovations affect our future. Using thematic analysis, we examine technology tradeoffs, our role in making tradeoffs and implications for management of technologies.

2) Rhythms of Commerce: Nonlinear Dynamics & Strategic Analysis, ***Greg Daneke***, Arizona State University, Technology Mgmt., 2323 S El Marion, Mesa, AZ 85202

Theoretical and practical implications of nonlinear dynamical systems, chaos and complexity are discussed. Artificial agent simulations learn and adapt through GAs and cellular automata. Nonlinear dynamics, explicating processes such as "lock-in, lock-out," might signal when and whether to enter the dominant design contest.

3) Mode 3, Networking Organizations as Complex Adaptive Systems, ***Efrem Mallach***, University of Massachusetts, Coll. of Mgmt., 1 University Pl., Lowell, MA 01854

Mode 3 networking organizations exhibit flexibility and cohesiveness during continuous change. Their behaviors are characteristic of CAS as defined by John Holland (Santa Fe Institute). We apply CAS principles to these organizations and analyze the managerial implications of this mapping.

WB25 Integer Programming II

Contributed Session

Chair: Robert M. Nauss, University of Missouri, 8001 Natural Bridge Rd., St. Louis, MO 63121, robert_nauss@umsl.edu

1) Painting Cars & the Traveling Salesman Problem, ***Joel S. Sokol***, MIT, OR Ctr., 305 Memorial Dr., Cambridge, MA 02139, jsokol@mit.edu http://web.mit.edu/jsokol/www, ***Thomas L. Magnanti***

In automobile assembly plants, painting similarly-colored cars sequentially saves millions of dollars annually. We model this problem as a time-window TSP with 0/1 costs. For practical problems, our IP formulations contain 200,000 to 14,000,000 variables. We report preliminary heuristic and IP-based computational experience on real data.

2) Analysis of a General Class of Discrete Optimization Problems with Parametric Righthand Sides, ***Fatma S. Salman***, Carnegie Mellon University, GSIA, 5000 Forbes Ave., Pittsburgh, PA 15232, fs2c@andrew.cmu.edu http://www.contrib.andrew.cmu.edu/~fs2c/home.html, ***Barbaros C. Tansel***

We consider any linear or nonlinear integer program with a parametric righthand side vector. No monotonicity is assumed on the parameterization. We characterize the trajectory of the optimal objective value as a step function with finitely many discontinuities. We give algorithms to construct the optimal trajectory based on solving point value problems.

3) Generating Experimental Data for the Generalized Assignment Problem, ***Edwin Romeijn***, Erasmus University, PO Box 1738, Rotterdam, 3000 DR, The Netherlands, e.romeijn@fac.fbk.eur.nl http://www.fbk.eur.nl/fbk/vg1/her, ***Dolores Romero-Morales***

We propose a stochastic model for the GAP, encompassing most models from the literature and derive a measure of the tightness of the capacities for these models. We show how existing random instance generators should be modified to avoid creating easier instances when the number of machines increases.

4) The Elastic Generalized Assignment Problem, ***Robert M. Nauss***, University of Missouri, 8001 Natural Bridge Rd., St. Louis, MO 63121, robert_nauss@umsl.edu

Recently, dramatic improvements have been made in solving hard generalized assignment problems to optimality in terms of size (over 2000 binary variables) and computation time. We extend the classic GAP to allow for under and over time costs by making the resource constraints elastic. A B&B algorithm and computational results are presented.

WB28 Nonlinear Programming II

Contributed Session

Chair: Jayant Rajgopal, University of Pittsburgh, 1048 Benedum Hall, Pittsburgh, PA 15261, rajgopal@engrng.pitt.edu

1) Lower Bounds for Fuel Cost Minimization on Gas Transmission Networks, ***Roger Z. Rios***, University of Houston, Dept. of Math., Houston, TX 77204-3476, roger@hpc.uh.edu www.hpc.uh.edu/~roger/

We address the problem of minimizing the fuel consumption incurred by compressor stations on natural gas pipeline networks. We introduce the mathematical model, discuss several model relaxations and present computational experience for this hard nonconvex NLP.

2) Solving Structural Optimization Problems via Semidefinite Programming, ***Chih-Jen Lin***, University of Michigan, Dept. of IOE, 1863 Lake Lila Dr. Apt B5, Ann Arbor, MI 48105, cjlin@engin.umich.edu, ***Nestor Michelena***

We will discuss the SDP relaxation of some structural optimization problems. Initial experimental results using SDP to obtain lower bounds will also be reported.

3) The Design of Optimal Tariff Structures, ***Varuna Panchapakesan***, Wichita State University, Dept. of IMFGE, Wichita, KA 67260, vpancha@ie.twsu.edu, ***Mark J. Kaiser***

The structure of tariff rates on revenue and equity measures is examined, including a constructive approach to generate Pareto-optimal tariffs and the efficient frontier. Tariff structures are formulated as a general NLP model and analyzed.

4) On the Robustness of Posynomial Geometric Programming Optima, ***Jayant Rajgopal***, University of Pittsburgh, 1048 Benedum Hall, Pittsburgh, PA 15261, rajgopal@engrng.pitt.edu, ***A. J. Federowicz***

We examine the situation where some of the coefficients in the objective of a polynomial GP are wrongly estimated. A simple analytical bounding procedure shows that the optimum value is very insensitive to such errors: even a 20% error can result in a cost increase of no more than 1.67%.

