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EDELMAN AWARD**

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COVID-19 with analytics

**DATA SCIENCE
AND FASHION**

At Stitch Fix, using
algorithms is trendy

**RESEARCH-BASED O.R.
AT BETHLEHEM STEEL**

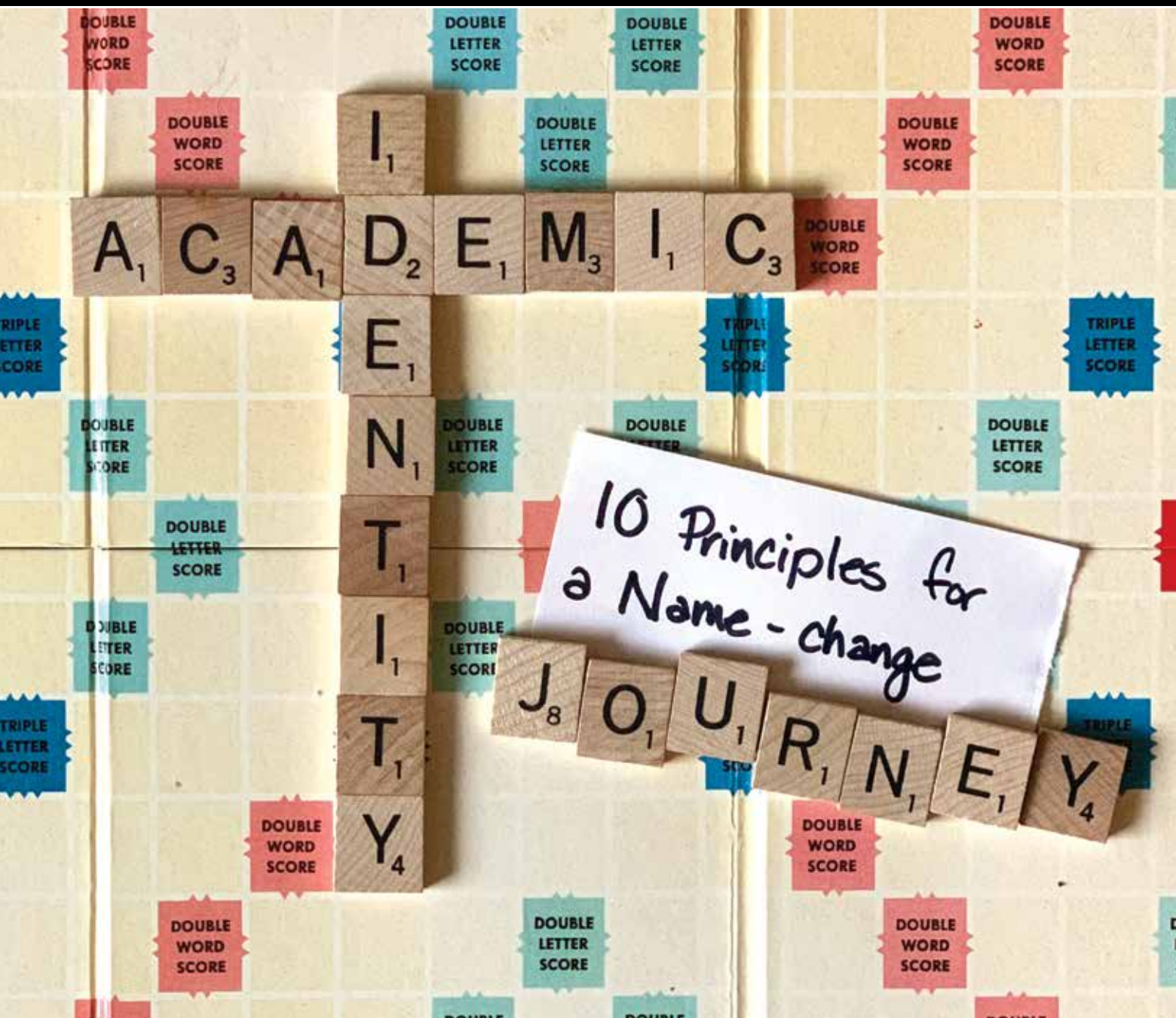
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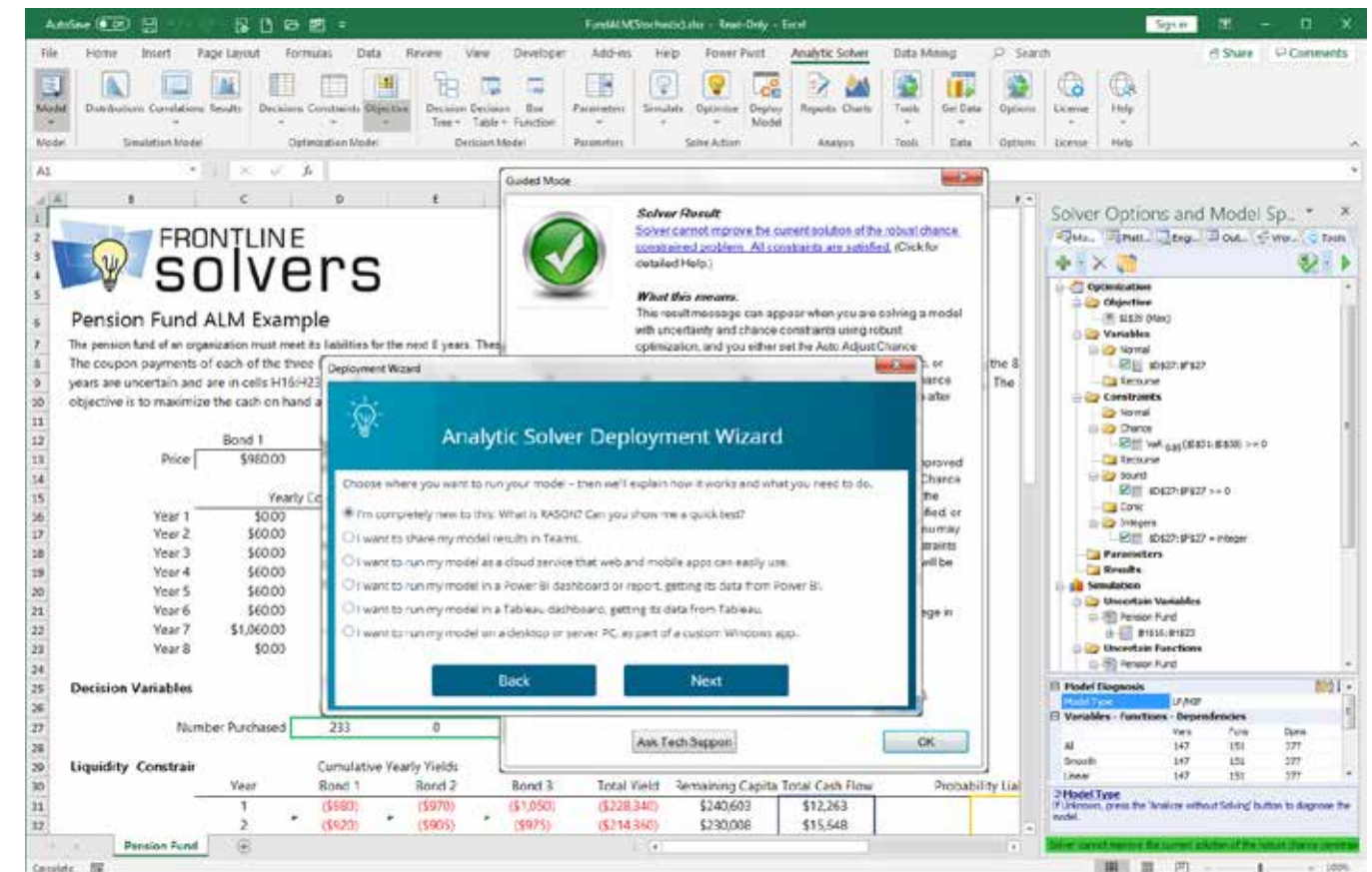
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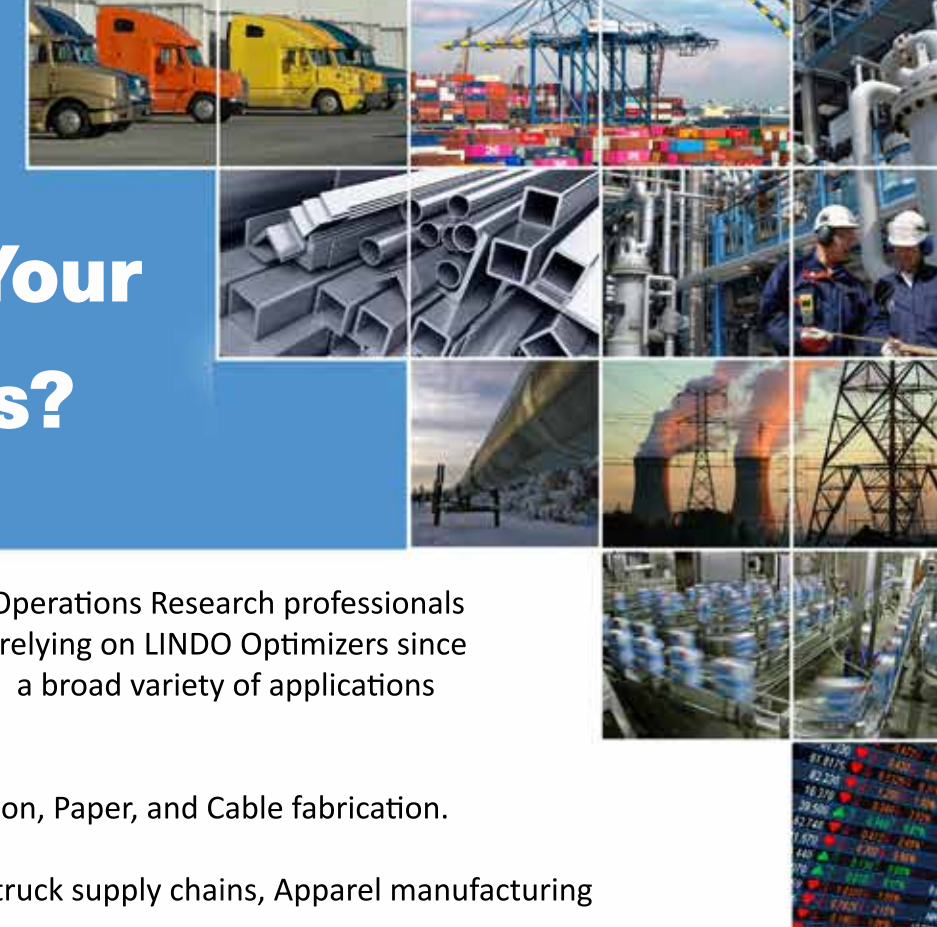
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OR/MS TODAY ADVERTISING AND EDITORIAL OFFICE

5521 Research Park Drive, Suite 200, Catonsville, MD 21228
Tel.: 443.757.3500
Email: informs@informs.org

Editor

Kara Tucker, kara.tucker@informs.org

Director of Marketing

Mary Leszczynski, mary.leszczynski@informs.org

Advertising Sales

Olivia Schmitz, olivia.schmitz@informs.org

Production

Ashley Kilgore, akilgore@informs.org
Max Liberatore-Resnick, mresnick@informs.org
Eilyn Cubillo, ecubillo@informs.org

Magazine Editorial Advisory Board

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www.informs.org
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YOU CAN DO HARD THINGS

BY KARA TUCKER



FULL DISCLOSURE: THIS JOB IS HARD. I am now halfway through my second year as editor of *OR/MS Today*, and I have loved every part of it. From meeting new members to publishing extraordinary works of operations research (O.R.) and analytics to collaborating with INFORMS colleagues on the beautiful design of the print issues to simply informing our members about upcoming events or something they might have missed. I have worked toward this for several years, and I think I'm doing alright. Of course, I'm still learning all the time and in constant search of the perfect story – which makes this job even better. And just as I feel as though I found my footing with *OR/MS Today*, a completely unplanned twist of events has also named me editor of *Analytics* magazine for the foreseeable future. As we announced in March, Peter Horner stepped down as editor of *Analytics* to prioritize his health. It was not his plan. It was not my plan. And the result? A much harder job than I anticipated.

Pete seamlessly steered two magazines for decades, yet I somehow feel like I've dropped the anchor and my boat is sinking. How did he do it? I will admit, things have certainly changed in the past 20 years – both magazines now have a heavy online presence, social media accounts, a redesigned print issue, "digital objects" to be created – and I have responsibilities that lie outside of the INFORMS

magazine world. But the core of the job is to find the stories that will inspire – inspire members to implement new techniques into their own research; inspire analytics and O.R. experts to join INFORMS as their professional home; inspire the non-analytics world to become familiar with how the field is saving lives, saving money and solving problems. I hope I'm at least doing that for both magazines for now, and using Pete's career as inspiration, we'll see what the future holds.

Today's Inspiring Stories

I might be biased, and yes I wrote the article, but I am still very much in awe of the Chilean team that won the 2022 Edelman Award. As I note on page 32, anyone in attendance during the winner announcement at the Edelman Gala can attest to the palpable joy and enthusiasm felt throughout that room – all stemming from the 13 members of the Chile team (and that was only half of them!). The story of Chile and analytics truly is an inspiring one – from the 1998 Edelman Award-winning team to this year's private-public partnership that decelerated COVID-19 in Chile. Every step of the research, every member of the team and every minute spent working toward keeping the pandemic at bay are an inspiration.

In another inspiring story, Laura A. Albert shares her personal journey to changing her name as a mid-career academic. At a time when identity

means so much to each individual, Laura offers 10 principles for how she reclaimed her name and why it shouldn't be as hard for others as it was for her. Wondering what the "A." stands for? Head to page 26 to find out.

We also have a historical retrospective of a successful research-based OR/MS group at Bethlehem Steel Corporation. The authors discuss the practice of this group operating within a corporate research department and provide the conditions under which this arrangement may work for other OR/MS groups. After a successful 40-year run, you might want to pay attention to the experiences described on page 44.

If a research-based OR/MS team isn't your fit, perhaps an algorithms team at an online personal shopping and styling service is (p. 38). Stitch Fix is changing the way people find clothes they love by combining technology with the personal touch of seasoned style experts. To do this, they leverage O.R. and machine learning to provide styling services personalized through a combination of algorithms and expert stylists. Who knew data science could be so fashionable?

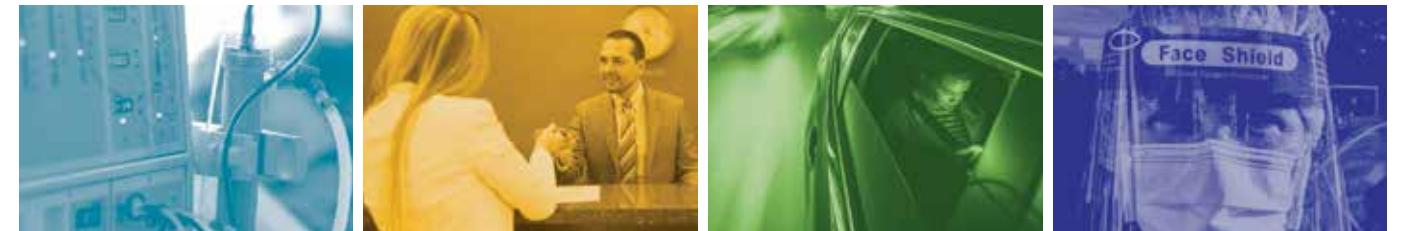
From Inspiration to Celebration

On page 63, current president of the INFORMS Roundtable, Margery Connor, shares the history of the group to celebrate its 40th anniversary. Member organizations have effectively collaborated for four decades to share insights and best practices and advance professional growth. Happy anniversary to the Roundtable and all its members!

In another recurring column, Jeff Cohen, INFORMS chief innovation and strategy officer, proves that the advocacy initiative is making a difference, having an impact and creating valuable opportunities for INFORMS members and the policy community alike. He details why in the "Advocacy in D.C." column on page 12. Without giving away too many spoilers, congrats are in order for Ramayya Krishnan, David Simchi-Levi and the entire advocacy team.

I also want to congratulate and thank every author who has shared a story within the pages of *OR/MS Today* and *Analytics* magazine. I know I'm inspired to keep finding more.

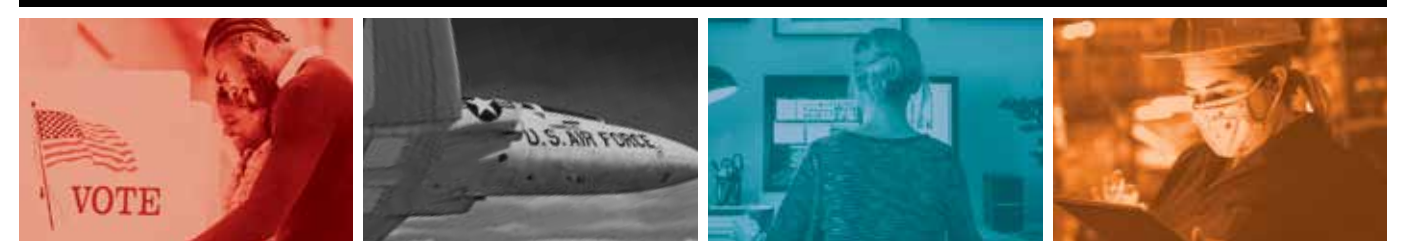
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HOUSTON HIGHLIGHTS, LEADERSHIP OPPORTUNITIES AND MORE

BY RADHIKA KULKARNI



I AM EXCITED TO SHARE WITH YOU SOME of the top INFORMS-related events that were highlights for me in the past couple of months.

INFORMS Analytics Conference in Houston: Overall Excitement and Exuberance!

The first completely in-person Analytics Conference since the start of the COVID-19 pandemic was an eagerly awaited event by many of us, and it certainly surpassed our expectations. It was clear that all the attendees were excited to be back in person to see their friends and make new connections. It was invigorating to walk around the conference and see smiles on people's faces!

