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Sustained Integration of Operations Research

Emphasizing Long-Term, Multiproject Success

April 3, 2017

Las Vegas, Nevada

The Edelman Gala

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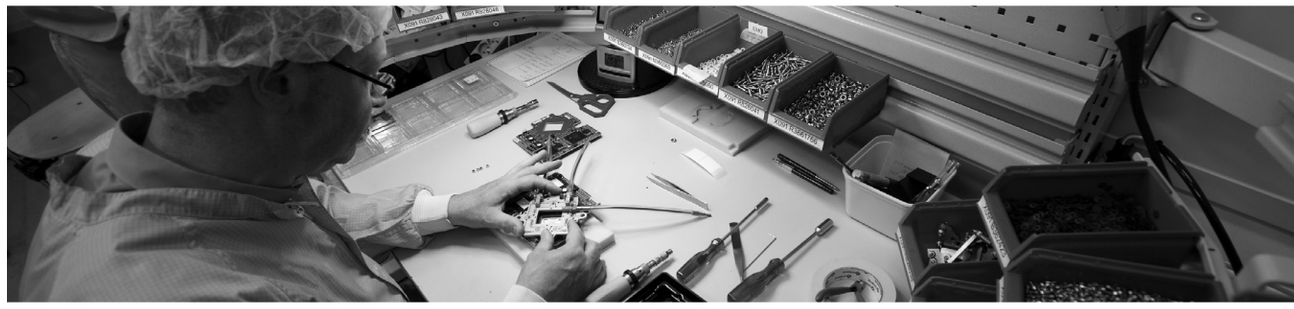
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The Edelman Gala



2017 Edelman Gala

Welcome, Acknowledgments, and Awards to be Presented
Michael A. Trick, Master of Ceremonies

Summaries of 2017 Edelman Finalist Work
American Red Cross
Barco

Presentation of the Wagner Prize
C. Allen Butler, Chair, 2016 Wagner Prize

Summaries of 2017 Edelman Finalist Work
BHP Billiton
General Electric and Norfolk Southern

Presentation of the UPS George D. Smith Prize
Robin Lougee, Chair, 2017 UPS George D. Smith Prize

Summaries of 2017 Edelman Finalist Work
Holiday Retirement
New York City Department of Transportation

Presentation of the INFORMS Prize
Tarun Mohan Lal, Chair, 2017 INFORMS Prize

Recognizing Members of the Franz Edelman Academy
Michael A. Trick, Master of Ceremonies

Announcement of the 2017 Franz Edelman Award Winner
Brian T. Denton, President, INFORMS
Anne G. Robinson, Chair, 2017 Edelman Award

Master of Ceremonies

Michael A. Trick



Michael A. Trick is the Harry B. and James H. Higgins Professor of Operations Research and Senior Associate Dean, Faculty and Research at the Tepper School of Business, Carnegie Mellon University, where he has been on the faculty for 28 years.

Mike's interest in operations research began in the early 1980s when, as an undergraduate student, he spent the summer trying to figure out how to cut large pieces of cardboard into smaller pieces of cardboard for a paper manufacturer. Other projects soon followed, including trying to determine how to send large military units to battle sites (it is important that the kitchen unit is not the first to land on a contested beach), scheduling robotic arms in producing 1990s-era cell phones (think phones the size of a book), assigning tax inspectors to regions of the country (there is no truth to the rumor that there are certain holes in their coverage in Pittsburgh), and many other projects. More recently, much of his practical work is in the area of sports scheduling, beginning with scheduling college sports leagues leading up to scheduling Major League Baseball, through his small company The Sports Scheduling Group.

Mike's academic research has grown out of his practical experience, and concentrates on approaches to solving hard discrete optimization problems. These approaches include branch-and-price, Benders approaches, and constraint programming. He is a big believer in the value of research infrastructure, dating back to the early 1990s when he ran a DIMACS Computational Challenge, putting together challenging datasets that are still in use today.

Mike has been involved with INFORMS since its creation in 1995 with the merger of ORSA and TIMS. He had one of the early web servers, collecting pointers for operations researchers through Michael Trick's Operations Research Page. He became INFORMS first webmaster, a position that led directly to his being elected president of INFORMS for the year 2002. He is currently president of the International Federation of Operational Research Societies (IFORS), a "Society of Societies," of which INFORMS is the largest member.

Mike has been involved with the Edelman Competition for many years, serving on the selection committee and as a judge before chairing the judging panel in 2015 and 2016.

He is an active social media user, with a well-known blog and twitter account that tries to expand the understanding of operations research and analytics to a broader audience.