WB33 Crew Pairing Optimization

Sponsor: **Aviation Applications**

Sponsored Session

Chair: Eric Gelman, United Airlines Corporate R&D, 1200 Algonquin Rd., Elk Grove Village, IL 60173, eric.gelman@ual.com

1) Daily Consistency in Weekly Crew Pairing, ***Diego Klabjan***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, diego@akula.isye.gatech.edu, ***Ellis L. Johnson***, ***George L. Nemhauser***, ***Pamela H. Vance***

We present a new model for the weekly airline crew scheduling problem that captures daily regularity in a weekly schedule. The model results in an IP having a huge number of variables and rows. We present techniques for solving the model, some of which can be applied to general large-scale IPs.

2) Crew Scheduling Considering Operational Effects, ***Andrew Schaefer***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, schaefer@akula.isye.gatech.edu, ***Ellis L. Johnson***, ***Anton Kleywegt***, ***George L. Nemhauser***

We propose a crew scheduling model which considers possible disruptions, and develop schedules to reduce crew costs incurred during operations. The model estimates network and recovery effects through a simulation. We present preliminary computational results from a large domestic fleet.

3) Why Primary Line Construction Is Difficult, ***Eric Gelman***, United Airlines Corporate R&D, 1200 Algonquin Rd., Elk Grove Village, IL 60173, eric.gelman@ual.com, ***Yanqi Xu***, ***Connie Chen***, ***Balan Chidambaram***, ***Zaili Zhang***

Primary line construction has been driven mostly by 2 factors: efficiency (monthly crew utilization) and quality (purity and/or repeatability of monthly flying and/or days off patterns). We will discuss results produced by UAL's recently developed and deployed system - AFLYER. Related technical topics involve column generation/shortest path and LP.

Sunday 08:15-09:45

SA01 Panel: Decision-Analytic Concepts in Computing Applications
SA02 Customer Satisfaction Issues in the Software Industry/Product Delivery & Quality Issues in Electronic Networks
SA03 Education & Information Technology
SA04 Internet Applications I
SA05 Financial Considerations & Production Models
SA06 Recent Effects of Globalization
SA07 Computer Science Applications
SA08 Applied Probability
SA09 New Product Development
SA11 Technology Management: Application to Mexican Industries
SA12 Replication Strategy
SA13 Knowledge & Organizations
SA14 Yield Management, Pricing & Analysis of Transportation Systems
SA15 Methodologies in Traffic Safety & Infrastructure Modeling
SA16 Dynamic Traffic Assignment I
SA18 Economics
SA19 Military Applications
SA20 Analysis of Small-Scale Contingency Operations
SA21 Electricity Markets
SA22 Advances in Collaborative Stewardship
SA24 Multicriteria Decision Making I
SA26 Combinatorial Algorithms & Applications
SA28 Path-Following Methods for Complementarity Problems
SA29 Optimization: Applications & Theory
SA30 Optimization Techniques I
SA33 Airline Revenue Management: Looking to Future
SA34 Simulation I
SA35 Key Factors to Success in OR Practice
SA36 Scheduling I
SA37 Telecommunications I
SA38 Inventory Models I
SA39 Production Scheduling I

Sunday 10:00-11:00

SM40 Morse Plenary: Technology-Enabled OR Education - What it May do for Professors & Practitioners

Sunday 11:00-12:00

SE40 Edelman Plenary: The Use of OR Systems in Chilean Forest Industries

Sunday 13:00-14:30

SC01 DA Computation
SC02 Information Technologies in Management & Accounting
SC03 Using Technology in Instruction
SC04 Internet Applications II
SC05 Research Strategies in Operations Management I
SC06 Global Manufacturing
SC07 Operations & Technology Strategy
SC08 Algorithms for Dynamic Jobshops
SC10 Pseudo-Boolean Functions
SC11 Rethinking Conventional Models in New Product Development
SC12 Technology Management: A Brazilian Perspective
SC13 Knowledge & Organizations
SC14 Vehicle Routing
SC15 Integration of Transportation & Inventory
SC16 Dynamic Traffic Assignment II
SC18 Health Applications I
SC19 Reliability
SC20 Routing Using Tabu Search
SC21 Modeling Environmental Problems
SC22 Innovative Uses of OR in the Environmental Arena
SC23 Analytic Hierarchy Process
SC24 Implementation Issues in MCDM
SC25 Network Optimization & IP Applications
SC26 Flows, Non-Flow Cuts & Multi-Commodity Cuts
SC27 Interior-Point Methods for Linear Optimization
SC28 Complementarity
SC29 Application of AI Techniques
SC30 Optimization Techniques II
SC31 Technological Forecasting
SC32 Software Demonstrations
SC33 Airline Revenue Management: Optimization Issues
SC34 Simulation II
SC35 Business Process Reengineering
SC36 Scheduling II
SC37 Telecommunications II
SC38 Inventory Models II
SC39 Production Scheduling II