On the first day of the conference, I enjoyed listening to the three finalists for the UPS George D. Smith Prize as they described their innovative programs that train future operations research (O.R.) and analytics professionals. It was gratifying that there were two international universities in this list. I spent most of the following day attending each Edelman finalist presentation and feeling proud to see so many timely and critical applications – three of the six finalists either were directly related to the pandemic (Janssen, Chile) or their implementation was clearly affected by it (U.S. Census Bureau). I am sure the judges had a hard time picking the winning team. Which brings me to one of the most memorable INFORMS moments for me: the Edelman Gala and announcing the winner of the 2022 Edelman Award.

Accentuated by the euphoric applause from the Chilean team when they were announced as winner, I can truly say that I will never forget this year's gala. The reaction from the team and the resulting applause from the audience in response to their joyous yell was beyond any expectations! Apart from my personal excitement, I think the uniqueness of this year's win is the fact that the *entire* country was involved in this project, because of the global and terrifying nature of the pandemic. It is a true exemplar of the far-reaching effects of our profession and its ability to save lives, save money and solve problems. Congratulations to the winning team! The success of this team should not diminish the excellence of the other amazing projects, each of which made me proud to be an O.R. professional.

It is worth noting that many of the awards this year were won by international entries: the Smith Prize went to Eindhoven University of Technology, the Innovative Applications in Analytics Award (IAAA) was won by Prof. Debjit Roy and his team from India, and of course, the Edelman Award went to Chile. We are indeed an international organization!

Another exciting part of this year's Analytics Conference was meeting so many students who were first-time attendees. Kudos to Purdue University's Krannert School of Management for sending more than 50 students to the conference – what a wonderful way for them to be introduced to the networking and learning opportunities at such an event! I hope that this experience will encourage them to be lifelong members of our profession and choose INFORMS as their professional home.

I am eagerly looking forward to the Annual Meeting in Indianapolis, where I hope to meet many more students and professionals and build new connections!

Nurturing the Pipeline for Our Profession: Memorable University Visits

One of my passions is to be an ambassador of INFORMS to the external world and to expand our "tent" by reaching out to many audiences. I believe that students entering STEM areas form an important component of this outreach. The health of our profession heavily relies on the pipeline of talent feeding the multiple industries with analytical groups, as well as training future researchers entering academia. What better way than visiting universities (and even high schools) and sharing with prospective students the many opportunities in the fields of O.R. and analytics?

I was lucky to have two such in-person visits in the past few months. One was to Purdue University's Krannert School in March. I did not get a chance to meet students on this visit (it was spring break for the students) but met with fantastic faculty members who are focused on ensuring that their students learn about the many opportunities in analytics, including sponsoring dozens of students to attend the Analytics Conference. These students presented posters (including three winning ones) and met with prospective employers while in Houston. I applauded the faculty for ensuring that their students get a great start in analytics with this effort.

My second visit was to the University of Kansas (KU) in Lawrence, Kansas, to speak to the fellows in their leadership program (SELF Fellows). Every year, the KU engineering school grants about 30 fellowships to freshmen to augment their education with leadership skills. My seminar was part of their invited leadership speaker program (<https://enr.ku.edu/self>). I talked about my analytical journey, focusing on the opportunities and challenges that I encountered in my career. It was fun to talk to these young students about leadership qualities and share my passion for the wonderful opportunities in O.R. and analytics. Many of these students were eager to hear about the problems they could solve with such training. To quite a few of them, the field of operations research was completely new. I left the campus hoping that we may see some of them as INFORMS members in the future! Imagine my excitement when I heard back from the program that the SELF Fellows were thinking of data analytics as their career choice. My thought: Mission accomplished!

I encourage all my peers to use every opportunity to interest young students entering college to pursue O.R. and analytics by sharing your own passion for the work we all do.

I end my column with brief updates on two of my passionate endeavors from my term on the Board of Directors.

Increasing Industry-Academia Connections: Practice Mega Discussion at the Spring Board Meeting

In my first column this year [1], I mentioned that the board is exploring opportunities to increase practice member engagement. During the board meeting in April, we chose "practice" as the topic for a mega discussion, the term used by the board for a three- or four-hour session during the board meeting for in-depth discussion about a specific topic. This mega discussion was led by Robin Lougee, VP, Practice, with ample support from Scharan Johnson, director of Membership & Engagement at INFORMS. Eight industry professionals from a range of companies (e.g., Chevron, Ford, IBM), varying educational backgrounds (Ph.D., master's) and several other characteristics were invited as guests to provide their perspectives on how INFORMS can provide better value to industry professionals. Several opportunities were discussed that spanned many different areas of INFORMS activities. The plan is for the board and INFORMS staff to use feedback from these discussions to further engage with various constituencies and consider possible enhancements of services or products. Stay tuned to hear more about this effort!

Exciting Outcome from AI Initiative Efforts

One of the efforts related to the AI initiative at INFORMS focuses on active engagement with the federal government's AI initiative, with assistance from the Signal Group. In late 2021, in response to a general request for nominations to the White House's National AI Advisory Committee (NAIAC) [2], the INFORMS executive committee nominated Ramayya Krishnan to this distinguished committee. I am very glad to report that Krishnan is one of just 27 people named to the NAIAC. Krishnan is superbly qualified for this appointment, and his selection is a huge honor to INFORMS and our profession because we now have someone who can influence AI strategy at our country's highest levels. Many thanks to Krishnan for accepting this responsibility and to Jeff Cohen and the Signal Group for their efforts in supporting this nomination.

RADHIKA KULKARNI is retired VP of advanced analytics at SAS, Inc. She is the 2022 INFORMS President.

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1. Radhika Kulkarni, 2022, "10 Opportunities from the 2022 INFORMS President," *ORMS Today*, Feb. 3, <https://doi.org/10.1287/orms.2022.01.03>.
2. <https://www.ai.gov/naiac/>

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REFLECTING ON DIVERSITY, EQUITY AND INCLUSION: PAST, PRESENT AND FUTURE

BY ELENA GERSTMANN



MY JUNE 2021 OR/MS TODAY COLUMN was about diversity, equity and inclusion (DEI) [1]. I'm revisiting this topic to provide our community with transparency into our work. Our commitment to DEI must not be performative; it must be impactful.

May 25, 2020. A turning point in modern history and a date many won't forget – the day George Floyd was murdered by a Minneapolis police officer. Although racism has been part of the United States since before its incorporation, the untimely death of George Floyd served as a catalyst for change and is still very present here at INFORMS.

Days after Floyd's murder, INFORMS released the following statement:

No words can fully express our sadness and disappointment as we watch the continued civil rights abuses transpiring throughout the country, and we acknowledge the structural issues contributing to a compounding of racial injustices and pain that have led to this point. This is one of the most poignant moments in our history; we must stand together and work together for a diverse, inclusive, fair, and just future. INFORMS looks forward to leading future conversations and supporting the work of our members that explore solutions and call us to action.

INFORMS wasn't alone; many people, businesses and organizations spoke up. Since then, there has been a shift. The needle has moved toward increased advocacy for diversity, equity and inclusion. This

includes the INFORMS Board of Directors approving a new strategic plan with one goal laser-focused on advancing DEI. The battle is far from over, but progress is being made.

Of course, DEI is more than race and ethnicity, and work is being done in many industries and organizations, including INFORMS. A wide range of actions are being taken. For example, Rice Krispies Treats™ recently introduced revamped wrappers to make them sensory-friendly. We've seen the makers of Barbie roll out gender-neutral dolls and dolls with vitiligo; Coca-Cola has marketed their sodas with a wide variety of names on the labels that can be found across the world; and, of course, future-forward Sesame Street has introduced new characters, including an Asian American and an autistic Muppet. Changes are happening.

Here at INFORMS, we are building on our momentum that started decades ago. The Forum for Women in OR/MS (WORMS) was formed in 1995, Minority Issues Forum (MIF) in 2001 and the INFORMS Diversity, Equity, and Inclusion Committee (DEIC) in 2015. These communities have been trailblazers in the fight for inclusion within INFORMS. Over the past few years, the focus of these groups has turned into association-wide goals, as demonstrated clearly in our new strategic goals approved in 2021.

Some highlights of what we have accomplished over the past 12 months are below. This includes the revision of the INFORMS Code of Conduct to include adherence to DEI principles [2] and introducing training for unconscious bias for INFORMS volunteers.

- The DEIC's Ambassadors Program is in its third year and going strong. The number of ambassadors has increased each year from 14 in 2020 to 22 in 2021 and 23 this year. Projects have also increased from only eight in 2020 to 10 projects this year. Some of this year's projects include "Implementing an Accessible INFORMS," "Informal Reception for LGBTQIA+ Folks and Allies at 2022 INFORMS Annual Meeting" and "INFORMS Member Demographic Campaign Visualization." This last project includes the graphic visualization of a large-scale campaign to gather demographic information from our members. With this information, we will be able to measure whether our DEI initiatives have been successful thus far. If we want to move the needle, we must know where the needle is.
- We also introduced the Amazon SCOT and INFORMS Fellowships during the 2021 INFORMS Annual Meeting. This program provided scholarships to students from minority-serving institutions to attend the conference and become an INFORMS member. We hope to include a similar program for the 2022 INFORMS Annual Meeting. In addition, the DEIC sponsored a keynote speaker at the 2020 and 2021 Annual Meetings, and we are now proposing to operationalize this as a component for the 2022 INFORMS Annual Meeting and all future annual meetings.
- The INFORMS Combined Colloquia continues to hold DEI-focused sessions (a trend going on two years now), and this year, the DEIC was invited to present during the colloquia. Additionally, there are plans to formally add language to the INFORMS Policies & Procedures document to ensure DEI is a standard part of the program.
- INFORMS' Publications Department has made strides in the DEI effort, including publishing several special issues on DEI within our academic journals as well as covering the topic in *OR/MS Today*. There are currently two special issues in the works for our journals: "Special Issue on Diversity, Equity and Inclusion in OR/MS Classrooms" in *INFORMS Transactions on Education* and "Conference and Special Section of *Marketing Science* on Diversity, Equity and Inclusion" in *Marketing Science*. The publications group has also increased the diversity of editors-in-chief and its search-and-review committees as well as diversified authorship within the magazines. In 2021, 68% of the feature articles in *OR/MS Today* were authored by first-time authors. Language is also being added to its Policies & Procedures to advance DEI. Moreover, we have increased transparency by including demographic information of editorial boards on the websites for each journal.

FREQUENTLY ASKED QUESTIONS

Q: I'm glad INFORMS is advancing DEI. How can I help?

A: The easiest and fastest way is to become part of the Diversity Community within our online community, INFORMS Connect (<https://connect.informs.org/diversity/home>). Also consider becoming a member of and then becoming involved with Minority Issues Forum and WORMS. Both groups are welcoming and open to all.

Q: Why is INFORMS talking about DEI? INFORMS should just be about the science and technology of decision-making. DEI doesn't impact how I do my work.

A: INFORMS is indeed about the science and technology of decision-making. Given this, advancing diversity is critical because diversity of ideas and perspectives (e.g., employer type, educational background, gender, career stage) strengthens science and technology. If we don't create a welcoming environment for all, we undermine the impact of operations research, analytics, management science, economics, behavioral science, statistics, artificial intelligence, data science, applied mathematics and other related fields.

In my June column last year, I said that the statement made by INFORMS after the death of George Floyd resonated with me because it clearly stated that we must "work together" – it was a call to action [2]. What I have just listed are only some of the activities that we, as a collective INFORMS, have accomplished over the last year. We continue to build on our strong foundation, and it is a base that we can stand firm on. Let's keep climbing and building together. We are making strides each year. Imagine the exponential change we can make within INFORMS and around the globe if our community of 11,000+ members works together for diversity, equity and inclusion.

As always, I welcome your feedback.

ELENA GERSTMANN (egerstmann@informs.org), Ph.D., FASAE, CAE, is executive director of INFORMS (5521 Research Park Drive, Ste. 200, Catonsville, MD 21228). She can be reached via email or by phone at 443-757-3521.

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1. <https://doi.org/10.1287/orms.2021.03.07>
2. <https://doi.org/10.1287/orms.2021.06.09>

If we want to move the needle [on DEI initiatives], we must know where the needle is.

MAJOR ADVOCACY WINS

BY JEFF COHEN

I'M OFTEN ASKED TO TALK WITH INFORMS members about our advocacy initiative. They don't just want to know how to get involved, but at a deeper level, they want to hear our outcomes, whether we are having success and making a difference, whether we are well-aligned with the INFORMS strategic plan, and whether we are creating greater understanding and appreciation among policymakers and government officials for how the science and technology of decision-making – operations research, analytics and the full breadth of disciplines within the INFORMS community – save lives, save money and solve problems.

The short answer to these questions is a simple “yes.” We are making a difference, we are having an impact, and we are creating valuable opportunities for INFORMS members and the policy community alike. The INFORMS News Room (informs.org/About-INFORMS/News-Room) offers a tremendous amount of news and information that feature the expertise of our members who actively engage with the media; however, the outcomes of our direct engagement with policymakers is sometimes less obvious, albeit equally critical. Since 2018, INFORMS has had hundreds of meetings with Members of Congress and their staff, not to mention briefings with federal agencies and White House staff. Even though it's an impressive amount of work, those metrics don't offer meaningful

context. There's not enough space in this column to bring all that work to life; however, INFORMS and our members have had several recent public outcomes in Washington, D.C., that exemplify this work and provide important affirmations that we are indeed making a difference. Two specific examples showcase these types of direct and indirect outcomes.

National Artificial Intelligence Advisory Committee

You may have read by now that the 2019 INFORMS President Ramayya Krishnan was named one of 27 members of the White House's National Artificial Intelligence Advisory Committee (NAIAC). The way Krishnan was effectively positioned to receive this appointment goes to the heart of INFORMS' advocacy initiative. Indeed, Krishnan's appointment is a reflection of his superb qualifications, combined with several years' worth of work by INFORMS to create and strengthen relationships in Washington. We first took Krishnan to the White House in 2018 to discuss INFORMS and AI with officials from the Office of Science and Technology Policy (OSTP) when he was serving as INFORMS president-elect. In the ensuing years, he maintained an open dialogue with OSTP, made repeated trips to Washington and elsewhere with us for continued meetings with Members of Congress and their staff, and engaged

with various business groups and technology trade associations, among other organizations, to discuss the role of INFORMS, analytics, O.R. and AI in policymaking. In all, Krishnan's appointment to the NAIAC is a direct reflection on his credentials and an example of policymakers' increasing attention to and appreciation for operations research, analytics and INFORMS.

Supply Chain Task Force

As supply chain disruptions have become a mainstream concern across virtually every corner of the economy over the past two years, INFORMS has been working with numerous members to elevate their important work and expertise around the dynamic challenges, vulnerabilities and solutions to this critical issue. This includes an intentional approach of regularly sharing substantial material and expertise published in INFORMS journals and elsewhere with the White House and its supply chain task force, key figures on Capitol Hill and the media. In April, the 2022 Economic Report of the President referenced several articles published in *Management Science*, as well as work by its editor David Simchi-Levi, regarding supply chain stress tests. Although I want to be careful and clear that INFORMS did not specifically advocate for this material to be included in the White House's report,

it represents the types of organic outcomes that we aspire to see as we diligently work to elevate our members' expertise and content in Washington.

If You Build It ...

From legislation that includes provisions that facilitate partnerships with operations research, analytics and data science professionals for the implementation of key programs to the inclusion of members from our community in high-level government reports and committees and to local, national and international media actively seeking out INFORMS member experts, there's little doubt that the advocacy initiative and those participating in it are spurring a shift in Washington.

To the members who have been engaged with the INFORMS advocacy initiative, thank you for volunteering your time, talent and expertise. To the members who are interested in learning how you can get involved, please contact INFORMS Public Affairs Coordinator Ashley Smith at asmith@informs.org. We look forward to continuing to work together in pursuit of the letter and spirit of INFORMS' strategic goal to “advance the science and technology of decision-making and elevate its impact.”

JEFFREY M. COHEN serves as chief strategy and information officer at INFORMS. Connect with him on LinkedIn at [linkedin.com/in/jmcs](https://www.linkedin.com/in/jmcs).



FIGHTING THE EDUCATION REVERSAL FROM COVID-19: STEPPING UP TO SUPPORT ELEMENTARY AND HIGH SCHOOL STUDENTS WITH EXTRACURRICULAR ACTIVITIES

BY KITTY KAY CHAN

COVID-19 HAS AFFECTED STUDENT learning to a daunting extent. The United Nations projects that the pandemic could wipe out the progress achieved in education over the past 20 years. Worldwide, the pandemic is expected to lead to more than 100 million students in grades one through eight falling below minimum reading proficiency, with similar results expected for mathematics proficiency [1]. In the United States, such negative educational outcomes have disproportionately fallen on minority and socioeconomically disadvantaged students [2]. Regardless of the pandemic, limitations on the number of teachers and other resources have long created a roadblock in the fight for “quality education for all.”

The strain the COVID-19 pandemic has created on the educational system has exacerbated the need to provide supplementary resources to ensure quality education. Many studies point to the positive impacts of participation in extracurricular activities on academic success and emotional well-being [3]. Students and educators at higher education institutions could help in various ways by supporting extracurricular activities for elementary and high school students, either remotely or in person, starting in their local communities. There are many components to think through in supporting these activities to bring positive impact for academic success and emotional well-being. Here are a few to consider.

Make it Practical and Connect Knowledge

Practical learning methods are powerful instruments to help students acquire and retain knowledge. Hands-on learning is one practical educational method [4]. For example, when teaching the mathematical concept of a slope, a teacher can bring in a few objects, such as a miniature model of a house or mountain, and ask students to measure and calculate the slope of the

roof and the mountain. Simulated real-life situation learning is another method [5]. There is a limited amount of time that can be allocated for hands-on learning during regular class time. Incorporating hands-on learning during extracurricular activities could provide supplemental experience for students. An example could be helping high school juniors and seniors prepare for college applications via an afterschool workshop using mock college interviews. During the mock interview, a student practices responding to a list of questions both verbally and using body language, in a formal setting that mirrors an actual interview.

Students learn a wide range of subjects in their classrooms. Traditionally, this learning is conducted in silos. Empirical evidence indicates that better connecting knowledge to the real world can improve students’ understanding and lead to positive impacts on learning. Siloed learning leads to storing information in discrete mental compartments without structural linkages to provide coherence [6]. Hosting an after-class or weekend seminar that demonstrates to students how to apply a concept from one subject to another could also help guide students in connecting knowledge – for example, linking the concept of standard deviation that students learn in math class to the notion of inequality that they learn in history class, or linking concepts around climate change to issues from geography class.