On a personal note, he is married to Ilona, whom he met as a postdoctoral student in Germany almost 30 years ago, and the proud father of Alexander, who takes up all of his spare time.

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Analytics and Operations Research Today



Edelman Program Notes from INFORMS President Brian Denton



Tonight we gather to celebrate the achievements of the recipients of four of INFORMS' most recognized awards for excellence in the application of operations research (O.R.) and analytics: *Franz Edelman Award for Achievement in Operations Research, Management Science, and Advanced Analytics, INFORMS Prize, Daniel H. Wagner Prize for Excellence in Operations Research Practice,* and *UPS George D. Smith Prize*.

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

This year's finalists for the Franz Edelman Award, the world's most prestigious award for achievement in the practice of O.R. and analytics, have made significant contributions to healthcare, transportation, manufacturing, mining, and revenue management. The American Red Cross has transformed blood collecting and processing for much of the southeast United States, reducing total costs associated with blood component collection and processing by 40 percent per unit. Global technology leader Barco employed a mathematical optimization model to develop multifunctional platforms for the development and production of high-tech medical devices screens that reduced product development times and improved delivery timeframes.

BHP Billiton created a new approach to expanding their mining portfolio from metals and minerals to bulk fertilizer commodities. Their Detailed Integrated Capacity Estimate (DICE) model has decreased the company's capital and operating expenses, while increasing overall net present value by $100 million. General Electric (GE) developed a system for scheduling thousands of trains in real time for the Norfolk Southern Railroad, replacing the previous manually operated system. In addition to realizing hundreds of millions in savings on the transportation of passengers, automobiles, and other freight, the new system increased average train speed.

By replacing an outdated pricing model with a new revenue management system, Holiday Retirement increased revenue and customer satisfaction for their more than 300 independent senior living communities. In addition to a reduction in delivery costs and vehicle emissions, the New York City Department of Transportation's Off Hours Delivery (OHD) Project increased pedestrian safety. Under this program, more than 400 establishments have transitioned their delivery times between the hours of 7pm and 6am, when city streets are much less congested by both vehicular traffic and pedestrians.

INFORMS Prize

The INFORMS Prize has been recognizing organizations that have effectively integrated advanced analytics and O.R. programs since 1991. This year, we have selected the United States Air Force and Walt Disney for their extraordinary contributions to advancing analytics and O.R. within their organizations.

Daniel H. Wagner Prize for Excellence in Operations Research Practice

For nearly 20 years the Daniel H. Wagner Prize has paid homage to the late Daniel H. Wagner and his emphasis on clear intelligent writing, strong analytical content, and verifiable practice successes. The 2016 winners, a team representing Université Laval, The Forestry Research Institute of Sweden and SDC, Sweden, used operations research methodologies to create a calibrated route finder that collects and analyzes a broad range of data to better identify optimal driving routes for drivers of heavy trucks in Sweden. Today, their Calibrated Route Finder (CRF) has been incorporated by all major Swedish forest companies and is used in 60 percent of transports conducted by this industry.

UPS George D. Smith Prize

Last but not least, the INFORMS UPS George D. Smith Prize is awarded in recognition of universities whose programs foster strong relationships between industry partners and young O.R. and analytics practitioners. The finalists for this year's prize are the Haslam College of Business at the University of Tennessee, the Institute for Advanced Analytics at North Carolina State University, and the Operations Research Program of the United States Air Force Academy.

Please join me in congratulating the 2017 winners and finalists. Their contributions to the field of O.R. and analytics have improved our world, inspired new discoveries, and contributed value to society.





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Achievement in Operations Research

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The Greenest Mile

By Ranganath Nuggehalli, CAP, Principal Scientist, UPS
Reflections on Winning the 2016 Franz Edelman Award

"The greenest mile is the mile not driven." That is the tagline for our sustainability contribution.

A great bonus came to UPS when our On-Road Integrated Optimization and Navigation (ORION) system, though originally conceived to improve the efficiency of package pickup and delivery (P&D) operations, also contributed to sustainability efforts. In addition to producing efficiencies worth $400 million annually on the bottom line, ORION also helps UPS' sustainability initiatives by reducing CO_2 emissions by approximately 100,000 tons per year.

We encountered many hurdles to making ORION a reality, so many that we were close to ending the project a few times. Somehow it survived. In the beginning, not many people at UPS believed such a system was needed, or could be built. After delivering packages for nearly 100 years, UPS has the reputation of being one of the most efficient companies in the business. Its reliance on methods and measurements is legendary.