Sunday 14:45-16:15

SD01 Outside-In: Insights from the Past Lives of DA Practitioners
SD02 Intelligent Group Decision & Negotiation Support
SD03 Implementing the Global Classroom: Science & Technology Commercialization
SD04 Symbolic Modeling Languages for Developing & Operating Math Programming Models
SD05 Research Strategies in Operations Management II
SD06 Globalization: Operations & Decision Modeling, and Education
SD07 Lean Supply Chain Management
SD08 Yield Management
SD10 Boolean Models in Artificial Intelligence
SD11 Current Topics in Product Development Research
SD12 Improving the Process of Strategic Planning in Hi-Tech Organizations
SD13 Knowledge & Organizations
SD14 Issues in Airline Management
SD15 Innovation & Technology Diffusion
SD16 Analysis & Algorithms for Path Problems
SD17 Approaches to Evaluating R&D Policy Impacts
SD18 Quality of Care Measurement
SD19 Issues in Commonality
SD20 Modeling & Simulation Futures
SD21 Environmental Costs, Hazards & Risks
SD22 Natural Resources Management I
SD23 Business Applications Integrating AHP, Finance & Distance Learning
SD24 Issues Related to Criteria Weights
SD25 Logical & Number-Theoretic Approaches
SD26 Routing & Scheduling Algorithms & Applications
SD28 Variational Problems & Complementarity
SD29 Data Mining & Massive Data Sets
SD30 Heuristic Approaches to Combinatorial Problems
SD31 The Metrics of Intersector Technology Cooperation
SD32 Software Demonstrations
SD33 Unmet OR Challenges in Airline Revenue Management
SD34 Simulation in the Process Industries: Applications & Advances
SD35 Cost & Performance Measures
SD36 Analytic Results in Scheduling
SD37 Telecommunications III
SD38 Inventory Models III
SD39 Production Scheduling III

Sunday 16:30-18:00

SE01 Panel: Downstream Decisions (Options) & Dynamic Modeling

Sunday 16:30-17:15

Sunday 16:30-18:00

Monday 08:00-09:30

Monday 09:45-10:45

Monday 11:45-12:45

Monday 13:00-14:30

MC33 ATM System Performance II
MC34 Simulation Methodology: Batch Means & Variance Reduction
MC35 Finance
MC36 Real Applications of Scheduling
MC37 Marketing II
MC38 Information Systems I
MC39 Facilities Planning & Design

Monday 14:45-16:15

MD01 Panel: The Case for an INFORMS Decision Analysis Journal
MD02 Railroad Capacity Issues
MD03 Teaching, Cases & Learning
MD04 Computing Environment for Modeling & Solving Stochastic Programming Problems
MD05 Information/Incentives in Supply Chain Coordination
MD06 FMS Design & Control
MD07 Supply Chain Optimization
MD08 Markov Decision Processes & Games
MD09 Auctions in a Deregulated Electricity Market
MD10 Access, Bandwidth & Modeling Problems in High Performance Networking
MD11 Interdisciplinary Product Development Education
MD12 Developments in Management of Technology Programs
MD13 Organization Theory
MD14 Logistics II
MD15 LGO: A Program System for Continuous/Lipschitz Global Optimization
MD16 Applications for Urban Public Transportation
MD17 Location Models II
MD18 DEA-Health
MD19 New Value Management, Theory of Constraints Developments & Applications
MD20 Data Association for Multitarget Tracking I
MD21 DEA Applications in Utilities & Construction
MD22 Natural Resources Management V
MD23 Entrepreneurial Behavior, Innovation & Sustainable Business
MD24 Financial Instruments & the Energy Markets
MD25 Computational Integer Programming
MD26 Network Design & Connectivity Problems
MD27 Interior Point Methods & Semidefinite Programming
MD28 Global Optimization Approaches for Molecular Problems
MD29 Satisfiability Problems
MD30 Using Metamodels for Engineering Design
MD31 Tabu Search, Metaheuristics & Finite Search
MD32 Software Demonstrations
MD33 ATM Operational Concept I
MD34 Production Planning
MD35 OR/MS Applications in Investment Finance
MD36 Strategic Planning I
MD37 Marketing III
MD38 Information Systems II
MD39 Decision Support Systems in Industry & Education I

Monday 16:30-18:00

ME01 Decision Analysis Society Awards Presentation
ME02 Competitive Marketing & New Product Strategies
ME03 Industry Speaks! OR/MS Education & Reality
ME04 Topics in Constraint Programming
ME05 Advances in Flexible Resource Scheduling
ME06 FMS Capacity Considerations
ME07 Supply Chain Research Across the Globe
ME08 Markov Decision Processes: Analysis & Computation
ME09 Modeling Auctions
ME10 Network Design Problems Arising in Telecommunications I
ME11 Teaching Product Development
ME12 Distinguished Speaker Session
ME13 Project Management I
ME14 Logistics III
ME15 Using the Integral Simplex Algorithm for Finding Pseudo-Polynomial Algorithms for Some NP-Complete Problems
ME16 Optimizing Freight Networks
ME17 Location Models III
ME18 Health Care Efficiency & Effectiveness
ME19 Conceptualizing the Big Picture Using Function Analysis System Techniques
ME20 Military Operations Research at TRAC-White Sands
ME21 Panel: Building Relationships Between Universities & Business & Government
ME22 Natural Resources Management VI
ME23 Strategy & Sustainability
ME24 Electricity Markets
ME25 Network & Cutting Plane Methods
ME26 Theoretical Studies of the TSP
ME27 Interior Point Methods for Mathematical Programming
ME28 Advances in Global Optimization
ME29 Logical Analysis of Data
ME30 Multiple Criteria Decision Making: Theory & Practice
ME31 Tabu Search Strategies & Their Applications
ME32 Software Demonstrations
ME33 ATM Operational Concept II
ME34 Web-Based Simulation Modeling
ME35 Financial Risk Analysis
ME36 Strategic Planning II
ME37 Marketing IV
ME38 Information Systems III
ME39 Decision Support Systems in Industry & Education II