Make it a Nurturing Environment

The sudden change in learning modalities and the social isolation, among other factors, that have come along with the COVID-19 pandemic have sparked negative emotions among students [7]. Researchers have linked high academic performance with positive student emotions and poor performance with negative student emotions [8]. In such situations, a nurturing learning environment

becomes even more important. Being encouraging, providing opportunities to grow and, whenever possible, also engaging with students’ families are critical.

When supporting extracurricular activities, instructors should make sure there are ample opportunities for students to speak, lead and engage with each other. Encouragement can be conveyed through positive feedback and celebrating success. Positive feedback can be either verbal or nonverbal; for example, encouraging students with a smile when you detect hesitation or verbally describing the great work they have accomplished. When a group of students has achieved a goal, celebrate it. It could be as simple as celebrating with gummy bears or a singalong with a music video.

Extensive research points to positive impacts from family engagement in student learning [9]. There are various ways to engage families, including bringing in family members to give a talk in their area of expertise or hosting hands-on training to share their talents.

Make it Accessible

Participation in extracurricular activities is typically voluntary. Students only have a limited number of hours at the end of a school day and must balance their time with other obligations, such as completing homework. Students also come from a wide range of socioeconomic backgrounds. Hence, making extracurricular activities easily accessible is crucial. Some factors that can positively affect accessibility include minimizing time spent traveling to the activities, limiting fees to participate, offering flexible time options and different modalities to join the activities.

To minimize travel time, combining different modalities could be a potential option. For example, leverage a hybrid modality when participants have the option to join either in the physical location where the activities take place or via a virtual meeting room. For activities that require fees, an award system is needed to offer seats to students who otherwise could not afford to participate. Regarding flexible time options, some activities could consider participation on a drop-in basis – for example, drop-in tutoring hours.

Because of COVID-19, it could be essential to make activities available to participants either at physical locations or via virtual meeting rooms. However, if the activities can only be offered virtually, this will require steps to enable participation for those who may not have access to the required technology, such as computers, cell phones or free internet access.

Conclusion

Public, private and nonprofit organizations will need to work together to overcome various barriers, including financial resources and the availability of technology, both in the schools and homes of elementary and high school students. For students and educators at universities and other institutions

of higher education, we could provide “boots on the ground” to supplement out-of-classroom activities for younger students. We can walk alongside them and cheer them on as they navigate middle and high school and potentially toward higher education. What each of us can do may seem small, but it is important that these steps are taken. It is the connection of these steps at the local and individual level that will make it possible for our society to leap into quality education for all.

KITTY KAY CHAN (kkc2139@columbia.edu) is a professor of practice in applied analytics and the program director for M.S. in Applied Analytics at the School of Professional Studies, Columbia University.

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MY MOM – OPERATIONS RESEARCHER EXTRAORDINAIRE!

BY JAMES J. COCHRAN

MY MOTHER AND FATHER HAD FIVE children – I am the oldest. My dad started his work life as a machinist, and he eventually became a shop floor foreman. Dad worked the night shift throughout most of my childhood, so I generally only saw him on weekends – and he frequently worked at least one day on the weekend as well. This is what my parents had to do to make ends meet for our large family. So for most of my childhood, it was just Mom and the five kids at home during the week.

Neither of my parents graduated from high school – not unusual at the time – and neither had ever heard of operations research (O.R.) until I was exposed to the discipline as an undergraduate student. But when I showed my dad some of the material in the introduction to operations management (OM) textbook assigned by one of my professors, he recognized and had used plenty of the concepts described in the book. He used many versions of Gantt charts; he even created some variations on the standard Gantt chart for the specific needs of his employers. He also relied heavily on quality control concepts, CPM, PERT charts and other classic OM tools.

However, none of the concepts in this introductory OM textbook were familiar to Mom. In spite of that, I believe, other than using the vocabulary, my mom could have written much of that textbook. Let me explain with a few salient examples.

Production. Consider meal preparation. Breakfast every day, sack lunches for five kids throughout the school year, and balanced, nutritious, home-cooked dinners were prepared every night. The dinner production portion of this problem is particularly interesting to me because I now realize that my mom had a secret weapon in her approach to this problem. She was a whiz at combining unlikely ingredients into balanced and delicious meals. Her ability to use and combine basic ingredients in many creative ways at dinnertime was essentially an early form of postponement – she just never thought to attach a name to what she was doing.

Inventory Control. Working with a small home with scant area for storage, a tight budget and limited access to transportation, my mom had to ensure that we always had sufficient food and dry goods. The food inventory issue is particularly interesting to me because this is another problem for which my mom's secret weapon – postponement – was key. Because she was great at using various ingredients in a wide variety of ways (and she rarely used a cookbook), she was seemingly always able to work

with the basic ingredients she had in stock (except for occasionally asking me to stop by the local grocery after I finished my paper route to pick up some onions, carrots or bread). Her use of postponement also simplified her inventory problem.

Scheduling. This is perhaps the easiest topic for me to explain. At one point, my mom had four boys (ages 6 to 15) playing organized baseball and a daughter (age 12) playing organized softball during the summer – all on different teams. Each of us had 14-18 games scheduled at different times and dates on different fields throughout May, June and July – and to compound the problem, I decided I would play for a team coached by my Uncle Bob in another community about six miles from my home. My mom was committed to watching every game possible (there were a few games scheduled simultaneously, and she usually split her time between the two games on those dates). She was also committed to having a complete home-cooked meal ready for us before every evening game (weeknight games generally started at 5:30 p.m. and 7:30 p.m.). My family only had one car, and Dad worked nights and thus needed the car to get to work. So we usually walked the half-mile to the little league fields in my hometown. Uncle Bob would sometimes pick me up and take me to his team's games, and other times we were able to find a teammate whose parents were willing to pick me up and take me to those games. This was certainly a complex scheduling problem, and frequent Ohio spring thunderstorms would often further complicate it. Thinking about this makes my head spin.

I could go on and discuss how my mom handled problems in reliability, decision theory, quality control, etc., but I suspect I have made my point. Not all great operations researchers are classically trained in the discipline – O.R.'s greatest asset is the mindset that it engenders. Some people, like my mom, develop that mindset by necessity through experience. Indisputably, my mom was a terrific implicit operations researcher – without knowing that she was.

In a subsequent issue of *OR/MS Today*, we will acquaint you with some examples of moms who are explicit operations researchers – classically trained in our discipline – who have raised children who have followed in their footsteps in some manner.

JAMES J. COCHRAN is associate dean for research and professor of applied statistics at the Culverhouse College of Business, University of Alabama. He is chair of the INFORMS Magazine Editorial Advisory Board.

Not all great operations researchers are classically trained in the discipline – O.R.'s greatest asset is the mindset that it engenders.

TOP SOCIAL POSTS



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[Live in Houston] Russell Allgor, Chief Scientist at Amazon, speaks at the 2022 INFORMS Business Analytics Conference
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5

5 Ways to Scale #AI Projects and Adopt #ArtificialIntelligence in Your Company
Analytics Insight

6

Giving wildlife conservationists some helping PAWS
Resoundingly Human

7

What could be better than Wordle? Mathle!
Mathle

8

The winner of the 2022 INFORMS UPS George D. Smith Prize is Eindhoven University
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MEMBERS IN THE NEWS

Chinese Invasion of Taiwan Could Undermine Global Semiconductor Market - Opinion, *Newsweek*, featuring Zachary Collier

Here's Why Breaks Are So Important When You're Working From Home, *U.S. News*, featuring Anita Williams-Woolley

How should parents who can't find formula feed their babies?, *CBS News*, featuring Natalia Summerville

RESOUNDINGLY HUMAN

April 2022

In these episodes we explore work to improve existing policies for the administration of compassionate dialysis in the emergency room and highlight the winner of the INFORMS Doing Good with Good O.R. competition.

April's episodes feature Sila Çetinkaya, Southern Methodist University; Olga Bountali, University of Toronto; and Lily Xu, Harvard University.

May 2022

In these episodes we hear an update on the status of INFORMS, including highlights from the 2022 INFORMS Analytics Conference as well as learn about the challenges of introducing common sense to artificial intelligence (AI).

May's episodes feature the 2022 INFORMS President Radhika Kulkarni and Mayank Kejriwal, University of Southern California.

What's Your StORy?

Matthew Brady



Founder & CEO, Volley Solutions
Instructor, University of Colorado
Leeds School of Business
INFORMS member since 2021



How did you discover INFORMS?

From the online content ... written, video, etc. Shortly after I joined, I registered for the 2022 INFORMS Business Analytics Conference and submitted a proposal to present, which was accepted. It has been an excellent experience thus far, and I look forward to the Annual Meeting in Indianapolis, and then welcoming everyone to Denver in 2023!



Do you have any advice for analytics/data science students who are trying to decide between industry and academia careers after they graduate?

There is significant overlap even now, and that will continue as industry takes on more of the responsibility of funding education, and academia puts more emphasis on strategic and applied training (borrowing from the "bootcamp" model).



As a new member, what benefits have you found useful so far, and what others are you looking forward to utilizing?

The breadth and depth of resources are remarkable. *OR/MS Today* and the many specialized journals are a significant value. As an entrepreneur and educator, I think it's critical to foster the overlap and collaboration. Ultimately though, it's about the people.



Say you walk outside and find a \$10M winning lottery ticket. What do you do?

We have been teaching our kids to give, save, and spend from an early age, and we have practiced that for quite some time. With the money that I spend, I think that we would get a lake house in Indiana, so that we could gather all of our family and friends for holidays.

Go to ormstoday.informs.org to read the full interview and watch the video for bonus questions!



CAN O.R. AND TECHNOLOGICAL FORECASTING RECONCILE?

BY FRED PHILLIPS



IN A 1997 PLENARY SPEECH AT THE INFORMS Annual Meeting, George Kozmetsky, co-founder of The Institute of Management Sciences (TIMS), emphasized the “synergy between OR/MS and the technology chain” [1]. He recalled meetings leading to the launch of the Operations Research Society of America (ORSA) and TIMS. Both organizations, George said, oriented themselves to extending the operations research (O.R.) advances of World War II, but the immediate impetus was “the shock so many of us felt after the successful launch of Sputnik.” ORSA founders saw the need to grow an American electronics industry to carry the country through the Cold War.

“Subsequent to 1968,” Kozmetsky continued, “the high technology industry first matched federal R&D investment and then surpassed it.” Writing in *Management Science*, Isenson noted, “The term, technological forecasting, is appearing with ever increasing frequency in the public utterances of government and industrial leaders ...” [2]. It was natural, then, for Hal Linstone, an operations researcher at RAND Corp., to launch the journal *Technological Forecasting* in 1969. The next year, Congress established the U.S. Office of Technology Assessment, and at the request of the publisher Elsevier, Hal expanded the journal’s title to *Technological Forecasting & Social Change (TF&SC)*.

When the Paths Diverged

TF&SC tops journal rating lists in a number of disciplines. Meade and Islam’s 1998 *Management Science* paper referenced a great many *TF&SC*

articles [3]. However, around 2010, Hal found an article in an O.R. journal that mentioned “a journal called *Technological Forecasting & Social Change*” – as if O.R.-oriented readers had never heard of it.

The split between O.R. and technology management – particularly technology forecasting and assessment – is unfortunate, and I hope for reconciliation. INFORMS has a Technology, Innovation Management and Entrepreneurship (TIME) section, but its membership is small compared with INFORMS’ total roster. Shane and Ulrich’s 2004 review of 250 articles titled, “Technological Innovation, Product Development, and Entrepreneurship in *Management Science*” [4], much like the TIME section, mashes together “research and development, innovation, product development, and entrepreneurship” of all kinds, like nontechnical innovation and entrepreneurship.

It seems management of technology (MOT), which addresses inter alia the price/performance trajectories, valorization paths, procurement, intraorganizational diffusion and social impacts of technology – and not just IT/MIS, but biotech, nanotech, space tech, med tech, etc. – has become just a tangential interest at INFORMS.

How Do O.R. and MOT Connect?

The clear links between the two are decision science and system approaches. A simple example demonstrates the former. Operations researchers figured out how to draw and solve decision trees. In these trees, chance nodes generate branches with probabilities (of various partial outcomes) attached

to them. With probability p the resource will be found, or not ($1 - p$). The needed technology will be developed on time (p), or not ($1 - p$).

Where do the probabilities come from? O.R. textbooks tend to dismiss this question, appearing to assume the numbers are somehow “given.” But obviously it is forecasters who must generate these probabilities, and who must do so realistically if the decision tree or the real-option model is to be of practical use. *TF&SC* has been the main platform for developments in Delphi and related techniques for this purpose.

Yet the two disciplines continue to diverge. Quantitative tech forecasters tend to leave time-series forecasting to the statisticians, preferring causal forecasting models. Frank Bass’ 1996 model, published in *Management Science*, is a fine example of the latter, portraying the curvilinear diffusion of a tech product as a result of external influence plus imitation of prior buyers [5]. (Explaining the liking for causal models would be a digression, but I’m glad to discuss it with anyone interested.)

Despite the latter models’ successes, *TF&SC* papers have migrated toward the upper-right quadrant of Table 1, as the problems enterprises face have become more cross-cultural, systemic and global [6]. “TOP” frames or perspectives – technical, organizational, personal – (or the like) are key to dealing with agents involved in such problems, as approaching them from a single, wrong frame will cause the analyst to miss critical elements of the situation. The U.N.’s Millennium Development Goals, for example, failed because of their sole technical orientation.

Organizational Complexity	High	Leadership	Multiple perspectives, multiple-constituent dialogue methods
	Low	"Just do it"	Mathematics
		Low	High

Technical Complexity

TABLE 1: A classification of decision problems and constructive responses. (This version is adapted from the Strategic Decision Group.)

They were succeeded by the current Sustainable Development Goals, derived via TOP discussions with diverse constituent groups.

To reconcile our fields of study, and to apply our joint brainpower to today’s wicked problem complexes, O.R. practitioners will have to step outside the comfortable lower-right quadrant – even as O.R. drifts more and more in the direction of “analytics” – and join the tech assessment/tech forecasting (TA/TF) folks, at least sometimes, in the upper right. The recent Vol. 49, No. 2, of *OR/MS Today* focused on international O.R., especially in developing nations. It reinforced my impression that my O.R. colleagues are stuck in the lower-right quadrant of Table 1. The most pressing problems in the countries featured in 49(2) are complex and wicked, falling in the upper-right quadrant of Table 1. Yet the words “optimize” and “optimal” – implying the



kinds of quantitatively best solutions that wicked problems obstinately resist – appear more than 50 times (not counting ads and page headers) in the issue, and the issue's subtitle is actually "Optimizing Operations Worldwide."

Former U.S. Secretary of State George Schulz said, perceptively, that some problems can be solved and other problems can only be made less bad. Indeed, some hard O.R. techniques, such as genetic algorithms, can improve a situation but cannot be shown to optimize. One article in Vol. 49, No. 2, used system dynamics (SD), which is a systems technique respected in O.R. (my Ph.D. advisor sent me to introduce SD to General Motors in 1972) and capable of making valuable contributions to a problem dialogue – while not optimizing. It is one arena for reconnection between O.R. and TA/TF.

Can O.R. and MOT Be Brought Together Again?

British system theorist Gerald Midgley writes:

Practitioners must think seriously about how they can transform O.R. practice to better address the complexities of an increasingly interconnected world, where stakeholders with different priorities often collide. If O.R. practitioners fail in this regard, they will find themselves largely excluded from dealing with the most serious challenges in today's societies. [7]

To this end, Midgley and colleagues organized sessions on systems thinking at the conferences of The Operational Research Society. The sessions have proven popular.

Kozmetsky believed the end of the Cold War threatened to terminate America's technological initiative, having removed that initiative's main raison d'être. However, confronting the "most serious challenges in today's societies" forces consideration of technological change. Not least among these challenges is the current East-West tension engendered by a tragic war in Ukraine –

possibly signaling a return to the Cold War-type conditions that motivated INFORMS' predecessor organizations to focus on technology futures.

Like Hal Linstone, I was originally an O.R. guy, having studied under Abraham Charnes, another co-founder of TIMS. In the late 1980s, I shifted my focus to technology management at George Kozmetsky's request. This led to my succeeding Linstone as editor-in-chief of *Technological Forecasting & Social Change*. I've maintained my INFORMS membership through the years and so have an emotional as well as logical motive for urging a reconciliation of O.R. and technology assessment/forecasting (TA/TF). They need each other.

Let's bring O.R. and technology forecasting together again.

Acknowledgment

The author thanks Phil Beck for suggestions that improved this article.

FRED PHILLIPS (fred.phillips@stonybrook.edu) is a visiting professor at State University of New York, Stony Brook and president of the TANDO Institute. He is a Fellow of PICMET; the Russian Academy of Sciences' 2017 Kondratieff Laureate; and editor-in-chief emeritus of *Technological Forecasting & Social Change*. He now coordinates 75 of the late George Kozmetsky's advisors, via www.tando.org.

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10 PRINCIPLES

FOR CHANGING YOUR NAME AS A MID-CAREER ACADEMIC

BY LAURA A. ALBERT

THERE ARE SEVERAL REASONS THAT PROMPT A DECISION TO A potential name change, with marriage and divorce being the two most common reasons. I did both. I changed my name upon marriage when I was a graduate student and again after divorce as an associate professor. Others may consider a name change after gender transition, for religious reasons, to reclaim ethnic heritage, and for a variety of other reasons. Although changing one's name has some drawbacks, it also offers enormous benefits to the individual considering this choice.

Changing one's name is a personal decision. Additionally – and importantly – changing one's name is not a one-time event. It's a process. This article is about this process in academia, with examples from my personal experiences. My journey may not be right for everyone, but it is my hope that this article offers others reassurance that it is possible to manage a name change in academia, although the process is at times difficult.

Changing my name as a mid-career academic was not straightforward. This article exclusively focuses on my second name change when I returned to my birth surname, how I navigated this process and the factors that influenced my decisions.