The operations planning team and the operations research (O.R.) team held different views on what was needed. The operations team wanted a system that would yield significant efficiencies yet precisely follow existing policies and procedures. The O.R. team, on the other hand, wanted operations to institute new practices to support the decision-assisting algorithms O.R. had developed. Only when both teams compromised on some key ground rules were we able to make progress.

At times it felt like we were playing the game of Whac–A-Mole: solving one problem exposed the next. After the algorithm, it was map data; then it was building a system that would support time sensitive operations; after that it was deploying the system and training front line personnel to use it. The fact that ORION overcame all those hurdles gives testament to our founder Jim Casey's assertion that determined people working together can accomplish anything.

Along the way, ORION garnered recognition that included rating a segment on NOVA and being written about in the media. Moreover, it brought significant recognition to the O.R. profession. My personal highlight was when we were invited by the Department of Defense to participate in a study to investigate how O.R. could be instrumental in reducing global conflicts.

We started thinking about the Edelman competition as early as 2010, but decided to wait until 2016 so that we would have a proven record of benefits. We felt our unique story covered numerous important aspects yet the competition required condensing into a 40-minute presentation. We received help on a number of fronts. First, everyone in the UPS Management Committee, the governing body of UPS, knew about ORION, and they supported us. Our CEO, David Abney, volunteered to participate in the final presentation, thereby upping the ante for us. Along with David, our CIO Juan Perez, and our Senior Engineering Vice President Mark Wallace also agreed to make the case for ORION. Our coaches Randy Robinson and Ananth Iyer offered valuable guidance.

Though we had been preparing for months, if not years, we were busy revising our script well into the wee hours of Sunday night before the Monday competition. In fact, during the last few days before the competition, the script had already been rewritten multiple times at warp speed. It was all made worthwhile when the judges graciously conferred the 2016 Franz Edelman Award on UPS' development and application of the ORION project.

During those anxious moments leading up to the final Edelman presentation, I kept telling myself that win or lose nothing is going to change; we will return to the same grind of addressing challenges in the next phase of the project. I was wrong. Winning did make a difference. Now I do not have to wake up in the middle of the night thinking there is something I could have done to change the outcome.

Our journey from the time we started talking about using operations research to improve P&D operations has been long. Still, for some of us this was a personal mission. But little did we know that the ORION system would not be completely deployed until 2016, would require more than $300 million in investment, and would employ 700 people at its peak. The result was worth the wait. Upon reaching our journey's milestone today, the ORION system not only substantially improves package-pickup-and-delivery operations but also constitutes the foundation for a new generation of UPS planning based on advanced analytics.

Nevertheless, the journey goes forward as we expand application outside the United States and continue adding refinements to the system.

We have come a long way; yet we have far to go.







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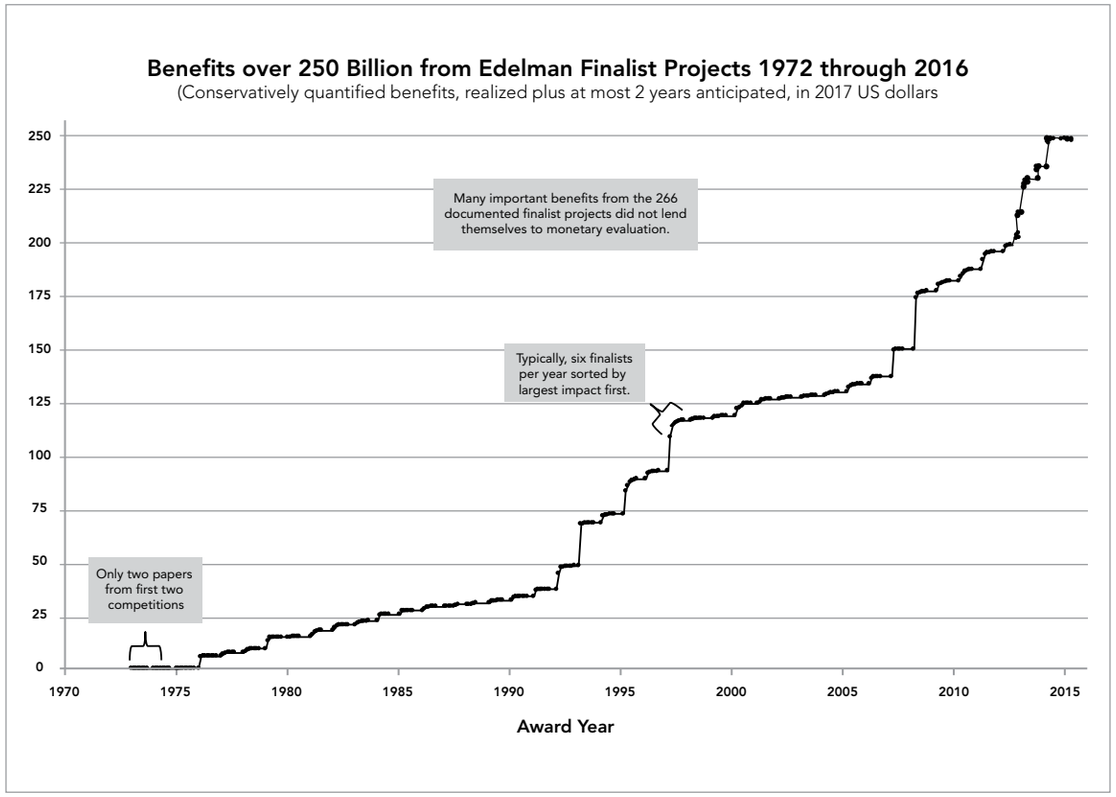
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Operations Research: Billions and Billions of Benefits!