Tuesday 08:15-09:45

TA01 Decision Analysis Arcade
TA02 Competition & Collusion
TA03 Undergraduate OR/MS Project Showcase
TA04 Panel: OR in 2048
TA05 Models & Analysis of Production Agility
TA06 Process & Product Design Concepts for Quality Improvement
TA07 Using Bayesian Statistics on Quality Problems
TA08 Software Development for Stochastic Modeling
TA09 When & How to Use Auctions
TA10 Network Design Problems Arising in Telecommunications II
TA11 Applications in Technology Management
TA12 Multicriteria Decision Making Involving Risk & Uncertainty
TA13 Computational Intelligence in OR & MS
TA14 Logistics IV
TA15 Complementarity Problems: Applications, Modeling & Solution
TA16 Fleet Operations Under Uncertainty & Irregularity
TA17 Logistics Planning & Execution
TA18 Health Applications in Taiwan
TA19 Augmenting Concepts for Strategic Decisions
TA20 Data Association for Multitarget Tracking II
TA22 The OCAT Approach: A Novel Data Mining Approach for Large Databases (formerly Natural Resources Mgmt. VII)
TA25 Scheduling Applications
TA26 Matrix Problems & Applications
TA27 Search Algorithms
TA28 Global Optimization of Expensive Black-Box Functions
TA29 New Directions in Nondifferentiable Optimization
TA30 Panel: Engineering Optimization Education
TA31 Tabu Search for Bin Packing, Constraint Satisfaction & Vehicle Routing
TA32 Software Demonstrations

Wednesday 10:00-11:30

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☐ Group Decision & Negotiation ($7.50/5/5)
☐ Health Applications ($20/10/5)
☐ Information Systems ($15/10/10)
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(How to Get the Most Value) From an INFORMS Meeting

Welcome to the INFORMS Meeting. We describe how you can get the most value out of an INFORMS meeting and from this program. It is designed for first-time attendees at an INFORMS meeting but others should also find it useful. INFORMS meetings and this program can be confusing and the INFORMS and local meetings committees want you to find the meeting a rewarding experience.

Why People Attend

The primary activity at an INFORMS meeting is to present professional work. We will describe how to get the most value out of the sessions. However, people have other reasons to attend the meeting and we describe how to make the meeting as valuable as possible for these purposes. These may include:

- networking with colleagues;
- recruitment;
- meeting with colleagues in a specialty (subdivision);
- displaying or exploring exhibits;
- meeting with a small number of colleagues on a specific topic;
- learning from other types of sessions, i.e., tutorials and panels;
- other activities, i.e., plant tours.

Networking

Informal Discussions - These other activities are important to most of our membership. In fact, networking is probably the major reason why many people attend. The major means of networking is informal discussions in the common areas between sessions, during the lunch break and after the daily set of sessions. There are usually one or two areas at the conference where attendees mingle. This may be near the registration area or near the exhibits, but is usually a large hall in close proximity to several of the sessions. Our members will often spend time in these areas for the simple purpose of finding colleagues. Other networking locations are around the coffee break locations.

General Reception - Another major means to network is at the General Reception on Monday night. This event is the major social meeting of conference. Generally, at least half of the attendees attend the general reception. Hors d'oevres are served buffet style and there is enough for a full meal if you choose not to dine after.

Business Meetings - The business meetings are another means to network. These are the meetings of INFORMS subdivisions, such as Optimization. Within these subdivisions, members develop strong professional relationships. The subdivision business meetings are held Sunday, Monday and Tuesday after the regular sessions and are a combination of business and socializing. The meetings provide an excellent way to meet colleagues with mutual interests and to join the "loop" of the subdivision.

Exhibits

The exhibit hall offers the chance to see recent publications and software. Vendors are eager to provide promotional copies and support to academics who are thinking about using their materials in their courses.

Program

Of course, the most important part of an INFORMS meeting is the professional program, and it is important to understand how the sessions and program are put together. Most meetings have a professional theme that many of the sessions are aligned with. Building on this theme, the local committee puts together a professional program based on 3 primary types of sessions: invited sessions, sponsored sessions and contributed sessions. Invited sessions are planned by the local programming committee and can be geared towards the theme of the meeting. Sponsored sessions are organized by the subdivisions; these can also be considered invited in that a session chair appointed by the committee invites each speaker. Finally, contributed sessions consist of papers submitted by authors directly to the INFORMS office in response to the Call for Papers. All papers are accepted for these sessions.

Invited sessions are organized into groups of sessions known as clusters. Clusters are generally related topics and are the basis from which the meeting planners develop the professional program. These clusters in turn relate to the theme. The clusters are of interest to attendees as they define topic areas that they may be interested in. To facilitate planning, individual sessions from these clusters are scheduled in one or more tracks. A track is a collection of sessions that meet in the same room throughout the conference. To find out more about the availability of sessions in a cluster, refer to the Master Track Schedule to determine the days and times during which a cluster is scheduled and the number(s) of track(s) containing the cluster of interest.

Master Track Schedule (Matrix)

The Master Track Schedule is an overall view of the program. Tracks are listed in the left-hand column; regular session times are listed across the top. Each session lasts approximately 90 minutes. There is one track per room. There can be one or more cluster topic per track. One can see from the track schedule, which tracks and corresponding topics might be of interest. While a track might consist of more than one topic and some related topics can appear in different tracks, the tracks are a useful way to navigate the program.