Along the way, I learned 10 principles for changing one's name in academia. In addition to being useful for anyone interested in embarking on a name change, the principles may be of interest to those who work with, evaluate and create policy for academics undergoing name changes, particularly given the emotional and professional challenges that a name change entails.

Principle #1. You do not need to figure it out now.

Early in the divorce process and well before my name change, one of my friends in academia asked whether I was going to change my name professionally. I had used my married name during my entire professional career thus far. A new

name would obviously be a big change in my publication record and professional identity. I told this friend that I had given it some thought and planned to change my (then) married name of “Laura A. McLay” to a hybrid name of “Laura Albert McLay,” with my birth surname of “Albert” as my middle name. Both my middle initial and my birth surname start with the letter “A,” so to many it would simply look like I was spelling out a middle name. When asked whether I was going to use this name for the rest of my career, I said that was a likely possibility. But I wasn’t certain. I only knew where I needed to begin.

Principle #2. You can set your own timeline.

I started the 2015-2016 academic year with divorce proceedings underway. It was a contested divorce, and I did not know when the divorce would become official. I felt uneasy about changing my name in the middle of the academic year because that could invite unwanted questions. I decided to set my own timeline by preemptively changing my name in professional circles before the academic year. At that time, I began using “Laura Albert McLay” professionally by updating my email, website, and curriculum vitae (CV) to this – even though my name had not legally changed at this time. I reasoned that changing my name between academic years would give me a consistent name for the entire year, which would not require students to adapt to a new name.

Principle #3. You do not have to immediately change your name legally when you have a life event such as a marriage or divorce.

The divorce resulted in a court order that enabled me to easily change my name in the following two years. There is wisdom in this choice. The law in my state recognizes that changing one’s name is a big decision and allows ample time to make this decision, potentially separating the time of the life event prompting the consideration of a name change from the time of the actual name change by years.

I anticipated that I would take months to decide whether to legally change my name back to my birth name. But the day after I received a certified copy of the divorce decree required for a name change, I went to the Social Security Administration office and legally changed my name to my birth name of Laura Albert. I was ready, and it felt right.

Principle #4. You do not have to change your name professionally when your name changes legally.

I changed my legal name in the middle of the academic year. Doing so was part of reclaiming myself after a divorce, and that part felt great. At that same time, I was not yet ready to change my professional name, because changing my professional name is a decision that, in my mind, carried a lot of risk. I was already well known by my married name and

was afraid of losing recognition and having awkward encounters with colleagues and acquaintances inquiring about a name change. As a result, I continued to use my hybrid name of Laura Albert McLay, combining my married and birth surnames, as my professional name for the rest of the academic year and the year that followed.

Managing two names and two identities eventually took its toll, and I desired simplicity. A year and a half later, I decided to change the name I use professionally to my legal name of Laura Albert. The time gap in making this decision gave me the confidence that the risk from changing my name was low. During this time, I transitioned to my “new” legal name in my personal life and was able to see how others adapted. Likewise, I went through a smaller transition with my professional name change (from Laura McLay to Laura Albert McLay) and encountered almost no invasive questions from colleagues.

I can affirm that there is no timeline for when to make these changes. It was a process, and I went through the process at a pace that felt right to me. It’s worth pointing out that this process did not match what I had anticipated when I set out on this journey (see Principle #1).

Principle #5. Updating your CV and Twitter username is the easy part.

The easy part was changing my CV and social media profiles. My legal name is at the top of my CV, and my former name is under it in smaller font. I changed my name before scientific publishing organizations adopted processes to support name change requests, so my publications are under two different names. The list of publications on my CV required some editing to make it clear that I am an author on each paper listed. I printed my names in boldface font in each of my publications to make it clear that I am an author.

A name change required that I change my Twitter username, since my username was literally my married name. Twitter and other social media accounts allowed me to easily change my username. I then created a second Twitter account with my old username to point others to my new Twitter username. Other social media accounts were likewise simple to change.

Principle #6. Updating your scholarly publishing profiles is straightforward.

The tools we use in academia to measure research impact rely on aggregating data according to name. As a result, I was concerned that others would find it hard to evaluate my research impact. Computing an “h-index,” for example, might be nontrivial if the systems used to do so assume that I have published under one name, which in turn could underestimate my research impact.

In retrospect, this was a nonissue. Google Scholar allows users to add publications to their accounts under any name. I was able to easily update my names

on Google Scholar, ResearchGate, SCOPUS and ORCID, where I manually added publications across both names and merged author names associated with my publications. I added links to my Google Scholar page, ResearchGate account, ORCID page and SCOPUS author page and to my CV and website so anyone looking at them could find my entire list of publications.

It’s worth noting that these issues apply to everyone, not just those changing their name. Anyone’s name can appear in different ways across different publications. SCOPUS, for example, merges the names for a single author to compute an h-index. This can be an error-prone process for any author, and as a result, it’s valuable for everyone to keep track of their publication impact because it is very easy for these systems to miss a few publications or to add publications by someone else with a similar name.

Principle #7. Universities may not respect your timeline.

I managed two names – a legal name and a professional name – for two years. When I changed my legal name to “Laura Albert” in the middle of the academic year, this instantly updated my name on various university accounts in the middle of the academic year. I understood that internal accounts such as the payroll database required my legal name.

At the time, I was not yet ready to switch my professional name to my legal name on outward-facing accounts such as email and the course management system profile (see Principle #2). My name in these outward-facing accounts was changed to my legal name according to university policy, which requires names to be consistently specified across all university software accounts and profiles. The policy requires faculty, staff and students to use their legal surname on all software profiles, only allowing changes to first and middle names.

This policy is inconsistent with Principle #4 by not allowing a legal name change to be made at a separate time from that of a professional name change. Although this would have been an issue for anyone changing their name for any reason, the policy itself felt patronizing and disempowering.

Moreover, the implementation of the policy left a lot to be desired. The preferred name I specified in my university account was either not used by some information technology (IT) systems or truncated by others, resulting in various not-preferred names appearing in course catalogs, the online course management system, teaching evaluations and emails to clients.

Despite university policy, I was able to manage my online presence according to my process (see Principles #5 and #6). My department administrator displayed my name on the department and college websites the way I desired, and my department’s IT administrator helped me create email aliases with my old and new names to make the transition seamless and on my timeline.

Principle #8. IT systems are a nightmare.

Changing my name, email and profile in various internet accounts was hands down the most time-consuming part of the name change process, with social media being the exception (see Principle #5). IT systems are not uniformly designed to accommodate name changes or email changes that reflect name changes. Sometimes, old names and emails would show up even after I updated my name and email, because these accounts sometimes pulled my name and email from shadow databases. I still have not fixed all of these issues five years later. A few web accounts use an email as a login and did not allow me to change my email without having to create a new account.

Others required me to make phone calls to talk to a customer service agent to make the change and fax a copy of my divorce decree for verification. The divorce decree included many details about my divorce, such as my financial assets and where my children would spend holidays, which felt like an invasion of privacy.

Principle #9. Your colleagues are a class act.

I announced my name change on Twitter and in a blog post, and I introduced a new Twitter username matching my name. I received an overwhelmingly positive response. When I decided to change my name, I was most concerned with my academic reputation and wanted to ensure that my colleagues could find and recognize me.

Five years in, I can say with confidence that my colleagues adjusted to my new name, had no trouble figuring out that my name had changed, and can find me online. I expected my colleagues to do their best in adapting to calling me by a new name. I also expected to be accidentally called by my old name for years to come. But it didn’t happen. The transition happened quickly, with my colleagues adapting at once.

Almost no one asked invasive questions about why I had changed my name, although a few congratulated me, incorrectly believing that I had gotten married. My name change was a monumental decision that consumed my time and energy for a long period of time. It was a relief to have colleagues react as if it were not a big deal.

Principle #10. Being who you want to be is underrated.

The importance of one’s name should not be taken for granted. Changing my professional name was a two-year journey. When I changed my name, I started a new chapter in my life, and I have been much happier.

I was promoted to full professor two years after I changed my name professionally. The promotion committee was presumably able to compute my h-index and assess my achievements. Regardless of the promotion, changing my name according to these 10 principles was entirely worth it.

We face many difficult journeys during our academic careers. The process of changing one's name should not be one of them.

In the past few years, I have reflected on this process. We face many difficult journeys during our academic careers. The process of changing one's name should not be one of them. Those who read this article may identify ways to lighten the load for others who may undertake this journey. Many obstacles can be removed by creating better software design and allowing users to have more discretion in managing their profiles and email accounts. Three possible policies could include (1) adopting generous criteria regarding when and how email aliases can be created, (2) adding entries for former names to software programs used by the university, and (3) allowing for flexibility in the timing of a name change in software program profiles. When issues with software inevitably arise, a single point of contact who oversees name changes at the university may serve as an avenue for support and ensure a smoother implementation of university policy as compared with whomever is on call at the IT help desk. I am heartened by recently adopted inclusive policies by U.S. national laboratories and publishers [1] to allow authors to change their name to claim authorship on publications from earlier in their career. Similarly, many videoconference tools, such as Zoom, allow users to specify their pronouns alongside their names, thereby giving users more control over their names and identities. These are steps in the right direction.

I would be remiss if I did not mention that the burden associated with name changes is almost exclusively born by women and transgender individuals. The burden is real. I managed two names and two identities for two years – a legal

name and a professional name – which was time-consuming and emotionally draining. I mentally prepared for invasive questions before attending conferences or traveling to other universities, even though these questions rarely materialized. Likewise, the hours I spent researching what a name change would look like, how to ensure my h-index could be accurately computed, and changing my name and email associated with a large number of web accounts is time that I would have preferred to spend with my family or on scholarship.

Although I would characterize the process of changing one's name as difficult but doable, I acknowledge that the path may be more difficult for others. Many may be more accepting of a name change due to a divorce than for marriage, since many in academia view name changes as optional for women getting married, and for transgender individuals who change their names.

While the process of changing my name was trying at times, I learned that having the name I want is important to my identity. Changing my name was a worthwhile endeavor, and I am glad I did it. My hope is that these 10 principles help others have similarly fulfilling-name change journeys.

LAURA A. ALBERT is a professor and the David H. Gustafson Chair of Industrial and Systems Engineering at the University of Wisconsin-Madison and is the 2022 INFORMS President-Elect. She is the author of the blog Punk Rock Operations Research. You can find her on Twitter at @lauraalbertphd.

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What's Your StORy?

Zohar Strinka



Data Practice Lead, North Labs and Principal Consultant of Analytics Strategies LLC INFORMS member since 2010



Tell us how you got into the field.

I took my first operations research course in undergrad during my junior year. Up to that point, I was double majoring in physics and industrial engineering, but I hadn't quite figured out what I wanted to do with those skills. When I got into that first class with Jean Phillippe Richard (then at Purdue University), I immediately recognized the O.R. framework as how I thought about the world naturally. You think about the goals, and you think about your constraints. That didn't really make the class easy, as any of my classmates could tell you. But it did really feel like a perfect match to how I saw the world.



How has your involvement with WORMS impacted your career/personal life?

WORMS was great during graduate school because it helped me find a smaller group within INFORMS, which is otherwise a huge organization. If anyone reading this is a member of INFORMS but has not tried to get involved in a section or forum, please look at your options either now or next time you are renewing your membership. Being involved in WORMS was very helpful because I got to meet not just other students or people in my focus area, but a cross section of INFORMS members. I also signed up to get mentorship, and talking to more senior people in industry helped me figure out some of my priorities and goals. More recently, I have also been active in the Practice Section, which has been incredibly valuable as I continue down the practitioner path.

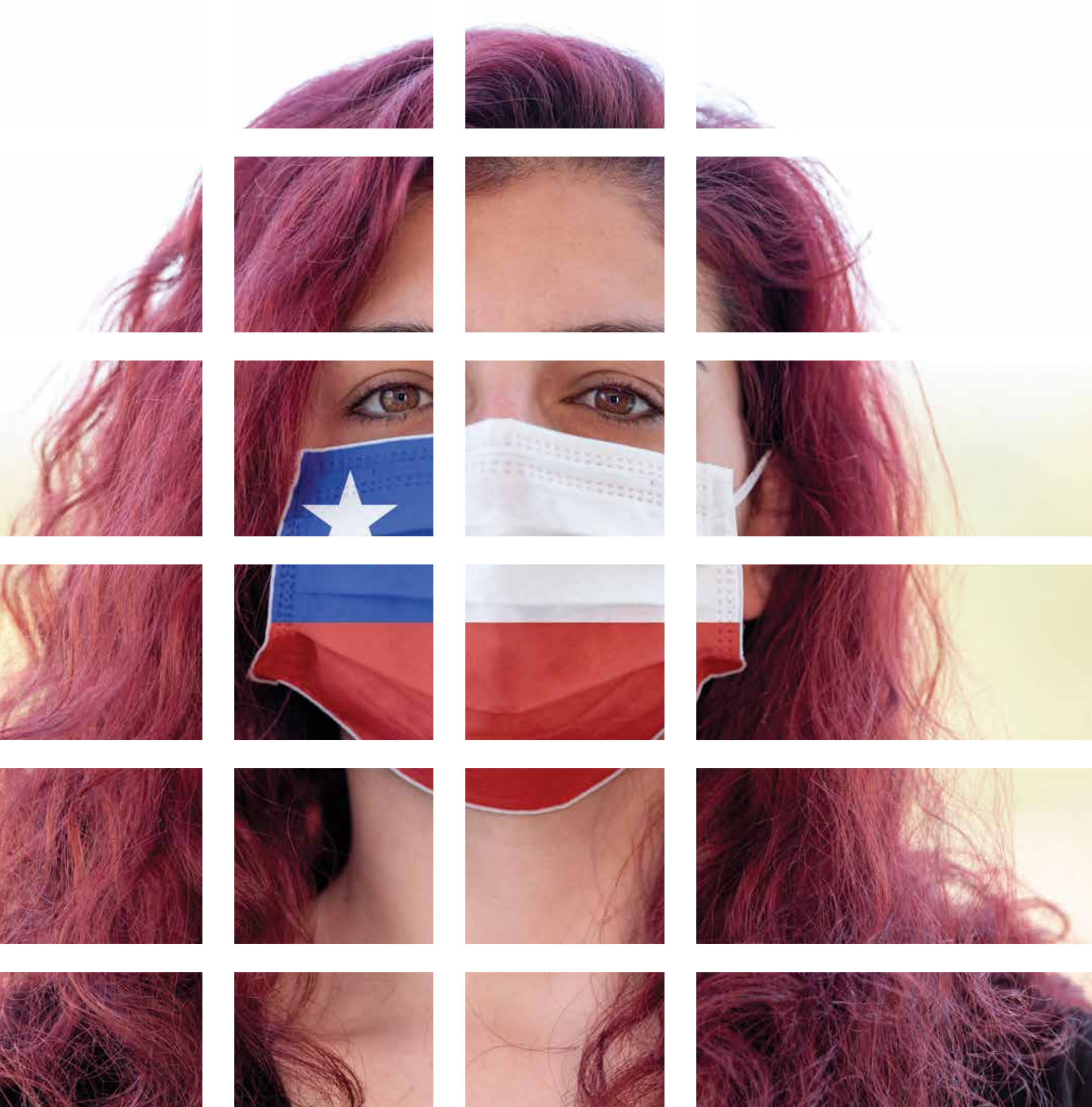


Tell us a funny math joke.

Did you hear about the mathematician who was scared of negative numbers? They would stop at nothing to avoid them.

Go to ormstoday.informs.org to read the full interview and watch the video for bonus questions!





THE STORY OF CHILE AND ANALYTICS

What bringing *home* the 2022 Franz Edelman Award meant after two years of unpredictable and turbulent times amid COVID-19 in Chile

BY KARA TUCKER

FOR ANYONE IN ATTENDANCE AT THE EDELMAN GALA DURING the 2022 INFORMS Business Analytics Conference in Houston in April, the announcement of the 2022 Edelman Award winner was an emotional one. The Chile team members yelled with joy (startling 2022 INFORMS President Radhika Kulkarni in the most memorable way), cheered with adulation or were mute with an unbelievable weight falling off their shoulders. Having been in the room, I can attest to feeling each of these emotions along with them – I even teared up a bit. The team’s excitement and humble gratitude was intensely palpable – you could tell winning the Edelman Award meant so much more than anyone could realize. Something else you might not realize is that this was actually the second time Chile won the Edelman Award; the first time was in 1998 when Bosques Arauco, led by Andres Weintraub, Rafael Epstein, Ramiro Morales and Jorge Seron, won for their project, “Use of O.R. Systems in the Chilean Forest Industries” [1]. And so begins the story of Chile, analytics and the Edelman Award.

The First Win

Since 1988, to compete in the world market, the main Chilean forest firms started implementing operations research (O.R.) models developed jointly with academics from Universidad de Chile. These models supported decisions

on daily truck scheduling, short-term harvesting, location of harvesting machinery and access roads, and medium- and long-term forest planning. The Edelman-winning team used simulation, linear programming (LP) with column generation, mixed-integer LP formulations and heuristic method approaches to solve these complex problems. As of the 1998 win, the systems led to a change in organizational decision-making and estimated gains of at least USD \$20 million per year.

These systems had a huge impact in Chile and were exported to other countries such as Brazil and South Africa. According to Andres Weintraub, winning the 1998 Edelman Award was a very important event at a time when communications were mainly by mail and Chile had just started being involved with the international research world. The award-winning work has evolved since then, incorporating new technologies and still being used as vital tools in current planning in leading firms including Arauco and CMPC. The visibility of winning the Edelman Award opened doors that led to working with different industries, including mining, salmon farming, shipping, sports scheduling and large-scale public auctions. The work with the shipping industry was a finalist in the 2011 Edelman Competition, and sports scheduling in 2016.

“Most importantly,” Weintraub says, “students and young researchers could see how O.R. and analytics can have a significant impact on firms and society, and that from Chile we could do frontier work. We were enthusiastic and proud to see that the new generation of researchers in our group won the 2022 Edelman Award, with superb work supporting essential decisions to fight COVID-19 in Chile.”