By Jeffrey M. Alden,
Technical Fellow, GM, R&D Operations Research



More than 250 billion U.S. dollars of impact! That's impressive! How were they estimated? How broad is the impact? Is there more?

Since 1974, the Edelman finalists published their project accomplishments in the INFORMS journal *Interfaces*. Reviewing all 266 articles, their monetary impact was estimated under these guidelines:

- Be objective and conservative.
- Include reported impact and at most two more years of anticipated impact.
- Include only one year of enormous impact (tens of billions) to downplay the huge size and budget of some organizations.
- Ignore relative impacts even though saving $10 million for a small company may be more impressive than saving $100 million for a large company.

These conservative guidelines do not include many important yet difficult-to-quantify benefits like better legal dispute resolution, cancer treatments, airline security, hazardous material deposition, budget allocation, epidemic disease control, organizational structure, on-time railway performance, and space shuttle heat shielding performance. For example, there are more than 20 finalist papers with significant life and health benefits. Most are very difficult to quantify, however a CDC project on (future) U.S. epidemics expects annual savings of 6,000 lives valued at $12B[1] and a U.S. Army project prevented 4,500 casualties by reducing requirements for helicopter and ground-convoy movements.[2] Almost all finalist papers report nonmonetary benefits and frequently tout them as most important and longer lasting by establishing, for example, ongoing practices and organizational changes that improve health, safety, cooperation, decision making, and job satisfaction. Great! Clearly, the reported monetary benefits greatly understate the full impact of the Edelman finalist projects.

Another important indication of the influence of O.R. is the impressive breadth of applications. The Edelman finalists represent over 125 different application areas including: air traffic, banking, canal operations, communications (broadband, broadcasting), consumer products, crowd control, express delivery, defense (Air Force, Army), education, financial (pension, investment, credit card, settlement), fire protection, forestry, healthcare (cancer, hospital, pharmaceutical, diagnosis, elderly, disease control), hotel management, energy production and distribution (coal, gas, electric, oil, nuclear), land use, manufacturing (electronics, food, paper, seeds, steel, tires, vehicles, wood), marketing, printing, sanitation, security (airport, police), social networks, sports, tax collection, transportation (airline, highway, railway, space), treasure hunting, waste management, water (resources, quality, flow, flood), and weapons dismantlement. The list goes on and on! In fact, 675 organizations (business, government, academic, etc.) are recognized and honored as supporting or benefiting from finalist projects (some counted more than once).

Finally, the O.R. impact reported here is just the "tip of the iceberg" because the Edelman competition only captures those O.R. professionals choosing to compete. Just think, the count of Edelman finalist authors (1,197) represents about 10% of the current INFORMS membership.[3] Undoubtedly, there is a vast number of O.R. projects with significant impact that did not compete due to confidentiality, lack of internal support to compete (e.g., no one thought of it, too busy, no management support, inadequate documentation), or the team was simply unaware of the competition.

The impact is immense ... O.R. professionals should be proud of their profession – you can say "billions and billions" when asked about the value of O.R.!

[1]For CDC: 6000 lives / year ≈ 314M U.S. population ⋆ 5% epidemic penetration ⋆ 10% die under current practices ⋆ (1-80% fatality reduction under improved practices) ⋆ 1 epidemic per 200 years. Value of quality year of life in U.S. is $2M / average life ≈ $50K / year (a standard value) ⋆ 78 years life expectancy ⋆ 50% average life lived. Total expected annual impact is $12B = 6000 ⋆ $2M. See "Advancing Public Health and Medical Preparedness with Operations Research," *Interfaces*, Vol. 43, No. 1 (note Figure 6).