Special Sessions

The program includes a number of special sessions. A plenary talk is given on a topic of broad interest to the membership and is the only presentation scheduled for a particular time period. Every meeting also has a number of tutorials, usually with a single speaker, devoted to a single topic. A tutorial gives an overview of the topic with a focus on the state-of-the-art knowledge or practice in the area. They are generally popular and well attended. A panel is developed to topics for discussion with several experts. They can involve or any other topic where the interaction will be useful to attendees.

Session Codes

The main body of the program lists the details of the tracks in chronological order. Each session is identified by a code to identify the day, session time and slot. A paper is referred to by this code and indicates the order it is to be presented in the session. For example, MA02.3 is the Monday session, time slot A, track 02, and third presentation. This code appears directly before the paper title and is also used to identify presentations in the Participant Index at the back of the program.

In the body of the program, sessions are listed by day and time with the title of the session, sponsor or cluster, type of session and the room where the session is held. The session chair's name, affiliation, mailing address and email address are then indicated, followed by the title and authors of each presentation. The lead author's information will include affiliation, mailing address and email address and co-authors are listed by name only. In the preliminary program, only abstract titles and authors are shown and in the final version, a 50-word abstract is included for each presentation.

Front Material

Many of the special sessions, such as the tutorials and plenary or keynote presentations, are described in further detail in the front material pages. It is useful to review this material. The front material also contains subdivision meeting schedules, details about the host city and hotel and information on the social functions. A hotel floor plan is included in the final program; this is crucial in navigating your way through the meeting.

Indexes

The program will include a participant index. This lists the speakers alphabetically and gives the session codes for each of their presentations.

Addendum

Be aware that there are changes to the program at the last minute. An addendum to the final program listing last minute changes will be distributed with registration materials.

While there are many sessions at the conference, popular sessions such as some tutorials may fill up quickly. It is best to arrive early. The technical sessions are also an excellent place to network, as there is time after each session to speak with presenters and request papers. It is a good idea to bring an ample supply of business cards with you.

INFORMS Online

The preliminary and final versions of the printed program are also available on INFORMS Online (http://www.informs.org). You can identify specific sessions and print them out in an individual, customized program, search sessions using keywords and in general, map out your particular meeting plans at a more sophisticated level. In general, it is important to try to plan as much as possible before you arrive at the meeting. Like many other endeavors, the value you get out of a meeting will depend on the effort you put into it. To this end, we recommend reviewing the program and technical sessions in advance. Navigating the meeting will then be an easy task.

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Applications in Technology Management
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Evolutionary Algorithms: Applications & New Developments
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Flexible Manufacturing Systems
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Forecasting Applications
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Global Partnership, Information Systems & Quality
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Globalization: Operations & Decision Modeling & Education
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Issues in Commonality
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Knowledge & Technology: Making the Connection
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Mathematical Programming & its Applications
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Partnering Value Methodology, Theory of Constraints & Decision Analysis
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SESSION CODES

The 2-letter codes for sessions indicate the day and time of each:

Sunday
October 25

SA	8:15 – 9:45am
SC	1:00 – 2:30pm
SD	2:45 – 4:15pm
SE	4:30 – 6:00pm

Morse Lecture Plenary	10:00 – 11:00am
Edelman Plenary	11:00am – 12noon

Monday
October 26

MA	8:00 – 9:30am
MC	1:00 – 2:30pm
MD	2:45 – 4:15pm
ME	4:30 – 6:00pm

ORS Plenary	9:45 – 10:45am
Welcoming Session	10:45 – 11:45am
Invited Plenary	11:45am – 12:45pm

Tuesday
October 27

TA	8:15 – 9:45am
TC	1:00 – 2:30pm
TD	2:45 – 4:15pm
TE	4:30 – 6:00pm

Optimization Plenary	10:00 – 11:00am
Omega Rho Plenary	11:00am – 12noon
Information Technology Keynote	2:45 – 4:15pm

Wednesday
October 28

WA	8:15 – 9:45pm
WB	10:00 – 11:30am

DAILY PLANNER

Sunday	Monday	Tuesday	Wednesday
SA 8:15-9:45	MA 8:00-9:30	TA 8:15-9:45	WA 8:15-9:45
Morse Plenary 10:00-11:00	Organizational Science Plenary 9:45-10:45	Optimization Plenary 10:00-11:00	WB10:00-11:30
Edelman Plenary 11:00-12noon	Welcoming Session & Awards 10:45-11:45	Omega Rho Plenary 11:00-12noon	
Lunch Break 12noon-1:00	Invited Plenary 11:45-12:45	Lunch 12noon-1:00	
SC 1:00-2:30	MC 1:00-2:30	TC 1:00-2:30	
SD 2:45-4:15	MD 2:45-4:15	TD 2:45-4:15	
SE 4:30-6:00	ME 4:30-6:00	TE 4:30-6:00	

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INFORMS MEETING CALENDAR

JANUARY 2 - 6, 1999
INFORMS Organization Science Meeting
Keystone Resort & Conference Center
Keystone, CO

MAY 2 - 5, 1999
INFORMS Cincinnati Spring 1999
Cincinnati Convention Center,
the Omni Netherland Plaza
& the Hyatt Regency
General Chair: David F. Rogers
University of Cincinnati
513-556-7143
david.rogers@uc.edu

MAY 20 – 23, 1999
Marketing Science
Syracuse University
Co-Chairs: Amiya Basu,
Tridib Mazumdar, S. P. Raj
Syracuse University
mktsci@som.syr.edu