At the time of his team’s win, Weintraub was a professor in the Department of Industrial Engineering at the Universidad de Chile. Leonardo Basso, who led the 26-person 2022 Edelman-winning team, is currently a professor at Universidad de Chile in the Civil Engineering Department and director of the Instituto Sistemas Complejos de Ingeniería (ISCI), a position he took over from Weintraub. Rafael Epstein was the M.Sc. thesis advisor to Marcelo Olivares, Denis Sauré and Marcel Goic of the 2022 winning team. Gabriel Weintraub was also part of the new team, son of Andres (on another note, the first time a father and son won a pair of Edelman Awards).

There is clearly a legacy connecting the Edelman Award and Chile, and it simply shows their passion for and belief in applying analytics to make the world – and in this case, their home – a better, safer place. There is also a proven connection now between the two Edelman Award wins and the use of industry-academia collaboration to make an impact.

March 2020

When the COVID-19 crisis became pandemic status in March 2020, Basso and his team at ISCI realized right away that they could and therefore needed to help, and they needed to use analytics to do it. As the analytics team began to work, they realized it was imperative to convince the public sector that they had useful analytics tools that could help. They tried to gather people from the government, frontline healthcare workers and medical professionals to ask, “How can we help?” After several weeks of reaching out, Basso finally sent a last-ditch 3 a.m. WhatsApp message to an undersecretary, who responded that he and his team could have 15 minutes the following

day to state their case. Basso and team put together a three-slide presentation, spoke for 15 minutes, and was given another 15 minutes the following day. After that, the Chilean Ministries of Health and Sciences decided to give it a go with ISCI and the Universidad de Chile, and thus, a groundbreaking collaboration was born. The interdisciplinary team also partnered with telecom company Entel to solve the myriad problems arising from COVID-19, including infection spread and death, hospital bed allocation and more.

More specifically, the Chile team worked on improving the pandemic response in their home country by providing guidance on contagion prevention, vaccination, central management of ICU beds, mobility, testing and active screening, and serology surveillance. Operations research and analytics played a crucial role, but what proved to be even more crucial was the public-private partnership. Part of what made this Edelman team stand out was proving the possibility of an interdisciplinary and institutional collaboration focusing on national needs in a timely and positive manner.

When asked about why the Chile team stood out among the six Edelman finalists, Manoj Chari, assistant professor of business analytics at Elon University and 2022 Edelman Competition judge, said:

The Edelman Award is very much about innovation, successful implementation and impact. What was significantly different about Chile was that it was a monumental implementation effort. Each subproject within the larger project had a different analytical problem that needed to be solved with rapid innovation, had a unique set of implementation details and required cooperation of different combinations of stakeholders from the central and local governments, the private sector, civil society and finally the general population. The public health benefits of the project would not have been realized without the team’s success in convincing such a diverse population of the goals of these projects, and keeping them engaged and on task throughout the implementation, especially given the urgency and environment of fear and uncertainty caused by the pandemic. This required open communication of the goals and ongoing dissemination of concrete, accessible information that tracked the progress on these goals. Doing all this on a nationwide scale, even for a medium-sized country, was a remarkable effort.

Even more surprising, he said, is “the fact that evidence-based approaches formulated by a team of scientists and engineers were able to influence and guide the policies of a government of a center-right political persuasion, and work collaboratively for the larger good of the nation and society.”

2022 EDELMAN AWARD FINALISTS

As a first-time Edelman finalist, Leonardo Basso couldn’t help but be extremely impressed with the other five competitors. “The projects were massive,” he said, “When you think about it, it is the [culmination of] the work of a lot of very intelligent people over five or seven years. It’s very impressive.”

The additional finalists included:

- Alibaba for “Integrated Forecast, Inventory, Price Optimization and Recommendation Has Reduced Millions in Inventory and Shrinkage Cost and Sustained Revenue Increase for Alibaba Retail Businesses”
- General Motors for “Vehicle Content Optimization at General Motors”
- Janssen Pharmaceutical Companies of Johnson & Johnson (Janssen) for “Data-driven COVID-19 Vaccine Development for Janssen”
- Merck Animal Health for “Operations Research Improves Biomanufacturing Efficiency at MSD Animal Health”
- U.S. Census Bureau for “Optimization and Routing for the 2020 Decennial Census”

In a similar sentiment, Andrés Couve, former Chilean Minister of Science, Technology, Innovations and Knowledge, said that winning the Edelman Award “shows the importance of investing in science, innovation and technology, and that a small and far away country can produce world-class, world-changing science.”

Paula Daza, former undersecretary of public health, also said, “The whole country had one objective: contain the pandemic. Everyone was working toward one goal, and that was the main point.” She went on to note, “These [analytics] innovations have been used in key decision aspects that helped with the three pillars of the Chilean strategy against the virus: contagion prevention (mobility and testing), centralized management of critical ICU beds and vaccination.”

The Chilean Strategy

To get even a small glimpse of what it was like conducting this lifesaving work against COVID-19 during the pandemic, Basso offered an image of team members working with babies in their laps, running prediction models for ICU planning at 2 a.m. and taking the results to the Minister of Science at 3 a.m. so that they would be ready for review by the President and the Ministry of Health by 7 a.m. “It was crazy,” Basso said, “it was really a lot of work and it was very hard on our families.”



Part of what made this Edelman team stand out was proving the possibility of an interdisciplinary and institutional collaboration focusing on national needs in a timely and positive manner.

According to Basso, it was a huge commitment from the entire team. There were 20-some students working up to 16-hour days, some who put their studies aside to help. He couldn't even count how many hours his team worked each day. The people at the ministries were working on the project in addition to their regular day-to-day job tasks. "And we did this without knowing each other," confirmed Basso.

Here's what they worked on.

ICU Allocation. Throughout the COVID-19 pandemic, hospitals became one centralized system – at the most critical times – and a detailed forecast of beds needed in each region of the country was a necessity for ICU capacity planning, which quickly became the first order of concern for the analytics team. To prepare forecasts, Goic explained, the team studied inbound and outbound flows of patients: symptomatic cases, the number in need of beds and the number discharged. The first compartment model proved to be useful yet insufficient: The system for generating data was under constant stress and in need of continuous learning due to the novelty of COVID-19, and medical teams were also still learning to deal with critical cases. To accommodate these changes, the team ran autoregressive and machine learning models in addition to the compartment model and assembled them to implement the forecasting system that resulted in bed capacity in even the most congested regions of Chile. Forecasts were run every two days for the entire duration of the hospital crisis, resulting in approximately 850 fewer deaths.

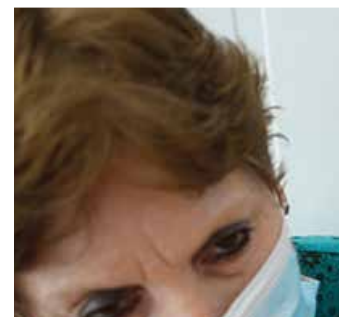
Mobility. When school closures were mandated and localized lockdowns began in late March 2020, COVID-19 cases were quickly growing in lower-income areas, and the lockdowns were too late to contain outbreaks. Marcelo Oliveres, researcher at ISCI, said the team needed to quickly evaluate the effectiveness of lockdowns and use mobility data to anticipate outbreaks. ISCI started with mobility data from Google, which turned out not to be an adequate strategy because the data was not granular enough and there were no details of transmission between areas; data on outbreaks in one area was not enough. At this point, Entel allied with ISCI to study and understand mobility during a pandemic. The results allowed the team to transform data from mobile phones into a territorial dashboard and provided the foundation to build additional initiatives with the Ministries of Health and Science.

The team mapped movements to construct an origin matrix and implemented data aggregation to provide transparency to individuals on a publicly available platform, which became a useful tool. Paola Pontoni, Health Emergencies Director of Ministry of Health, explained that this information was valuable to plan for lockdowns and assess their effectiveness.

The platform also contributed to other public policies developed in Chile during the pandemic, all data was made publicly available, and reports gathered impressive amounts of attention from the press, including more than 25 interviews on national television.

Testing. Analytics was used to increase testing capacity in Chile – in particular, through group/pool testing. Denis Sauré from ISCI explained how the team took this from theory to practice and piloted COVID-19 testing at a long-term care facilities, ultimately diagnosing people at a lower cost. Group testing accounted for 20% of the total testing in Chile, a 50% increase in testing capacity and \$90 million in savings. At the time, Chile was playing defense against COVID-19 cases, and it was time to switch to offense by searching for cases – especially asymptomatic cases. The team began placing PCR testing stations in public spaces. The system was built around an active screen index called the BAC index – which stands for Active Case Search in Spanish – weighting estimated positivity calculated from case density of the area from which the positive patient came as well as mobility data. The index studied how the disease moved in territories; it was not enough to simply know where positive cases were or came from – the movement had to be studied. This data was provided to teams on the ground in the form of heat maps to help them better choose the locations to conduct testing in the public space. The information was also integrated into the Ministry of Health surveillance platform. The BAC index became a key component in active case screening, and the heat maps helped pinpoint and prioritize areas in need of testing, identify case clusters and possible outbreaks, and finally project future cases.

Serology Surveillance. In all areas, the COVID-19 vaccine rollout was essential to contain the pandemic, but vaccine supply in Chile was uncertain. The country did not have much access to mRNA vaccines and thus, decided to combine the use of vaccines with different technologies to speed up the process. This led to substantial use of the Sinovac (CoronaVac) vaccine, which was used to inoculate 75% of the Chilean population. Because this vaccination strategy was novel, the team could not use international data to study its effectiveness. Miguel O'Ryan and Juan Pablo Torres (Faculty of Medicine, Universidad de Chile) and a team of engineers from ISCI had to monitor Sinovac. Testing station selection was done with integer programming and mobility data to provide population representation. Results were pivotal to show that the strategy worked: A potent immune response was achieved, but it also showed early evidence to determine a third dose was needed for Sinovac. The national strategy led to 29,000 fewer infections and 1,000 fewer deaths – another incredible outcome of the unlikely collaboration.



What's next in Chile?

As noted, the success of the project was mainly due to the national public-private partnership of a team that created reliable systems in record time to break a raging pandemic. These systems can now be used for other diseases or future pandemics and be relevant to a diverse set of research applications. In fact, the project led to at least five publications in outlets such as *INFORMS' Management Science* and *The Lancet Infectious Diseases*.

The team used cutting-edge science in the fields of O.R. and analytics. Gabriel Weintraub, professor of operations, information and technology, is now using this top-notch research with real-world application in a course at Stanford University.

According to Daza, all of these efforts can be used in subsequent stages of the COVID-19 pandemic and the evidence-based decision-making can be used in future public policy or health emergencies.

Chile can be an example to the world of how science can be leveraged to inform and help mold public policy. The relationship between government and academia brought O.R. to the forefront. Even the president of Chile, Gabriel Boric, noted the importance of this team's collaboration, remarking, "This government will be at the service of science!"

Current Minister of Health, Begoña Yarza, said, "We are very proud that this work in Chile has received this prestigious award. Our administration is just starting, and we are enthusiastic to continue collaborating and using analytics to support decision-making in other public health challenges." Finally, Antonio Moreno, managing director of Entel Ocean, emphasized "how fruitful the joint work of academia, government and a private sector willing to innovate was, and may be in the future."

Although he knew that the work he and his team were doing was important in the moment, the impact became clear much later to Basso. "It was only when we applied for the Edelman Award that we were pushed to calculate the impact of our work. We didn't see it before. Not only because of money [saved] ... it's 3,000 lives, it's impressive. It really hit us at that time, when we saw these numbers."

All in all, the team, its project and use of analytics made a sizeable impact on many aspects, saving \$207 million and nearly 3,000 lives. It's a good time to be Chilean (except for La Roja fans). Don't worry, there's an Edelman trophy to hoist.

KARA TUCKER is editor of *OR/MS Today* and *Analytics* magazines.

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DATA SCIENCE, BUT MAKE IT FASHION

Stitch Fix algorithms use operations research to personalize your style

BY CARL MORRIS



STITCH FIX IS AN ONLINE PERSONAL shopping and styling service for women, men and kids that delivers one-to-one personalization to help customers discover and buy what they love. Stitch Fix is changing the way people find clothes they love by combining technology with the personal touch of seasoned style experts. To do this, we leverage operations research (O.R.) and machine learning (ML) to provide styling services personalized through a combination of algorithms and expert stylists. Operations research provides a critical role in the client experience, enabling them to receive high-quality and timely service. Stitch Fix clients have two primary ways to shop: The first is through a Fix, which is a selection of five items curated by our expert stylists and sent directly to your door. The second is through Freestyle, your own personal shopping feed, where you can buy what you want when you want from a personalized feed that has items curated just for you. Our algorithms teams are foundational to Stitch Fix's human-first approach because they blend cutting-edge machine learning technology with expert stylists to recommend outfits and items and even build a complete styling box. Our data scientists build end-to-end ML and O.R. technologies to improve the client experience – from recommended items your stylist puts in your Fix or personal Freestyle shop to what items our buyers purchase for our inventory and even the items that are included in emails sent to clients. New Stitch Fix clients fill out a complete style profile by answering a carefully curated series of questions that form the foundation for a wide array of ML models.

How the Algorithms Work for You

Once a new client creates a style profile, they can choose to either browse a selection of algorithm- and stylist-curated outfits and items in Freestyle or schedule a Fix consisting of five items (10 for kids). The data journey for a five-item Fix begins when the client requests a date for their Fix to arrive. The calendar of available dates is maintained by algorithms that ensure overall demand and shipping capacity are matched. An optimization algorithm selects a warehouse to fulfill the order to minimize transportation costs while balancing warehouse capacity. Depending on a variety of factors, the right combination of algorithms and stylists curate a set of 10 items for the client to review and select up to five items to ship in their Fix. Once the client preview is complete, if the client selected fewer than five items, the task of selecting the remaining items (to total five) is routed to a stylist via a client-stylist assignment optimization that balances client-stylist stylistic affinity and relationships with on-time delivery. Once the items are finalized, a batching and pick-pathing model will optimize the shipments at the warehouses to begin picking the order so that it will be complete when the time to ship arrives and the order can be efficiently picked. Once picked, a carrier is selected to ensure on-time delivery, and

the box is shipped to the client. The client keeps desired items and returns the remaining items that are then made available to other clients. Each of these processes are supported by O.R. models that optimize a balance of client experience, quality of service, efficient operations and on-time delivery.

Many different teams of data scientists work together to build end-to-end systems to support this process. Unlike some technology companies, Stitch Fix does not hand off models to engineering teams; the data scientists own the models and systems serving their recommendations. Thanks to a breadth of platform technologies, the skills required to run production ML and O.R. models are quickly developed by newly onboarded scientists at Stitch Fix [1]. This data science strategy improves the pace of innovation at Stitch Fix, avoiding the wait time to get on another team's road map, and ensures a more consistent vision from ideation through development and maintenance [2]. Instead, the data scientist works closely with business and engineering partners to inform Stitch Fix strategy and ensure the best client experience.

Case Study in Stylist-Client Assignment Optimization

Stitch Fix stylists spend their time working on a variety of tasks to fulfill a client's Fix. Which client a stylist will work with next is recommended by our Stylist-Client Assignment Optimization model. This model has evolved through many iterations designed to improve both operational efficiency and the client's experience. At its most basic level, the system ensures the client's needs are surfaced to stylists' in a timely manner so that shipments can be delivered on time. However, we layer even more algorithms and models into the process to improve the client experience: Data scientists leverage a client's latent style, a set of numbers that encodes a client's style preferences [3], in the assignment process. The algorithm matches the client's request with a stylist who has a similar latent style. Once a client receives and decides what to keep from their Fix, the client may request to have their next Fix styled by the same stylist in the future. Our model respects these requests to maintain and build the relationship between a client and their preferred stylist. We also model good Fix outcomes and recommend a client-stylist relationship be made. These relationship matches allow the model to optimize beyond short-term outcomes to provide the best long-term experience for the client.

Originally, there was only one kind of styling work: the five-item Fix. In the past year, an extra preview step was added during which clients have the opportunity to select up to five items from a 10-item set of personalized styles. As the kinds of work grew, ad hoc additions to the existing optimization became unwieldy, and the data scientists of the Styling Operations Algorithms team decided to rebuild the optimization from the ground

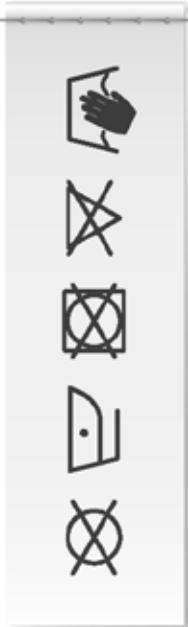
up. At its core, the optimization resembles a simple assignment problem [4]. Accounting for the varying times required to complete different kinds of work and accommodating each stylist's schedule quickly turns the optimization into a multiple-knapsack problem, which becomes prohibitively complex as the size of the problem grows (NP-hard, in the language of complexity theory) [5]. Therefore, optimally solving these assignments is very difficult. This is before we even take into consideration scheduling nuances, such as whether it is better to style a client's request today or tomorrow.

The team resolved to tackle this problem pragmatically. Stylists work throughout the day, providing an opportunity for them to update the recommendations in real time to adapt to what is actually happening in styling operations. This naturally leads to an iterative optimization algorithm based on local search heuristics that allow us to update our assignments, taking into account previous assignments and new work arriving throughout the day. This sort of agile solution is well supported by Stitch Fix's ownership model. The data science team owns not only the optimization model but also the data pipelines and service layer leveraged by engineering partners for integrating these recommendations into the stylist workflows. This ownership allows the data scientists to make holistic trade-offs in designing the end-to-end system to ensure the right data is available for these models and the model runs frequently enough to ensure recommendations are responsive to real-time operations. The system was rolled out in April 2022, and by re-architecting the service layer, we've seen reliability improve from 99% to 99.99% availability and a nearly 50% improvement in latency. Improvements to client outcomes will take longer to discover, and a full road map is in place of improvements leveraging the new model architecture.

Ensuring an Excellent Client Experience in the Face of Scarce Inventory

Because of our business model, Stitch Fix has some unique operational challenges. A significant portion of our inventory is being trialed by clients as part of their Fix shipments of 5- or 10-item previews. Even for a happy client, not all items may suit their needs, and many items will be returned and soon sent out to a new client. During this period when inventory is out with a client, it may appear out of stock for future clients. Therefore, it is especially important that we ensure the most suitable items are shared with our clients, and must account for the relative scarcity of some items. This raises the issue of how to go beyond the typical recommendation engine that suggests which item is a good pick for clients and build a system that is sensitive to both inventory availability and an active client base.