Numbers are reasonable values offered by the author.

[2]"Bayesian Networks for Combat Equipment Diagnostics," *Interfaces*, Vol. 47, No. 1.

[3]It is interesting how the average number of authors per paper has grown from 1.8 over first 10 award years (1974 –1982) to 7.7 over last 10 award years (2007–2016). Linear regression gives 0.16 annual growth in average authors per paper with $R^2 = 0.77$.

Franz Edelman Award





Recognizing and Rewarding Real Achievement in O.R. and Analytics

The Franz Edelman Award Competition is administered by
The INFORMS Section on Practice

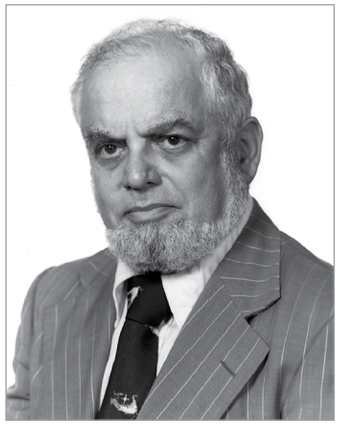
For more than 40 years, the international Franz Edelman competition has shined a spotlight on the most outstanding real-world applications of operations research and analytics that are transforming our approach to some of the world's most complex problems.

Every year, organizations from around the world, both large and small, profit and nonprofit, business and governmental, private and public, compete for the Edelman Award. The common theme shared by all selected finalists is having realized substantial benefits, from life-saving medical advancements to millions in cost savings and efficiency gains, from the practical application of advanced methods of operations research and analytics.

Rich with insightful research, the abstracts from Edelman finalist papers are shared through *Interfaces* online, and full-text versions of some of these papers are available in an online archive. In addition, video of past competition presentations can be found in the INFORMS Video Learning Center, and serve as valuable tools for teaching, marketing, or publicizing O.R. practice successes.

The history of the Edelman Award predates that of INFORMS. In 1972, The Institute of Management Sciences (TIMS), together with its College on the Practice of Management Science (CPMS), created the competition. In 1986, the award was renamed in honor of one of the earliest industry practitioners of O.R. in North America, Franz Edelman. When TIMS merged with the Operations Research Society of America to create INFORMS in 1995, the Edelman Award became the flagship event in a growing awards program.

Born in Germany not long before Hitler came to power, Franz Edelman encountered much adversity at a young age. After fleeing the Nazi regime in the late 1930s, a teenage Franz Edelman found himself in England, where his alien status resulted in internment and he was sent to Canada for an interlude of lumberjacking. After overcoming these obstacles, he received his undergraduate



Franz Edelman

education at McGill University, and later earned a PhD in applied mathematics from Brown University. He then joined the RCA Corporation as an engineer concentrating on computational topics. While his earlier efforts focused on physical science problem solving, he rapidly began to envision the extreme value of computer systems that could assist with management and business operations. By the early 1950s, this insight led him to establish RCA's legendary Operations Research Group, one of the first such groups in a North American corporation.

As he continued to advance the O.R. profession, Franz Edelman advocated that success in operations research requires excellence in information technology (IT) – computer software, computer hardware, and communications. His passion for IT ultimately led him to his new role as vice president of Business Systems and Analysis for RCA, responsible for IT as well as O.R. These ideals are still very much present in our current focus on "analytics" and "business intelligence," where strong analysis combines with strong IT.

After 30 years of service to RCA, Franz Edelman retired and formed Edelman Associates, an O.R. consulting firm. Throughout his career, Franz's commitment to advancing O.R. and his positive influence on others enhanced his legacy as a leader in the field of O.R. practice. Shortly after his death, the Franz Edelman Award was named in his memory and today continues to advance the operations research practice to which he contributed so much.