NOVEMBER 7 - 10, 1999
INFORMS Philadelphia Fall 1999
Philadelphia Marriott
General Chair: G. Anandalingam
University of Pennsylvania
215-898-8790
anand@seas.upenn.edu

MAY 21 – 24, 2000
INFORMS Salt Lake City Spring 2000
Little America Hotel
General Chair: William Giauque
wcgiauqu@acd1.byu.edu

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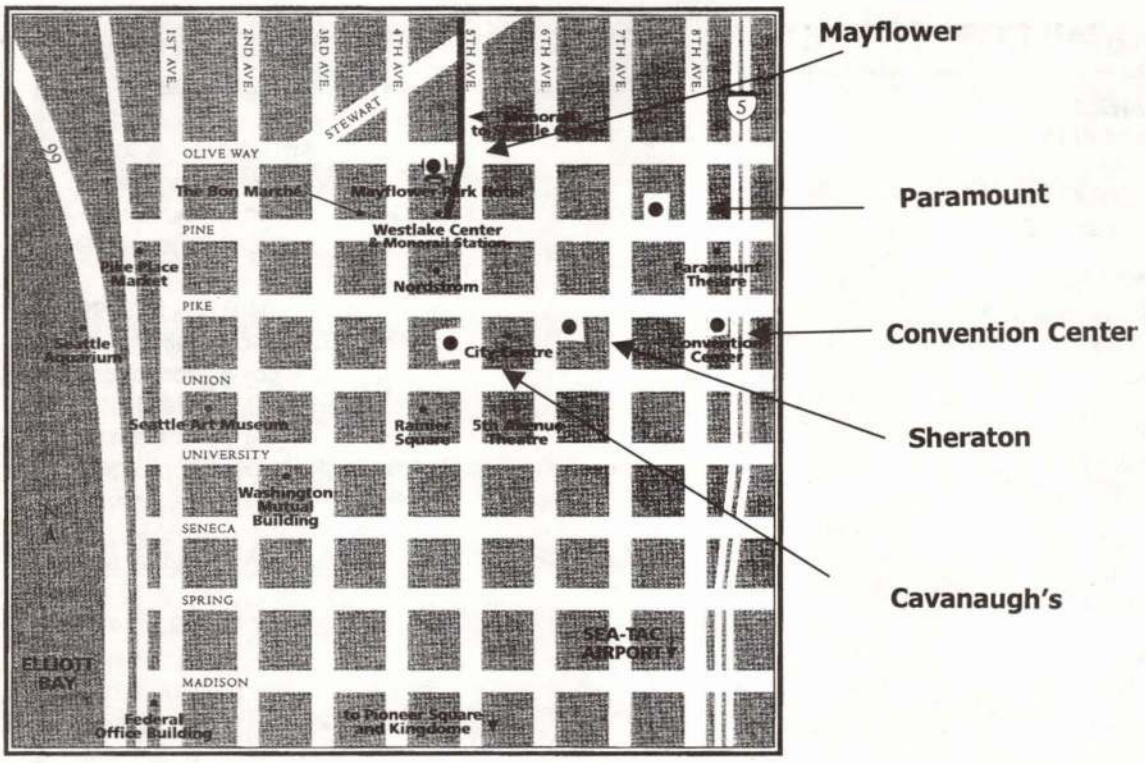
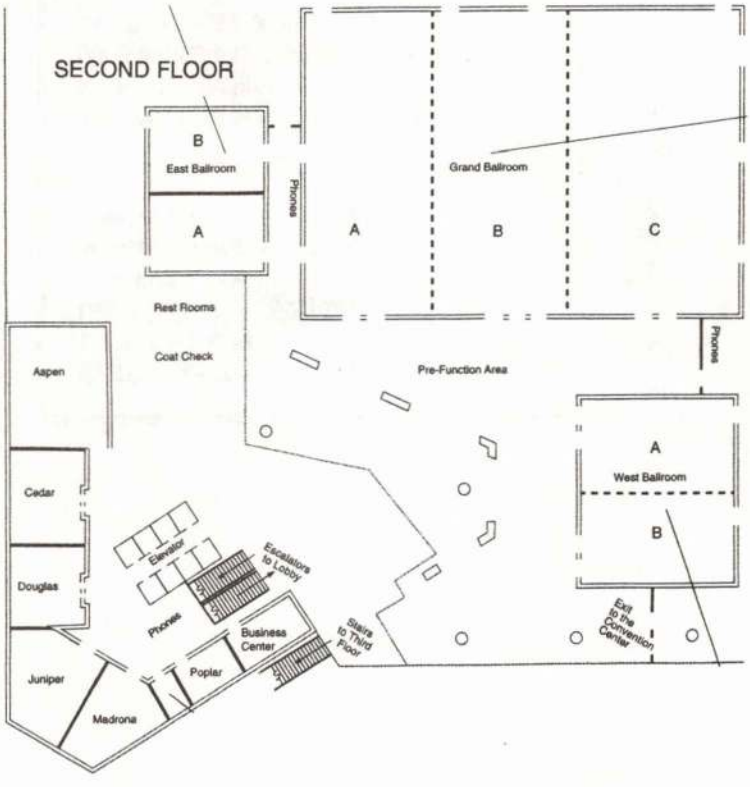
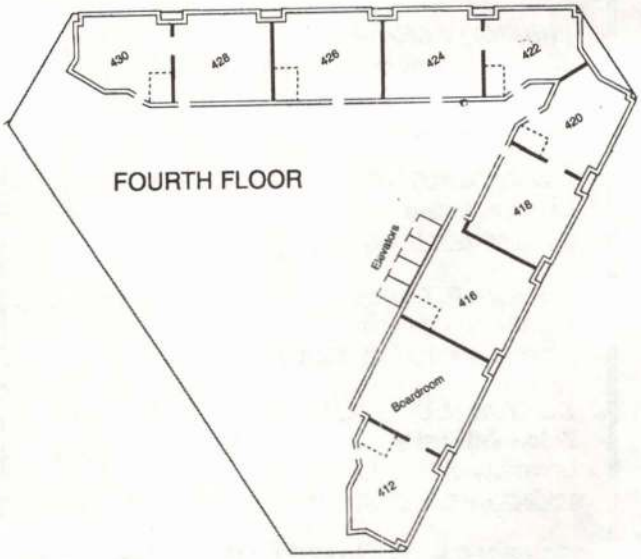