Stitch Fix uncovered this issue when some new items significantly underperformed against expectations. One of our data scientists dug deep





into the issue and observed that these new items were sent to a client and returned multiple times, and the hypothesis was made that items that were expected to suit a specific type of client were being sent to other types of clients. This happened in part because the recommendation engines and stylists were not aware of how scarce an item was when offering it to a client. Through a collaborative effort, we took a holistic view of our inventory and client base, which enabled the data scientist to build a new model on top of the recommendation engine.

To better understand the problem, let's take an example of two styles and two clients, Sarah and Mary. The first style, a red dress, may be best suited for both clients, but significantly better for Mary than for Sarah. Ideally, both Sarah and Mary can receive a red dress, but if there's only a single red dress in inventory, then a greedy algorithmic approach may accidentally give the red dress to Sarah when it is better holistically to give it to Mary. Ensuring Mary receives the red dress when inventory is scarce can be accomplished by reserving it for her and offering alternative styles of similar quality to Sarah. This process in general means that we aim to reserve the scarce styles for the clients who most need them, rather than sending them to clients with other, equally good options. To reach this solution, the scientist looked to solve the hypothetical problem of how best to match our on-hand inventory with our entire client base. The resulting model solves a large linear program and extracts shadow prices from the optimal dual solution to infer which items are scarce and best suited for a particular client. This ensures that items uniquely valuable to a subset of clients end up with those clients, whereas other clients receive acceptable substitutes.

Wealth of Opportunities and More to Come

The two efforts discussed so far, client-stylist assignment and inventory-aware recommendations, are examples of the innovative ways that Stitch

Fix leverages operations research to improve the client experience. These innovations have several follow-on benefits. For example, the shadow prices from the inventory-aware recommendations have enabled Stitch Fix to learn and explore what types of inventory would best serve our existing clients, leading to innovation in the buying optimization models. Similarly, we can identify what kinds of clients would be best served by our current inventory if we could find more clients like them.

The unique data science culture at Stitch Fix is a key driver of its innovation. What sets our teams apart is that each data scientist is empowered and encouraged to leverage their expertise and dive deep into problems and opportunities. Because they play a central role in the organization and have a seat at the table with their cross-functional partners, data scientists make key decisions around what needs to be built and how it should be done. This ensures that our business cultivates a unique blend of O.R., ML and human expertise as Stitch Fix continues to grow and expand its offerings.

Stitch Fix has built a uniquely personalized shopping experience with both its Freestyle and Fix offerings. In our operations today, we leverage both client and stylist latent styles to better personalize stylists' work to improve the client experience. We've also blended classic inventory allocation models with recommendation models to provide an inventory-aware recommendation policy. This central focus on personalization is essential to the way Stitch Fix delights its customers. In operations, the aim goes beyond cost minimization and service levels to a personalized approach delivering to the client's needs – from assigning shipments to warehouses to the way emails are personalized based on style preferences. These are operations research questions with a long history to which Stitch Fix intends to add a different perspective in the near future.

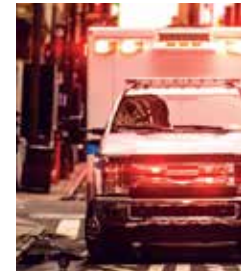
CARL MORRIS is a data scientist in the Operations Algorithms team at Stitch Fix. He is a member of INFORMS.

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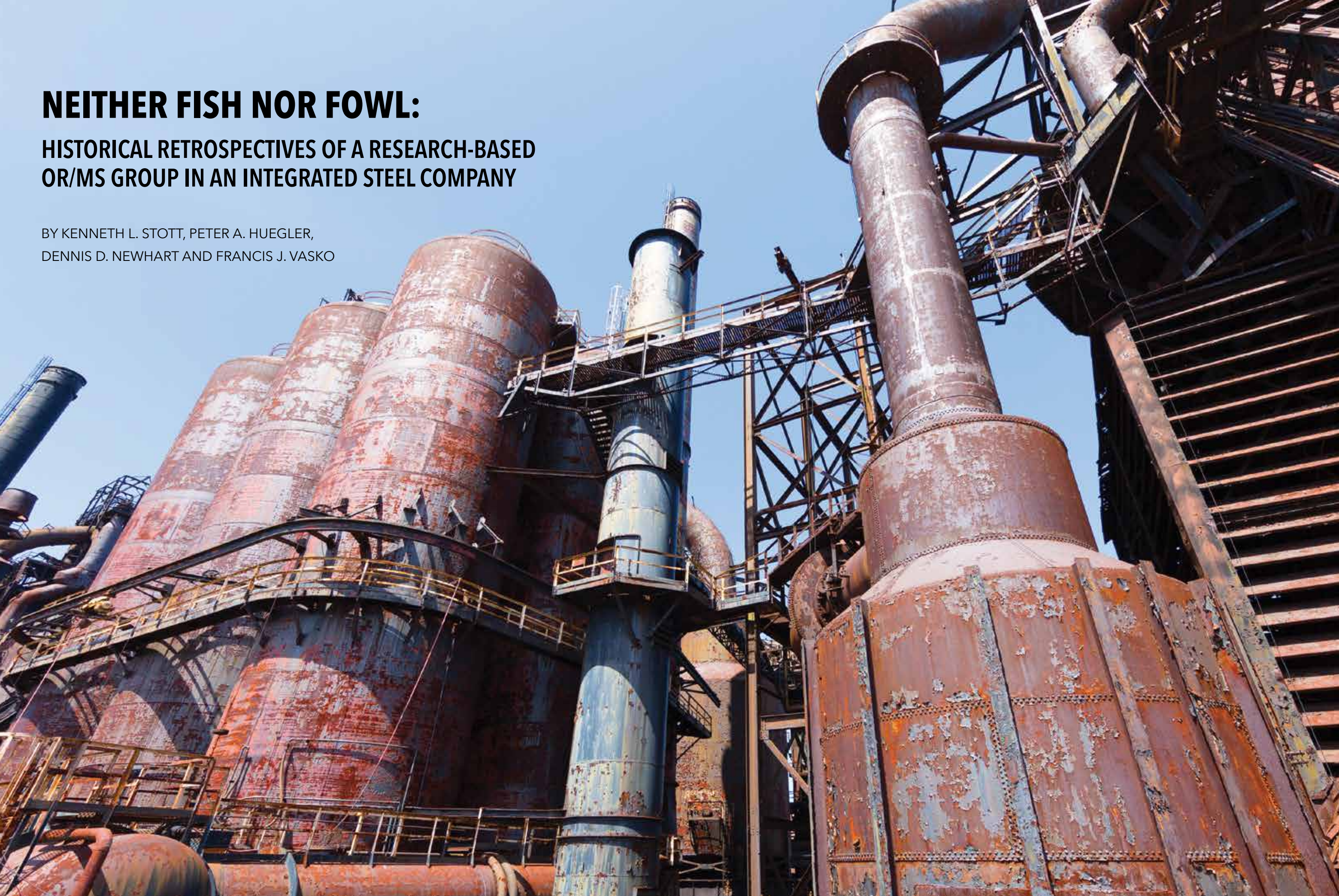
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NEITHER FISH NOR FOWL:

HISTORICAL RETROSPECTIVES OF A RESEARCH-BASED OR/MS GROUP IN AN INTEGRATED STEEL COMPANY

BY KENNETH L. STOTT, PETER A. HUEGLER,
DENNIS D. NEWHART AND FRANCIS J. VASKO



WHILE BETHLEHEM STEEL CORPORATION (BSC) ceased to exist in 2003, the authors believe that there is still merit in describing the experiences of the Systems Analysis Group (SAG) of the former BSC to understand how this group (reporting to the Research Department) successfully functioned for nearly four decades. We discuss the practice of an Operations Research/Management Science (OR/MS) group operating within a corporate research department and provide the conditions under which this arrangement may work for other OR/MS groups.

Research-based OR/MS

Efforts to characterize and define a “blueprint” of the factors and reasons that influence the success of effective OR/MS practice has been the theme of discussions and articles for many years [1]. Although there is considerable agreement with many of these reasons, there are examples suggesting that the optimum “blueprint” may be situationally dependent based on factors such as (1) the maturity of the group; (2) the mix, teamwork and passions of the personnel; and (3) how well the group functions within the organizational hierarchy.

There are considerable benefits in reporting to a centralized research organization. However, there are legitimate restrictions and responsibilities that must be respected by a research-based OR/MS group to ensure success. Thus, the characteristics and requirements of a research-based group will be discussed. We will also summarize the key factors that resulted in the considerable successes of the SAG during its nearly 40 years of existence.

The Systems Analysis Group

In 1965, the Systems Analysis Group emerged from an early computer group whose function was to support research activities at Bethlehem Steel Corporation. At the time, it was part of the Systems Analysis and Computation Section. The new group had the usual growing pains as it attempted to explain its function while building the reputation of making a contribution to BSC. The group members realized early on that to be successful and build a reputation, we would have to work closely with the client community and complete the work through the implementation phase. One of the biggest initial struggles was the belief of the Research Department (Research) that we should pass the results on to the clients and to handle the actual implementation. Through client satisfaction with our work and positive feedback to Research, we overcame that struggle. SAG was well known for its ability to solve problems and implement solutions.

The next challenge was to address the recurring question: “You are doing great work, but is it research?” This dichotomy was in part resolved through publishing in refereed journals. Clients were enjoying the success of our results, and we were demonstrating that research was required to formulate and solve their difficult problems.

Our technical presentations and publications supported the notion that research was necessary. Furthermore, in a research department where metallurgy was the dominant discipline, it was easy to imagine that SAG could be considered “only a support group.” However, SAG’s numerous publications in international peer-reviewed journals and its recognition within the OR/MS community for significant contributions to the practice of OR/MS resulted in SAG being highly regarded within Research.

SAG soon demonstrated that it was achieving the goal of providing research-based solutions to operational problems with its first Edelman Award finalist project [2]. Our team was further encouraged by the following comment by Andrew Vazsonyi concerning the future of O.R. [3]:

Today, imbedding a linear programming optimization module into a Decision Support System, as done by Stott and Douglas [4], is still a novelty.

This “novelty” had been fully implemented by 1974, eight years before Vazsonyi’s 1982 article.

For nearly four decades, the Systems Analysis Group offered a desirable combination of technical and business talents that used both mathematical modeling and computer science expertise to solve a wide range of problems that directly impacted Bethlehem Steel’s operations. We view the intersection of the components of mathematical sciences, computer sciences, and the real-world experience of solving business and technical problems as necessary to the practice of operations research.

A key component to the success of SAG was *how* we conducted projects. It still is our belief that this one variable explains more than any other why SAG was different and successful when compared with many operations research groups. This “how” can best be described as rapid, evolutionary prototyping. For example, if we received a call or inquiry about

a potential new project, our approach would be to assess whether anything could be done to help the client on a short-term basis of one to two weeks. Often, this might be a straightforward request for computer science assistance, such as calculating the costs of using a single ocean vessel in a particular ocean trade. However, to our surprise in many cases, going ahead with this request evolved into large-scale optimization models that were never envisioned by the client or our team in the initial phase of the project.

This emphasis on quickly getting back to the client with what we called “level-zero” analyses created three major benefits:

1. Rapid, evolutionary prototyping allowed us to improve our understanding of the problem and whether trade-offs had to ultimately be made to solve the problem with O.R. tools. It took several trials of prototyping to see where the project might fit in the scheme of doing business. More importantly, it helped us avoid the type III error – finding the perfect solution to the wrong problem. We believed the tools to solve the problem could always be found or developed within the group, but *a precise understanding of the problem was critical to success*, and often the client was simply unable to articulate this definition early in the project.
2. The best technical solution to a problem can easily be wiped out if priorities and objectives are not agreed on by all. Rapid, evolutionary prototyping provided early insight into the political landscape at the client company regarding who was the real decision-maker, who could obtain the right data, who would integrate the O.R. model into existing systems, who would be opposed to this approach, and why they would benefit from using a model to aid their decision-making.

There are legitimate restrictions and responsibilities that must be respected by a research-based OR/MS group to ensure success.



3. We adopted the approach of learning the current decision-maker's calculations. This was often done step-by-step to gain a foothold of credibility. We would then show how the current solution could be improved with an optimization model.

If we felt like we were going to make a type III error, we bailed before having to explain why a large portion of our resources were expended for many years without useful results. Rapid, evolutionary prototyping requires a specific mindset, lots of give-and-take brainstorming and the ability to bounce back from criticism. Nevertheless, the investment in this phase of the project paid huge dividends.

It was this approach to problem solving that led one manager to call the SAG "neither fish nor fowl." In other words, we were never completely home office types who did not fully appreciate the complexity of the problem; and we were never completely plant operation types who did not fully appreciate the power of mathematics.

The OR/MS group at Research continued to thrive and survive for nearly 40 years despite decades of BSC's employee contractions. During this time, the group size remained the same, whereas the corporate size had been reduced tenfold. Our dedication to solving real-world problems, staying current through continuing education and focusing on how we work as a group within the research reporting structure was the key to the practice of OR/MS at BSC.

Benefits of a Centralized Research-based OR/MS Group

As a centralized group positioned at Research, the OR/MS group capitalized on the transfer of ideas and concepts among the plants at BSC. The concept of lead-follow is efficient and useful; the work is researched, developed and implemented at the lead-plant and then followed by specific development and implementation at the follow-plant. The concepts and experiences are generally transferable, and the implementation is tailored

to the requirements of the second plant. Such a process resulted in faster solutions, quicker implementations and in-house references for credibility. As for SAG, the centralized organization provided a way to leverage our diversified talent in terms of being able to brainstorm apparently unrelated problems with the same group of people. We reported in our second Edelman finalist paper [5] that the same mathematical formulation solved (1) optimization of the number of ingot mold sizes at the Bethlehem Plant – a strategic planning problem – and (2) metallurgical-grade consolidation for strand casters at the Sparrows Point Plant – a tactical production planning problem. It is notable that these were different plants and different applications both using the same mathematical formulation and solution technique.

As a research group, it was part of our job to keep abreast of new ideas and changing technologies, contribute to the state-of-the-art technologies and ultimately implement new technologies for the financial benefit of BSC. Over the years, the OR/MS group grew functionally as the technology became more robust. We believe that our positioning in Research permitted us to appropriately change, grow and improve while continuing to be a vital and robust contributor.

Positioned in the Corporate Office organization, we had the opportunity to work on a broad range of corporate problems: operations, transportation, shipbuilding, mining, marketing, finance, strategic planning and sales. We were not limited to working on plant operations problems. This broad exposure and relationship with many managers of diverse activities assisted us in marketing our services for future projects, and this flexibility allowed us to work across plants and departments and open the boundaries and constraints of the problem to yield more robust solutions.

As a group located at Research, we acted as internal O.R. consultants. The plants called in the "research experts" to help solve their problems and resolve priority-setting issues because we were able to act as referee and subtly handle trade-offs and disagreements among departments [6]. As an internal consultant, we knew the business, the plant language, the culture, the technology available, and the existing legacy systems. We were part of the corporation and yet were able to act as the neutral third party when necessary.

Critical Success Points

The article aimed to demonstrate how an operations research group could successfully function within a research department of an integrated steel producer.

The following points that are critical to such a group's success should be noted:

1. The approach of "how" the work is conducted with clients, which is critical to its success – that is, the use of rapid, evolutionary prototyping to firm up the problem definition and make an early decision on pursuing the project as an OR/MS problem.

2. The desire by all to show an impact to the bottom line by solving and implementing applied problems that are of immediate value to the operations.
3. The ability to do research "in-house" by developing creative solution procedures that use domain-specific problem information to solve the correct problem.
4. The commitment to obtain peer recognition by publishing nearly 60 articles in refereed journals, leading to a strong group identity both inside and outside BSC.
5. The interdisciplinary nature of SAG, which enhanced the OR/MS group's effectiveness.

It is important to note that many of the results achieved by SAG are still having a very positive impact on the steel industry today. Specifically, statistical analyses resulted in a patent that details how to avoid producing defective steel coils for the auto industry and roof construction that is still applicable today. Also, a decision support model implemented at BSC for determining the optimal blend of coals for cokemaking was discussed in a journal article published in 2005 [7]. Since its publication, there have been about 40 worldwide requests for this article, including several this year. Finally, although BSC plants have changed ownership over the years, we suspect, but cannot verify, that many computer systems developed and implemented by SAG at these plants are still in use.

KENNETH L. STOTT retired in 2000 as SAG supervisor at Bethlehem Steel Corporation, Bethlehem, PA.

PETER A. HUEGLER is an associate professor in the Business and Computer Science Department at Lock Haven University, Lock Haven, PA. He was supervisor of the SAG at Bethlehem Steel Corporation in 2003.

DENNIS D. NEWHART was senior research engineer in SAG at Bethlehem Steel Corporation.

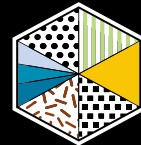
FRANCIS J. VASKO is professor emeritus in the Department of Mathematics at Kutztown University, Kutztown, PA. He was an employee of BSC Research Department from 1978 to 1986 and a consultant to the SAG from 1986 to 2003.

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It is important to note that many of the results achieved by SAG are still having a very positive impact on the steel industry today.