Edelman First-Place Award Recipients

2016 UPS
"UPS On-Road Integrated Optimization and Navigation (ORION) Project"

2015 Syngenta
"Good Growth through Advanced Analytics"

2014 U.S. Centers for Disease Control
"Eradicating Polio Using Better Decision Models"

2013 Delta Programme Commissioner
"Economically Efficient Flood Standards to Protect the Netherlands Against Flooding"

2012 TNT Express
"Supply Chain–Wide Optimization at TNT Express"

2011 MISO
"Midwest Independent Transmission System Operator Applies Operations Research to Energy and Ancillary Services Markets, Unlocking Billions in Savings"

2010 Indeval
"Mexican Financial Markets Benefit from Novel Application of Operations Research"

2009 Hewlett-Packard
"HP Transforms Product Portfolio Management with Operations Research"

2008 Netherlands Railways
"The New Dutch Timetable: The O.R. Revolution"

2007 Memorial Sloan-Kettering Cancer Center
"Operations Research Advances Cancer Therapeutics"

2006 Warner Robins Air Logistics Center
"Warner Robins Air Logistics Center Streamlines Aircraft Repair and Overhaul"

2005 General Motors
"Increasing Production Throughput at General Motors"

2004 Motorola, Inc.
"Reinventing the Supplier Negotiation Process at Motorola"

2003 Canadian Pacific Railway
"Perfecting the Scheduled Railroad: Mode Driven Operating Plan Development"

2002 Continental Airlines
"A New Era for Crew Recovery at Continental Airlines"

2001 Merrill Lynch, Inc.
"Pricing Analysis for Merrill Lynch Integrated Choice"

2000 Jeppesen Sanderson, Inc.
"Flexible Planning and Technology Management at Jeppesen Sanderson, Inc."

1999 IBM
"Extended Enterprise Supply Chain Management at IBM Personal Systems Group and Other Divisions"

1998 Bosques Arauco, S.A.
"Use of OR Systems in the Chilean Forest Industries"

1997 Societé Nationale des Chemins de Fer Français and Sabre Decision Technologies
"Schedule Optimization at SNCF: From Conception to Day of Departure"

1996 South African National Defense Force (SANDF)
"Guns or Butter: Decision Support for Determining the Size and Shape of the South African National Defense Force"

1995 Harris Corporation/Semiconductor Sector IMPReSS
"IMPReSS: An Automated Production-Planning and Delivery-Quotation System at Harris Corporation—Semiconductor Sector"

1994 Tata Iron & Steel Company, Ltd.
"Strategic and Operational Management with Optimization at Tata Steel"



Edelman First-Place Award Recipients

(Continued)

1993 AT&T
"AT&T's Telemarketing Site Selection System Offers Customer Support"

1992 New Haven Health Department
"Let the Needles Do the Talking! Evaluating the New Haven Needle Exchange"

1991 American Airlines
"Yield Management at American Airlines"

1990 Health Care Financing Administration
"Diagnosis Related Groups: Understanding Hospital Performance"

1989 ABB Electric, Inc.
"A Choice-Modeling Market Information System That Enabled ABB Electric to Expand Its Market Share"

1988 City of San Francisco Police Department
"A Break from Tradition for the San Francisco Police: Patrol Officer Scheduling Using an Optimization-Based Decision Support System"

1987 Syntex Laboratories, Inc.
"Sales Force Sizing and Deployment Using a Decision Calculus Model at Syntex Laboratories"

1986 Southland Corporation (CITGO Petroleum Corporation Subsidiary)
"The Successful Deployment of Management Science throughout CITGO Petroleum Corportation"

1985 Weyerhaeuser Company
"Weyerhaeuser Decision Simulator Improves Timber Profits"

1984 (dual) ***Blue Bell, Inc.***
"Blue Bell Trims its Inventory"

1984 *(dual)* ***The Netherlands Rijkswaterstaat and the RAND Corporation***
"Planning the Netherlands' Water Resources"

1983 Air Products and Chemicals, Inc.
"Improving the Distribution of Industrial Gases with an On-Line Computerized Routing and Scheduling Optimizer"

1982 Arizona Department of Transportation
"A Statewide Pavement Management System"

1981 ANR Freight System
"From Freight Flow and Cost Patterns to Greater Profitability and Better Service for a Motor Carrier"

1980 Kelly-Springfield Tire Company
"Coordinating Decisions for Increased Profits"

1979 The Greater New York Blood Program
"The Long Island Blood Distribution System as a Prototype for Regional Blood Management"

1978 Cahill May Roberts, Ltd.
"A Planning System for Facilities and Resources in Distribution Networks"

1977 Syncrude Canada, Ltd.
"Simulation of Tar Sands Mining Operations"

1976 American Telephone & Telegraph
"The Use of Management Science in Making a Corporate Policy Decision–Charging for Directory Assistance Service"

1975 Xerox Corporation
"Management Science's Impact on Service Strategy"

1974 Canadian National Energy Board
"Management Science in Energy Policy: The Trans Canada-Great Lakes Transmission Case"

1973 The Babcock & Wilcox Company
"Planning Nuclear Equipment Manufacturing"

1972 The Pillsbury Corporation

Congratulations!