LEGEND

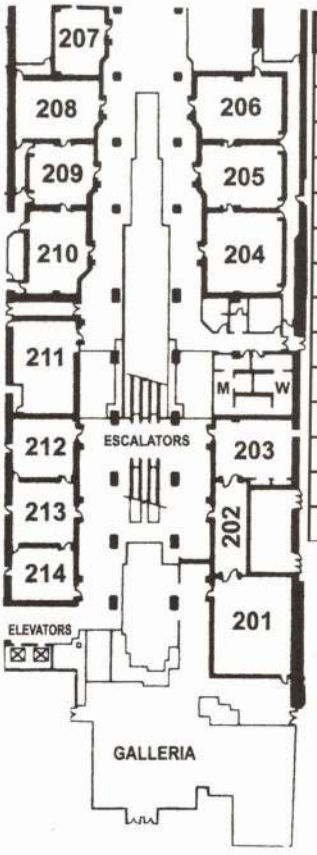
Cavanaugh's on 5th Avenue, 1415 5th Ave.
Mayflower Park Hotel, 4th & Olive
The Paramount Hotel, 724 Pine St.
ThePlaza Park Suites, 1011 Pike St.
Sheraton Seattle Hotel & Towers, 1400 6th Ave.
Washington State Convention & Trade Center, 800 Convention Place

SHERATON HOTEL MEETING ROOMS

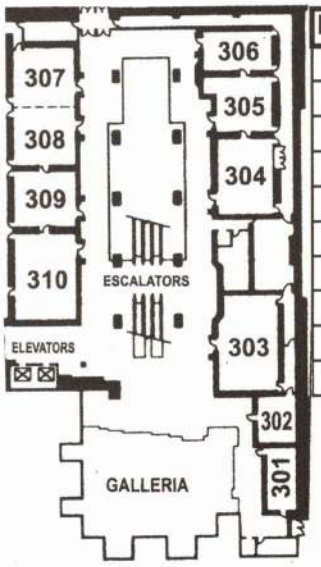




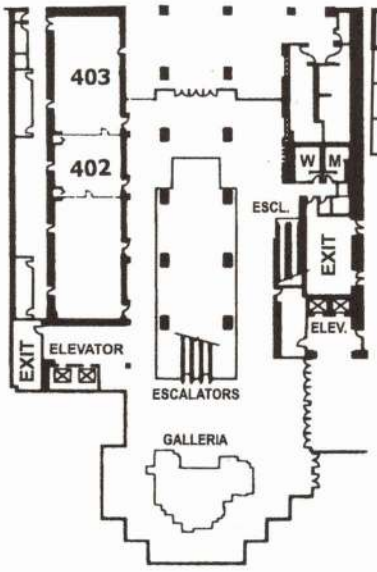
CONVENTION CENTER MEETING ROOMS



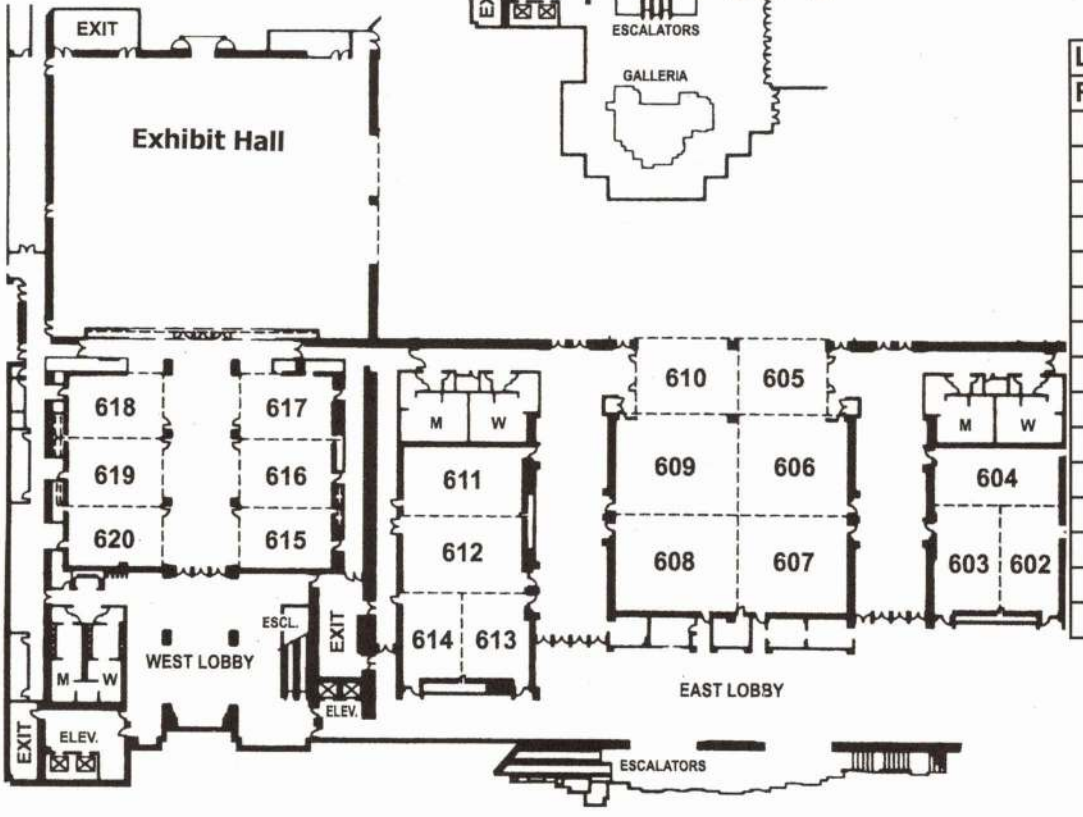
LEVEL 2	
Room	Track
201	1
203	2
204	3
205	4
206	5
207	6
208	7
209	8
210	9
211	10
212	11
213	12
214	13