HOW DIVERSE IS INFORMS, REALLY



UPDATE YOUR DEMOGRAPHICS

BY TRACY CAHALL, MARY LESZCZYNSKI,
AND MAX LIBERATORE-RESNICK

One of INFORMS strategic goals is advancing diversity, equity, and inclusion in all that we do. We're asking for all members to add or update their demographics so that we can better understand the diversity within INFORMS. As 2022 proceeds, you'll see the blank outlines on the opposite page continue to fill in with color, shape and texture representing the diversity of INFORMS members. ¶

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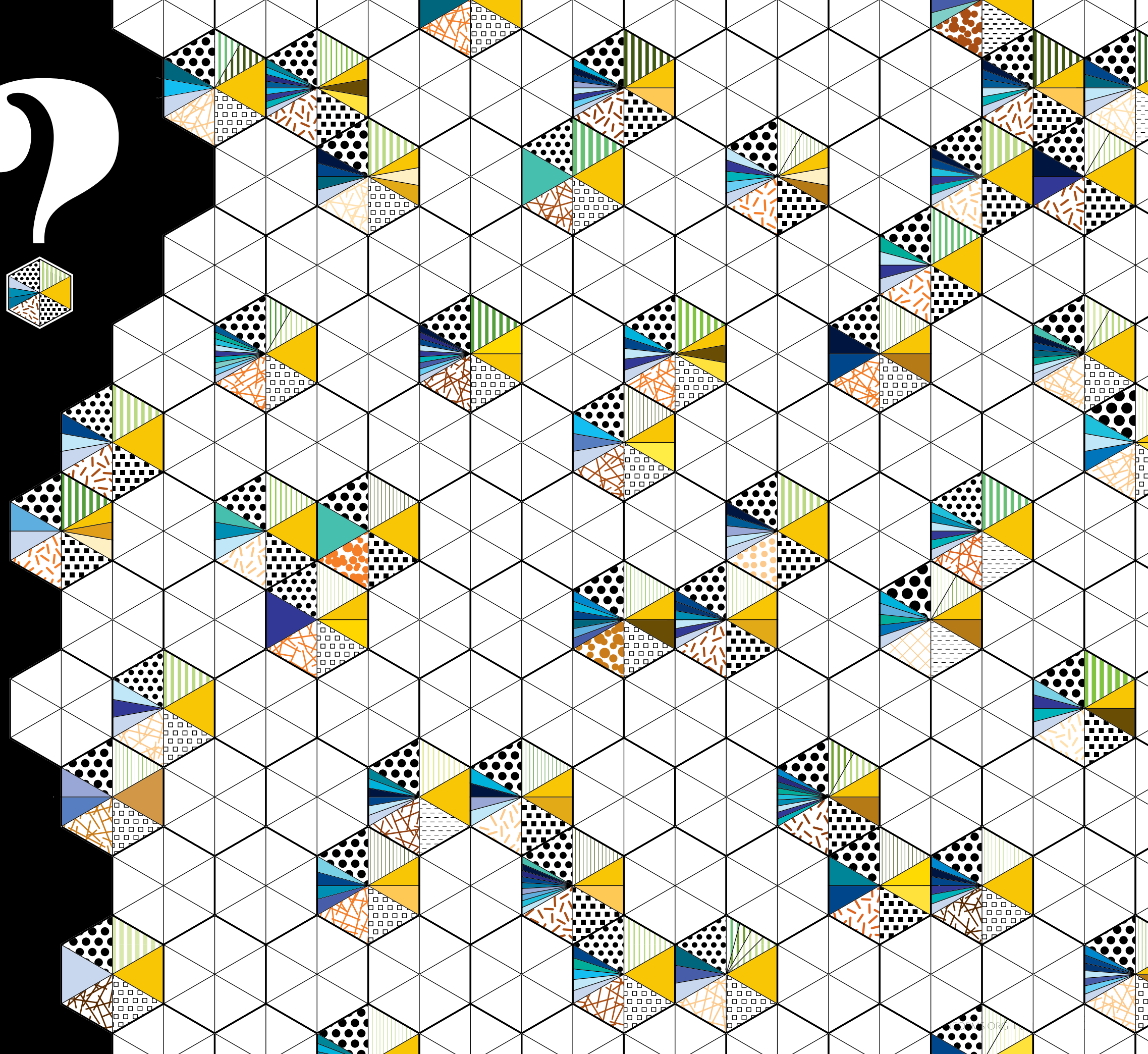
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QUESTIONS TO ASK YOURSELF WHEN COMPOSING A DIVERSITY STATEMENT

BY ABIGAIL LINDNER

"[The] diversity statement is not intended to be a recitation of all the ways that a particular candidate is diverse or their life story about adversity that they've dealt with or overcome. That certainly can be there. But it really is supposed to think about ... how is this person going to engage diversity, equity inclusion issues if they become a faculty member? What are they going to bring to the classroom? What are they going to bring to research? How are they going to advance the mission of the university or the department with relation to these topics?" [1]

DIVERSITY STATEMENTS ARE BECOMING A COMMON ELEMENT OF academic applications in countries such as Australia, the United Kingdom and the United States. These statements provide applicants an opportunity to explain how their research, teaching, community service and life experiences support their understanding of and interactions with students and colleagues with diverse backgrounds.

As awareness and appreciation of the role of the diversity statement grows, many job seekers remain confused about what should be included in one. Colleges and universities have different expectations for specific elements in the diversity statement, and some provide rubrics for prospective applicants to structure their essays. Beyond institution-specific instructions, asking yourself the following five questions is a solid start to a strong, general diversity statement:

1. What webinars, conferences, workshops and/or trainings have I attended to better understand inclusive teaching practices?
2. What initiatives have I spearheaded or contributed to apply my diversity, equity and inclusion (DEI) training for the improvement of the academic experiences of diverse groups of students?

3. What academic and nonacademic literature have I engaged with to expand my awareness of DEI issues and underrepresented groups in my field?
4. What acquired experiences in DEI have I gained and/or do I have? That is, how have I engaged with diverse groups in real life and/or how has my diversity influenced my work?
5. In answering questions 1-4, have I conveyed a clear willingness to invest time and effort and make accommodations so that I can contribute to on- or off-campus DEI research and teaching?

The remainder of this article explains why these questions are important and how they will help you craft a compelling diversity statement.

What webinars, conferences, workshops and/or trainings have I attended to better understand inclusive teaching practices?

By spending valuable time participating in extra-curricular learning opportunities while earning your doctorate degree (a difficult feat in itself!), you demonstrate your commitment to better understand and engage with DEI topics in your field and academia in general. The former is conveyed through webinars and conferences and the latter through workshops and trainings. Here, you might detail one or two of these extracurricular activities in your diversity statement, describing what the event was about, how you contributed to it (if you did), and what you gained and were challenged by during it.

What initiatives have I spearheaded or contributed to apply my DEI training for the improvement of the academic experiences of diverse groups of students?

In addition to participation in extracurricular opportunities, your diversity statement should display your application of this DEI and inclusive teaching knowledge to your real-life campus and classroom experiences. This could include mentorship of underrepresented students in high school or college, leadership of an on-campus minority-led student organization and encouragement of diverse viewpoints in the classroom, among others. The goal here is to emphasize that you have determined not only to raise your awareness of DEI but also to act on that awareness in your academic work.

What academic and nonacademic literature have I engaged with to expand my awareness of DEI issues and underrepresented groups in my field?

Noting the academic and nonacademic literature you have engaged with is another way to convey your commitment to addressing DEI issues and underrepresented groups. From academic literature focused on investigating these, you might learn, for instance, about leaky pipelines in STEM-oriented

departments, bias in research designs, the treatment of different groups of people in a certain field, and the role diversity plays in enriching classroom experiences. From nonacademic literature, you can often gather a more first-person, "real-life" account of the issues dealt with at conferences and trainings and within academic literature. You can touch on these in your diversity statement to show your commitment both inside and outside of formal and classroom settings.

What acquired experiences in DEI have I gained and/or do I have? That is, how have I engaged with diverse groups in real life and/or how has my diversity influenced my work?

This question refers to "everyday" experiences that you have with DEI (i.e., about yourself, people you've worked with, or both). Are there situations in which you have interacted with diverse groups outside of academia and teaching? Examples include projects with volunteer organizations or in industry, discussions about cultural differences that challenged you and maybe made you feel uncomfortable, or travel that brought you in contact with people culturally or ideologically different from yourself.

Moreover, in what ways have your diversities (national origin, cultural background, religious beliefs, ideology, etc.) influenced your work as an academic at your university and a citizen of the world? Your acquired experiences might seem limited, but they have value. For those who, because of the demanding nature of graduate studies, have had little time for professional training and workshops, the answer to this question could be especially important.

In answering questions 1-4, have I conveyed a clear willingness to invest time and effort and make accommodations so that I can contribute to on- or off-campus DEI research and teaching?

This is the gist of the diversity statement. Everything you write about in this essay should be aimed at ultimately answering this final question.

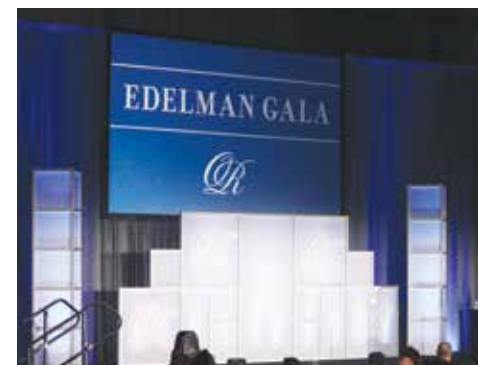
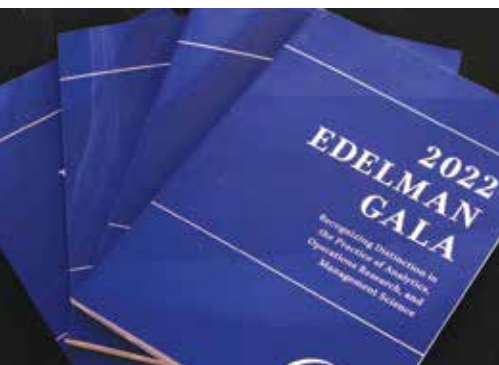
Author's note: A longer discussion about the general diversity statement can be found in *OR/MS Tomorrow* [2].

ABIGAIL LINDNER is a recent graduate of Regent University, where she earned a B.S. in mathematics. She serves as an editorial staff writer for *OR/MS Tomorrow*, the student magazine of INFORMS.

REFERENCES

1. Amanda Jungels, 2021, Personal interview, Sept. 15, Rice University. <https://www.informs.org/Publications/OR-MS-Tomorrow/Preparing-Your-Diversity-Statement-A-Commitment-to-Inclusive-Teaching-and-Research>

As awareness and appreciation of the role of the diversity statement grows, many job seekers remain confused about what should be included in one.



2022 INFORMS BUSINESS ANALYTICS CONFERENCE AND EDELMAN GALA

THE MUCH-ANTICIPATED RETURN TO fully in-person INFORMS events occurred in April for the first in-person Analytics Conference since 2019. Hundreds of operations research and analytics professionals reunited in Houston to network, present and discuss the latest research, developments and groundbreaking discoveries in analytics to showcase its continuing impact on the world around us.

After a brief hiatus due to the COVID-19 pandemic, the 2022 Edelman Gala returned in all its Oscar-like glory to invite attendees to recognize and celebrate the winners of several INFORMS awards, the competitions for which took place during the conference.

The following awards and winners were presented, judged and announced during the 2022 INFORMS Business Analytics Conference in Houston, April 3-5.

Clockwise from top left: 1) The 2022 Edelman Award-winning team from Chile celebrates their win after the Edelman Gala. 2) 2022 INFORMS President Radhika Kulkarni prepares to announce the Edelman Award winner while Edelman Gala emcee Erica Klampfl looks on. 3 & 4) The stage and trophy table at the Edelman Gala in Houston. 5) INFORMS Executive Director Elena Gerstmann (right) congratulates Paula Daza, former undersecretary of public health in Chile, and member of the 2022 Edelman Award-winning team.



2022 UPS George D. Smith Prize

In addition to the Edelman Award, INFORMS awarded its 2022 UPS George D. Smith Prize to the **Master Industrial and Applied Mathematics program in the Department of Mathematics and Computer Science at the Eindhoven University of Technology (TU/e)** in the Netherlands for its excellence in preparing students to become practitioners of operations research and analytics.

Over the last decade, the Industrial and Applied Mathematics master's program has raised, educated and nourished hundreds of graduates who have gone on to accept influential positions in society. The program has an intensive collaboration with industry, making optimal use of its location in Brainport, the high-tech hotspot around Eindhoven.

The Department of Mathematics and Computer Science at TU/e boasts three bachelor's degrees and five master's degrees. It also offers professional doctorate engineering programs in data science and automotive systems design. The department also has a vibrant student association, which is very active in the development of the program, curriculum, training sessions and trips. Perhaps the most noteworthy point of the program is the opinions of its students who pride themselves in being a part of the program.

"We are honored to receive the UPS George D. Smith Prize from INFORMS. It's a tribute to our faculty, to our students and to all those behind the scenes

that have made this school worthy of this award," said Alessandro Di Bucchianico, Graduate Program Director of the Industrial and Applied Mathematics program at the Department of Mathematics and Computer Science.

Named in honor of the late UPS Chief Executive Officer – a champion of operations researchers at a leading Fortune 500 corporation – the UPS George D. Smith Prize was created in the spirit of strengthening ties between industry and the schools of higher education that graduate young practitioners of operations research. The prize is awarded to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research or analytics.

"On behalf of the INFORMS community, we congratulate Eindhoven University of Technology, Industrial and Applied Mathematics, Department of Mathematics and Computer Science, for their unparalleled efforts to educate the next generation of leaders in the field of operations research and analytics. Their unrelenting work has undoubtedly helped to strengthen the ties between academia and industry," said Elena Gerstmann, INFORMS executive director.

The finalists for the 2022 Smith Prize included: The University of Toronto, Rotman School of Management, Master of Management Analytics and Purdue University, Krannert School of Management.

Maria Vlasίου (center) and Anke Simons (left center) accept the 2022 UPS George D. Smith Prize for Eindhoven University of Technology from Bala Ganesh (left) and Ranganath Nuggehalli (right), CAP, both from UPS, and the 2022 Smith Prize chair Andrew Wasser (second from right).

Members of the 2022 Franz Edelman Award winning team from Chile. (l-r) Antonio Moreno, Andrés Couve, Paula Daza, Leonardo Basso and Julio Covarrubias.

Franz Edelman Award for Achievement in Advanced Analytics, Operations Research and Management Science

As the most prestigious award for achievement in the practice of analytics and operations research, finalists for the Franz Edelman Award have made incredible contributions to nearly every industry around the world, for a cumulative impact of more than \$336 billion since the award's inception. As always, this year's finalists were no exception, with projects that have contributed significantly to e-commerce, biomanufacturing efficiency, vaccine development, vehicle content optimization and census routing.

Gobierno de Chile received the 2022 Franz Edelman Award for its use of operations research (O.R.) to improve response strategies to the COVID-19 pandemic. The winning team was announced by INFORMS President Radhika Kulkarni April 4 at the Edelman Gala during the 2022 INFORMS Business Analytics Conference in Houston.

During the COVID-19 crisis, the Chilean Ministries of Health and Sciences partnered with the Instituto Sistemas Complejos de Ingeniería (ISCI) and telecom company Entel to develop innovative methodologies and tools that placed O.R. and analytics at the

forefront of the battle against the pandemic. These tools shed light on the actual effects of lockdowns in different municipalities and over time; helped allocate limited intensive care capacity; allowed multiplying the testing capacity; provided on-the-ground strategies for active search of asymptomatic cases based on anonymized mobility data; and implemented a nationwide serology surveillance program.

For a detailed story about the Chile team and its impressive Edelman win, see page 32.

In addition to Chile, the finalist teams included:

- Alibaba for "Integrated Forecast, Inventory, Price Optimization and Recommendation Has Reduced Millions in Inventory and Shrinkage Cost and Sustained Revenue Increase for Alibaba Retail Businesses"
- General Motors for "Vehicle Content Optimization at General Motors"
- Janssen Pharmaceutical Companies of Johnson & Johnson (Janssen) for "Data-driven COVID-19 Vaccine Development for Janssen"
- Merck Animal Health for "Operations Research Improves Biomanufacturing Efficiency at MSD Animal Health"
- U.S. Census Bureau for "Optimization and Routing for the 2020 Decennial Census"





2022 INFORMS Prize

Wayfair, one of the world's largest online destinations for home goods, was awarded the 2022 INFORMS Prize for sustained and enduring achievement and success of utilizing operations research (O.R.) and analytics in its organizational decision-making.

The INFORMS Prize honors effective integration of O.R. and analytics into organizational decision-making and is awarded to organizations that have repeatedly applied the principles of O.R. in lasting ways.

Wayfair utilizes O.R. and machine learning models to support business processes, optimize customer experiences and drive supplier satisfaction. Within the company, models are utilized across a broad spectrum of functions such as marketing, fraud prevention, customer support, supply chain operations and optimization.

Speaking on behalf of the selection committee, Bryan Flietstra, 2022 INFORMS Prize committee chair, said: "Wayfair is showcasing data science as a source of business success and a necessary element to achieve customer satisfaction with a superb online experience. Wayfair is truly deserving of this prestigious prize, and the entire O.R. and analytics community joins INFORMS in thanking them for their priceless contributions to the field and the business world."

For more about Wayfair's win, visit: <https://www.informs.org/About-INFORMS/News-Room/Press-Releases/Wayfair-Honored-with-the-2022-INFORMS-Prize-for-Pioneering-Integration-of-Operations-Research-and-Analytics-into-Its-Business>.

(left) Representatives from Wayfair accept the INFORMS Prize.



2021 Wagner Prize

The winner of the 2021 Daniel H. Wagner Prize for Excellence in the Practice of Advanced Analytics and Operations Research was selected during the 2021 INFORMS Annual Meeting in Anaheim, Calif. The winning team included researchers from the University of Pennsylvania and University of Southern California for their work to deploy a national-scale targeted testing system to allocate limited testing resources in Greece to screen visitors for COVID-19 at the border. The winner was announced in the fall as well as during the Edelman Gala, and a reprise of the winning presentation was also giving during the 2022 INFORMS Business Analytics Conference in Houston.

The prize-winning paper, "Interpretable O.R. for High-stakes Decisions: Designing the Greek COVID-19 Testing System," provides profound applications of analytics and O.R. to effectively allocate resources to enact a testing system to ensure the health and safety of people who visit and live in Greece. The researchers developed the system to be used at the border for those entering the country.

Congratulations to Hamsa Sridhar Bastani of the Wharton School and Kimon Drakopoulos and Vishal Gupta, both of the USC Marshall School of Business.

James J. Cochran (left), 2021 Wagner Prize vice chair, poses with Vishal Gupta from USC Marshall School of Business.



2021 Innovative Applications in Analytics Award (IAAA)

The IAAA finalists presented in Houston during the in-person 2022 INFORMS Business Analytics Conference and the winner was announced during an awards luncheon of the Analytics Society.