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WHO IS ELIGIBLE?

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The Finest Step Forward: The Journey to the Franz Edelman Award

Each spring, the Franz Edelman Award for Achievement in Operations Research, Management Science, and Advanced Analytics is presented to just one remarkable candidate selected from a pool of incredibly accomplished finalists, in a culmination of what may represent years of research and hard work for that organization. For INFORMS too, the selection process begins long before the award is ever presented.

Each September, INFORMS issues a call for entries, and ultimately nearly two dozen organizations from around the world provide a brief summary illustrating a practical operations research (O.R.) application in which the results had significant, verifiable, and quantifiable impact for the organization.

The Franz Edelman Award Committee is composed of nearly three dozen O.R. practitioners and academics from leading O.R. programs, including BNSF Railway, HP, Intel, IBM, McDonalds, MIT, Purdue University, SAS, Schneider National, Southwest Airlines, Turner Broadcasting, and the Ivey School of Business. By November, this committee will have narrowed the applicant field to a group of semifinalists, and by the end of the year, six will be recognized as Edelman Award finalists.

Prior to being named finalists, each entry will be carefully reviewed by a team of verifiers, who work with the relevant stakeholders to validate the details of their award entry. The verifiers will thoroughly examine the O.R. work presented in the assigned entry summary, as well as its potential impact, and convey this information to the rest of the selection committee. The verifiers communicate directly with the entrant's O.R. team, the users of the work, and client management. Verification is a crucial step in the competition as it ensures that only the highest-quality O.R. will be represented in the Edelman Award competition. All verifiers follow detailed written guidelines and sample verification reports, to ensure a thorough process that is identical for each award entry.

Once the Edelman Award Committee has announced the six entries that will advance to the finals, each finalist will first prepare a journal-quality paper, and then a 40-minute presentatation to be given during the *INFORMS Conference on Business Analytics and Operations Research* in April. A team of experienced coaches is assigned to each finalist team to guide them throughout each step of the process, and help ensure that the team's paper and presentation will convey the significance and monumental impact of the work to the panel of judges.

Two months prior to the *INFORMS Conference on Business Analytics and Operations Research*, during which the final stage of the competition will be held and the winner announced, the finalist papers are presented to the judges, who will begin the long review process. Each judge studies the papers independently, and provides input to a group discussion. The finalists are each assigned a focal point judge who conveys valuable feedback from the judging committee to the finalist's coaches.

This feedback helps each team identify areas with potential for clarification or improvement prior to the final presentation.

On the day of the competition, each team will conduct a 40-minute presentation, followed by a 10-minute period of questioning by the judges. As they assess each presentation, the judges will follow a strict set of guidelines, including the importance of the application, the novelty and portability of the technical solution, the quality and effectiveness of the implementation, and the total impact of the project in both quantitative and qualitative terms. Once the final presentation is complete, the judges sequester themselves to carefully review all that they have heard and seen, until they unanimously agree on which finalist team best exemplifies the ideals and standards of the Franz Edelman Award that has recognized O.R. and analytics excellence for 46 years.

Following the competition, the incredible achievements of all the finalists will be showcased in the January/February issue of the INFORMS journal *Interfaces*, which is dedicated to improving the practical application of O.R. to decisions and policies in today's organizations and industries. In addition, the competition is filmed and all presentations are made available via streaming video shortly after the end of the meeting. All finalists will again be invited to reprise their work at a session of the INFORMS Annual Meeting in the fall, which attracts more than 5,500 analytics professionals and academics from around the world. The first-place team will also conduct a keynote address during the meeting.



The 2017 Selection Committee & Verifiers

We wish to thank the following individuals for their dedication and service as Selection Committee members and as verifiers for this year's Edelman Award.

Each of the semifinalists is assigned a verifier who works behind the scenes, often with an associate verifier, to validate the claims made by their entry. A verifier's primary role is to understand an applicant's O.R. work and its impact in detail, and then convey this to the rest of the committee, both orally and in a written report. Verification is a crucial element of the competition because it ensures that only the highest-quality O.R. and analytics work with verified impact makes it to the Edelman Award finals.