LEVEL 3	
Room	Track
302	14
303	15
304	16
305	17
306	18
307	19
308	20
309	21
310	22



LEVEL 4	
Room	Track
402	23
403	24



LEVEL 6	
Room	Track
615	25
616	26
617	27
618	28
619	29
620	30
602	31
603	32
604	33
607	34
608	35
611	36
612	37
613	38
614	39

INFORMS Seattle Master Track Schedule

		SA	SC	SD	SE	MA	MC	MD	ME	TA	TC	TD	TE	WA	WB
Room	Track	8:15-9:45	1-2:30	2:45-4:15	4:30-6	8-9:30	1-2:30	2:45-4:15	4:30-6	8:15-9:45	1-2:30	2:45-4:15	4:30-6	8:15-9:45	10-11:30
201	1	Decision Analysis													
203	2	Info Systems		Group Dec.	Women	Railroad Apps.				College on Marketing				Decision Analysis	
204	3	Education													
205	4	Internet Apps.		Computer Science						Panel	MSOM			Manufacturing	
206	5	Manufacturing and Service Operations Management												Operations Mgt	
207	6	Globalization			Flexible Manufacturing Systems					Quality and Statistics					
208	7	CS/Apps.	O&T Strat.	Supply Chain Management						Global IS for Quality Management					
209	8	Applied Probability													Stoch Proc
210	9	NPD	Roundtable			Competitive Bidding						Forecasting			
211	10		Artificial Intelligence					Section on Telecommunications						Quality Mgt.	
212	11	Tech. Mgmt.	Product Development							TM Apps	Tech. Mgt.	Management of Technology			
213	12	Technology Management Section (with Mgt of Prod and Tech)													
214	13	Organization Science						Org. Theory	Project Mgt.	Soft Computing				Project Mgt.	Res. Alloc.
302	14	Transportation						Logistics/SCM				Service Industry			
303	15	Transportation Science		Innov/Entre.		Tutorials						Data Mining		Logistics	
304	16	Transportation Science													
305	17			Pub Programs/Processes			Location Analysis			Logistics					
306	18	Economics	Health Applications												Proj. Plan
307	19	Mil. Apps.	Reliability	Component	Mil.Apps.	Partnering VM, TOC and DA								LP & Related Topics	
308	20	Military Applications													
309	21	Environment & Natural Resources		DEA					Panel		Social Science Apps				
310	22	Energy, NR & Environ.		Natural Resource Management							Scheduling	Keynote	Tutorial		
402	23		AHP		Know/Tec	Ecologically Sustainable Bus. Practices									
403	24	Multiple Criteria Decision Making				Energy									
615	25		Scheduling and Integer Programming											Integer Programming	
616	26	Network and Combinatorial Optimization												Net/Graphs	
617	27				Linear and Nonlinear Programming										
618	28	Complementarity Problems					Global Optimization							NLP	
619	29	Optimization	Optimization and Artificial Intelligence							Nonsmooth Optimization				Dynamic Pr.	
620	30	Opt. Techniques		Math Prog. & Apps.	Stoc & Int Pr		Engineering Optimization					CPMS			
602	31		Tutorials			Students	Tabu Search						Evol. Algs.	Heuristic Pr.	
603	32		Software Demonstrations												
604	33	Aviation Applications													
607	34	Simulation						Prod. Plan	Simulation						
608	35	Bus. Apps.	BPR	Cost/Perf.	Risk Mgmt	Financial Theory		Financial Services							
611	36	Scheduling						Strategic Planning							
612	37	Telecommunications				Marketing									
613	38	Queueing/Inventory					Information Systems								
614	39	Production and Scheduling					Facility Pla	DSS							

Sun - Morse Lecture 10-11, Edelman Lecture 11-12, Mon - ORS Plenary 9:45-10:45, Welcoming Session 10:45-11:45, Invited Plenary 11:45-12:45,
Tue - Optimization Plenary 10-11, Omega Rho 11-12