The purpose of the IAAA is to recognize the creative and unique application of a combination of analytical techniques in a new area. The award promotes the awareness and value of the creative combination of analytics techniques in unusual applications to provide insights and business value. IAAA is sponsored by the Analytics Society of INFORMS, Kinaxis and Adelphi University.

The winning application, "A Data-driven Optimization Approach to Solve the E-commerce Packaging Problem," was submitted by a team from Flipkart Internet Private Limited and the Indian Institute of Management (IIM) Ahmedabad. Members of the winning team included Sharvendu

Bhushan, Himanshu Gupta, Chandrasekhar K, Rohan Nanowire and Sandeep Sangwan of Flipkart; and Shanthan Kandle, Srikumar Krishnamoorthy and Debjit Roy (primary presenter) of IIM Ahmedabad.

The winning team's entry developed approaches to determine the optimal packaging box assortment in two phases: First, employing a mixed-integer linear programming formulation to provide substantial gains in reducing the box assortment size, improving volumetric efficiency by 12%, reducing CO2 emissions by 8 thousand metric tons, and resulting in a cost savings of about 3.7M USD accrued over two years. Second, an innovative hybrid optimization framework was developed combining unsupervised learning, reinforcement learning and tree-search. In particular, the optimization problem was formulated as a sequential decision-making task called the box-sizing game. A neural network agent is then designed to learn to play the game and eventually solve the problem.

Debjit Roy, Indian Institute of Management Ahmedabad, was the primary presenter for the 2022 IAAA winning team.

SECOND INFORMS CONFERENCE ON SECURITY SET FOR AUG. 29-30

BY ANDY HALL



INFORMS IS HOLDING THE BIENNIAL Conference on Security (IConS) across operations research (O.R.) on Aug. 29-30, 2022, at the Renaissance Arlington Capital View Hotel in Arlington, Virginia. INFORMS has identified two grand challenges that provide opportunities across O.R./analytics disciplines: security and healthcare. In alternating years, INFORMS hosts this conference to bring together our community to put decided effort into these challenges. The 2022 IConS is the second INFORMS gathering to focus on security issues.

The world is facing significant security challenges across the spectrum of daily life. Accordingly, we view the security theme of the conference in a most inclusive manner, encompassing homeland security, food security, public health security, emergency preparedness, pandemics, defense and military problems, data and artificial intelligence security, transportation, supply chain security, critical infrastructure and cybersecurity, power systems, energy resilience and more. We are looking to highlight these timely and essential problems to our researchers and practitioners to apply the entirety of O.R. tools to make a more secure world.

The field of operations research was spawned from the world's security problems as a part of the global conflicts of the Second World War. The teamwork of mathematicians and scientists not only helped to end the worldwide conflict but created a new field that applies scientific methods and problem-solving techniques to make better decisions. As the variety of problems in society that revolve around security continues to increase,

INFORMS brings this community together to highlight both the challenges and techniques that have been used.

What to Expect in Arlington

Keynotes and focused panels will showcase the variety of opportunities in security, specifically with keynotes focusing on linking technical applications to security problems. We hope that the conference will appeal to technical experts looking for new opportunities to apply their familiar tools to new situations and leverage the grant opportunities to advance both the field and their careers.

IConS 2022 will highlight an essential part of our community: federally funded research and development corporations (FFRDCs), the wide variety of problems being addressed there and opportunities for research careers within these organizations. There are multiple FFRDCs in the national capital region, and we are looking to showcase the work from our community and highlight research opportunities.

To that end, there will be a panel of National Science Foundation (NSF) program managers highlighting research and grant opportunities in security. These NSF programs provide an opportunity to support research on critical problems across the security landscape.

- Dr. Yueyue Fan, a professor at the University of California, Davis, will detail opportunities in the Civil Infrastructure Systems program.
- Dr. Paul Huth, a professor at the University of Maryland, is the program officer for the Security and Preparedness program.

- Dr. Daan Lang, a professor at the University of Alabama, leads the Humans, Disasters, and the Built Environment program.

Planned keynotes will be given by General Norton Schwartz, entrepreneur Josh Lospinosa, Professor Johannes Royset and Associate Dean Rajan Batta. Norty, as General Schwartz is known at the Institute for Defense Analyses (IDA), where he is the president, has a fascinating perspective that spans a career in the U.S. Air Force and the Joint Force, and he now leads one of the FFRDCs that provide analytical resources to the security community. IDA's 1,500 employees focus on work supporting the U.S. Joint Staff, Combatant Commands and Department of Defense.

Josh Lospinosa is the CEO and co-founder of Shift5, a cybersecurity company that focuses on operational technologies, from airplanes to trains and tanks. Shift5 raised \$50 million in Series B funding in 2022. He is poised to address the operational cybersecurity challenges across the airline, train and defense sectors.

Professor Johannes Royset is part of the Naval Postgraduate School faculty and brings insights from his research in optimization, data analytics, sensors and reliability. He will demonstrate the technical rigor that can be applied to problems in security.

Rajan Batta is an associate dean for faculty affairs and diversity in the University at Buffalo's School of Engineering and Applied Sciences. Batta will share his experience and research in security and his unique perspectives from his role as a champion of diversity.

Security and Healthcare

In alternating years, the INFORMS Conference on Security and INFORMS Healthcare Conference provide an opportunity between the INFORMS Business Analytics Conference in the spring and the INFORMS Annual Meeting in the fall to highlight your work in these important research areas. This August, IConS provides an important opportunity to gather as a community to address new solutions to complex problems. Between cybersecurity threats to multiple aspects of our society and critical infrastructure, challenges to the information environment posed by social media, and new military security realities exposed by the invasion of Ukraine, there is no lack of topics to address.

As we return to in-person meetings, please consider presenting your work from across the variety of analytical techniques on the wicked problems across the spectrum of security. The setting near Washington, D.C., provides a perfect backdrop for discussing how to win grants, applying your favorite tools to new problems and sharing our collective insights to create a safer world. The organizing committee of Miguel Lejeune and Payman Dehghanian from George Washington University, Manish Bansal from Virginia Tech, Regan Copple from Group W, and myself are happy to address any questions you have about this second iteration of our INFORMS Conference on Security. See you in Arlington in August.

ANDY HALL, Ph.D., is an associate professor of cybersecurity and data science at Marymount University and an adjunct research staff member at the Institute for Defense Analyses (IDA). He is general and program co-chair of the 2022 INFORMS Conference on Security.

This August, IConS provides an important opportunity to gather as a community to address new solutions to complex problems.



School of Systems and Enterprises Adjunct Faculty Pool — Available Positions

The School of Systems and Enterprises (SSE) at Stevens Institute of Technology is seeking a pool of qualified adjuncts for a range of part-time teaching assignments in the areas of software engineering, systems analytics, industrial and systems engineering and engineering management, with openings beginning in **Summer 2022**. Successful candidates will contribute to a dynamic and growing school that provides students with a research-centered interdisciplinary and transdisciplinary education embedded in systems thinking and design. Candidates will be evaluated on their teaching credentials and potential for delivering high quality instruction to undergraduate, masters and doctoral students.

Adjunct faculty will be responsible for teaching one or more courses, holding office hours and participating in course evaluations and assessments. Assignments may include day or evening courses and may be conducted on-campus, off-site or online. Adjunct positions are on a semester-by-semester contract basis, and successful acceptance into the adjunct pool does not guarantee an offer of a contract.

Among the available assignments is the teaching of courses offered through the SSE corporate education program. Industry experience is a plus for these positions. These courses are offered in a virtual format that is both live and recorded with flexible scheduling based on corporate partners needs and preferences.

1 Castle Point Terrace, Hoboken, New Jersey 07030

Basic Qualifications

Applicants must possess a masters or doctoral degree in a related engineering or science discipline and evidence of rich industry experience and successful university teaching experience. Knowledge of applied statistics, applied mathematics, modeling and simulation methodologies, engineering economics and Python a plus. Experience in software and product development or data science desirable.

Please submit your cover letter, CV and contact information for 2-3 references through the Workday jobs portal, Careers at Stevens. Applications will be reviewed on a rolling basis.

About the School

The School of Systems and Enterprises (SSE) at Stevens Institute of Technology is a leading institution in systems innovation and research located in Hoboken, New Jersey, a vibrant city with a population of 54,000 on the Hudson River directly across from New York City. Ranked amongst the top graduate programs in industrial, systems and software engineering by the U.S. News and World Report, faculty in SSE embrace diverse careers with both academic and industry experience. Stevens is an Equal Opportunity Employer. SSE values diversity and seeks candidates who can contribute to a welcoming climate for students of all races and genders. Stevens is an NSF ADVANCE institution committed to equitable practices and policies. We strongly encourage qualified women and minority candidates to apply.

www.stevens.edu

INFORMS ROUNDTABLE TURNS 40!

BY MARGERY CONNOR

ESTABLISHED IN 1982, THE INFORMS

Roundtable is a peer-based, collegial group of experienced, senior operations research (O.R.) and analytics managers who meet several times each year to share best practices, engage in personal and professional development and provide an industry perspective to INFORMS' leadership. Roundtable members are organizations, not individuals, each represented by the ranking manager or executive in charge of all OR/MS activity within their respective organization. Roundtable membership provides a way for new OR/MS groups to leverage the hard-won lessons of established groups and for mature groups to keep their edge through exposure to new ideas and peer networking.

Currently 42 companies strong, the Roundtable regularly meets to discuss a range of topics, including recent themes such as operations research and data science, mental health challenges post-COVID-19 and the ethics of O.R. and artificial intelligence (AI). One meeting a year is dedicated for new member companies to present how they are leveraging operations research and analytics.

The INFORMS Roundtable typically meets during the INFORMS Business Analytics Conference in the spring and the INFORMS Annual Meeting in the fall. Roundtable members are often attending these conferences anyway.

The Roundtable also hosts a summer meeting for an additional opportunity to connect. Although the Roundtable has been meeting virtually since the onset of COVID-19, this summer's meeting will be the first in-person meeting in more than two years – the perfect opportunity to celebrate the 40th anniversary of the Roundtable!

Mission of the INFORMS Roundtable

- Provide topical business and technical content, including best practices, to be shared throughout member organizations.
- Advance professional growth of member representatives through interaction and knowledge-sharing with peer leaders.
- Share insights from leaders in "Practice" with the broader OR/MS community and advise the INFORMS Board of Directors on matters relating to practice.

"In my view, O.R./analytics is a niche profession. Being a part of the Roundtable helps me learn about how to successfully use O.R. to benefit my organization."

"Roundtable members are dedicated to furthering the profession. I do not think that level of commitment exists in other networking groups."

– Ranganath Nuggehalli, CAP, UPS

Although established in 1982, the first Roundtable meetings we have information on began in 1983. Topics discussed at the three meetings that year included:

- Decentralization and Absorption of OR/MS: A Sign of Success or Failure?
- Spreadsheet Models as a Spawning Ground for OR/MS Models: Promoting the Urge for Greater Analytical Power
- Enhancing the Image of OR/MS

Our profession continues to discuss related challenges today – i.e., organization structure, citizen modelers, role of OR/MS versus data science, machine learning and artificial intelligence, and more.

"The benefits of our membership for more than a decade in the INFORMS Roundtable have been priceless. The collection of leaders of world-class analytics/AI organizations is unique, and its collegial culture of mutual help and reflection consistently helps us evaluate and overcome business challenges."

– Steve Sashihara, Princeton Consultants Inc.

INFORMS Roundtable Membership Today

- 42 regular and four honorary lifetime members (the list of member companies and their representatives can be found on INFORMS Connect at connect.informs.org/roundtable/new-item/members).
- Regular members are organizations, represented by a senior OR/MS leader.
- Membership is dynamic.
- Veteran representatives provide leadership and stability.
- New representatives bring fresh ideas.

Most Valuable to Roundtable Members

- **Networking with other Roundtable members.** Connections with peers in external companies managing O.R./data science/analytics teams are helpful in thinking of new ways to address challenges – or simply getting validation for your own approach.



BRANDEIS UNIVERSITY - INTERNATIONAL BUSINESS SCHOOL

Senior Lecturer in Data Analytics

The Brandeis International Business School invites applications for a Senior Lecturer (non-tenure track) appointment in Data Analytics beginning July 2022. The search will consider applicants with specific teaching interests in all areas of data analytics. Ideal candidates should have a record demonstrating excellence or potential for excellence in teaching. Applicants should have a PhD in business, computer science, economics or a related field by the start of employment, but those with a Master's degree and extensive work experience may be considered.

About Brandeis International Business School: Our 420 graduate students come from over 30 countries and are enrolled in MBA, MA in International Economics and Finance, MS in Finance, MS in Business Analytics, and PhD programs. In addition, each year we graduate approximately 150 undergraduates with business majors. Faculty members in business, finance, and economics work closely together in a collegial and rigorous academic environment in one state-of-the-art building complex. You can find more information at www.brandeis.edu/global. At Brandeis, we believe that diversity, equity, and inclusion are essential components of academic excellence.

Brandeis University is an affirmative action, equal opportunity employer that is committed to creating equitable access and opportunities for applicants to all employment positions. Because diversity, equity, and inclusion are at the core of Brandeis' history and mission, we value and are seeking candidates with a variety of social identities, including those that have been underrepresented in higher education, who possess skills that spark innovation, and who, through their scholarly pursuits, teaching, and/or service experiences, bring expertise in building, engaging, and sustaining a pluralistic, unified, and just campus community. <https://www.brandeis.edu/global/faculty/profiles/index.html>

How to apply: Candidates should electronically submit a resume, a letter expressing interest, a description of their teaching philosophy, and a diversity statement describing how they incorporate goals related to diversity, equity, and inclusion into their work to: https://slate.brandeis.edu/portal/current_positions.

Job Requirements: Applicants should have a PhD in business, computer science, economics or a related field by the start of employment, but those with a Master's degree and extensive work experience may be considered.



"Roundtable representatives combine extensive technical expertise with superior management skills. Their knowledge, and willingness to share it, was instrumental in my professional success!"
 – C. Allen Butler, Daniel H. Wagner Associates

- **Sharing common challenges/best practices.** Topics have included recruiting, retention, scaling, organization structure, citizen data science and more.

"As an active member of the INFORMS Roundtable for a decade, I have been able to collaborate with world-class leaders in analytics organizations. This professional network has been the catalyst for sharing best practices, providing insights on how to create value from analytics, and establishing a forum of like-minded individuals to learn and grow together."
 – Pooja Dewan, Otis Elevator Company

- **Learning about new topics through themed Roundtable meetings.** Over the years, topics have included public and private cloud approaches, gamification, Internet of Things, real-time analytics, machine learning, big data and more.

Keynote Speaker Endowment

In 2019, INFORMS Roundtable funded an endowment to sponsor a plenary speaker at the INFORMS Business Analytics Conference for 10 years, starting in 2020. This endowment was designed to assist INFORMS in recruiting top-quality speakers for this conference. To date, sponsored speakers include:

- Talithia Williams, Big Data Expert, Professor of Mathematics and Host of NOVA Wonders (2022)
- Kate Darling, Research Specialist at MIT Media Lab (2021 speaker, postponed from 2020)

2022 Roundtable Board of Directors

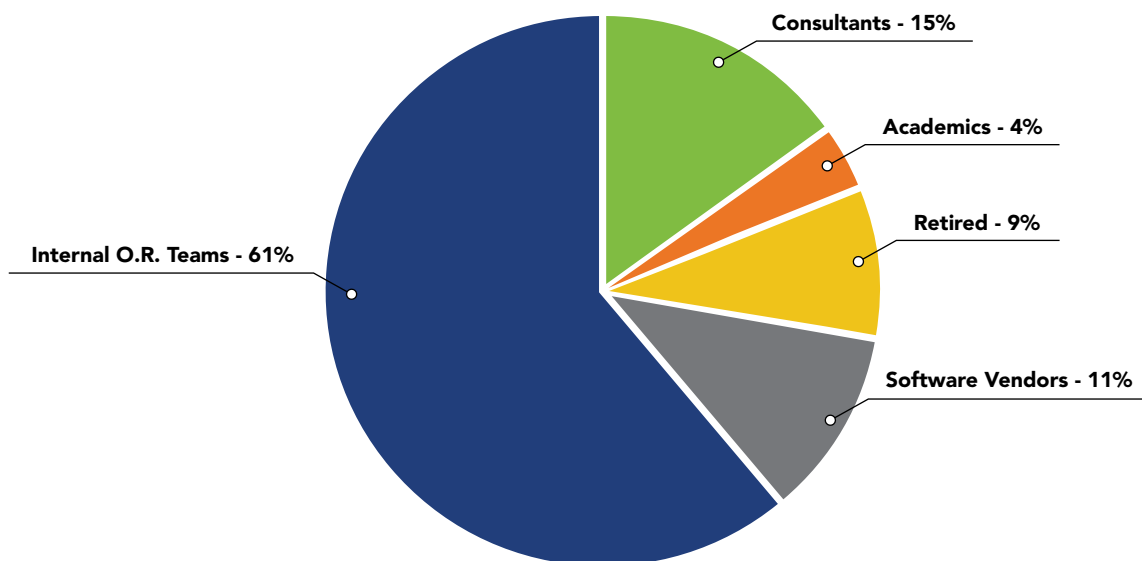
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We would like to take this opportunity to congratulate INFORMS and the Roundtable for four decades of successful collaboration. We thank all the representatives from the past 40 years and look forward to decades more of sharing insights and best practices with the greater OR/MS community.

If you are interested in having your company join the INFORMS Roundtable, please contact the VP of membership, Ranganath Nugehalli (UPS), CAP, at RNugehalli@ups.com.

MARGERY CONNOR is the data science and analytics advisor at Chevron. She is president of the INFORMS Roundtable and a Franz Edelman Laureate.

TYPES OF ORGANIZATIONS IN THE ROUNDTABLE



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Why do successful business innovators, academic thought leaders, and students join INFORMS? As the largest international association for operations research and analytics professionals, with over 11,000 members, our community has the strength to empower its members with continuous learning and career growth, meaningful volunteering, and life-changing networking opportunities at globally recognized conferences. For the last 25 years, INFORMS members have come together to save lives, save money, and solve problems. Now let's tackle the future together.

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