Selection Committee & Verifiers

- Layek Abdel-Malek, New Jersey Institute of Technology, *v*
- Susan Albin, Rutgers University
- Jeffrey M. Alden, General Motors, *v*
- Sharon Arroyo, The Boeing Company, *v*
- Carrie Beam, Carrie Beam Consulting, *v*
- Peter C. Bell, Ivey Business School at Western University, *v*
- Sudip Bhattacharjee, University of Connecticut
- John R. Birge, University of Chicago, *v*
- Anthony Brigandi
- Bruce Bukiet, New Jersey Institute of Technology
- J. Antonio Carbajal, CAP, Turner Broadcasting System, Inc.
- Luz Caudillo-Fuentes
- Alfred Degbotse, IBM
- Pooja Dewan, BNSF Railway
- Andrea Feunekes, Remsoft Inc.
- Howard Finkelberg, M.A.G.I.C. LLC
- Kenneth Fordyce, Arkieva, *v*
- Yanai Golany, Verizon, *v*
- Michael F. Gorman, University of Dayton
- Stephen Graves, Massachusetts Institute of Technology, *v*
- Arnold Greenland, CAP, University of Maryland, *v*
- Sidney Hess, *v*
- Mingguo Hong, Case Western Reserve University
- Bill Hostmann, Dresner Advisory Services, *v*
- Yoshiro Ikura, SAITECH, Inc, *v*
- Ananth Iyer, Purdue University, *v*
- Shailendra Jain, Hewlett Packard Enterprise
- William Klimack, Chevron
- Russell P. Labe, CAP, RPL Analytics Consulting
- Mark Lawley, Texas A&M University
- Evan Levine, New York City Police Department, *v*
- Grace Lin, Asia University
- Yingdong Lu, IBM, *v*
- Irvin Lustig, CAP, Princeton Consultants
- Douglas Matty, U.S. Army
- Charles McCallum
- R. John Milne, Clarkson University
- Sven Müller, University of Applied Sciences Karlsruhe, *v*
- Patricia Neri, SAS Institute, Inc., *v*
- Ranganath Nuggehalli, CAP, UPS, *v*
- Anna Olecka, Honeywell
- Ioannis (Yanni) Papadakis, Dun & Bradstreet
- Jesse Pietz, CAP, United States Air Force Academy
- Graham Rand, Lancaster University
- John Ranyard, Lancaster University
- Olga Raskina, Juno Therapeutics, *v*
- Anne G. Robinson, Verizon
- Randall S. Robinson, *v*
- Harrison Schramm, CAP, CANA Advisors, *v*
- Leon Schwartz, Informed Decisions Group
- Mark Squillante, IBM Thomas J. Watson Research Center
- Kendra Taylor, AECOM, *v*
- G. Jack Theurer, G Theurer Associates, Inc., *v*
- Michael A. Trick, Carnegie Mellon University
- Andres Weintraub, Universidad de Chile, *v*
- Peiling Wu-Smith, General Motors

"v" Indicates Verifiers

The Coaching and Judging Process & The 2017 Coaches and Judges

We wish to thank the following individuals for their dedication and service as coaches and judges for this year's Edelman Award.

The major role of the coach is to ensure each team's paper and presentation convey the work in a manner that may be well understood by a general operations research audience. Often a coach is paired with an associate coach who lends another perspective to the process.

The judges must work together, evaluating the evidence to determine which finalist is most deserving of the Franz Edelman Award for Achievement in Operations Research. The award is for implemented work that has had significant, verified, and preferably quantified impact.

Coaches

- Layek Abdel-Malek, NJIT
- Jeffrey M. Alden, General Motors
- Sharon Arroyo, The Boeing Company
- John R. Birge, University of Chicago
- Peter C. Bell, Ivey Business School at Western University
- Yanai Golany, Verizon
- Arnold Greenland, CAP, University of Maryland
- Ananth Iyer, Purdue University
- Irvin Lustig, CAP, Princeton Consulting
- Ranganath Nuggehalli, CAP, UPS
- Randall S. Robinson
- Harrison Schramm, CAP, CANA Advisors

Judges

- Anne G. Robinson, Chair, Verizon
- Susan Albin, Rutgers University
- Carrie Beam, Carrie Beam Consulting
- Michael F. Gorman, University of Dayton
- Stephen Graves, MIT
- Mark Lawley, Texas A&M University
- Yingdong Lu, IBM
- Leon Schwartz, Informed Decisions Group
- Kendra Taylor, AECOM

The Edelman Laureates

The men and women who author Edelman finalist papers are deemed Franz Edelman Laureates.

Authors of finalist papers to be published in *Interfaces* are recognized with this distinction, and each is formally presented with the Franz Edelman Medal.

Laureates are recognized for their significant contribution to work that is selected each year as representative of the best applications in the world of analytical support for decision making.

The Laureate recognition is distinct and separate from membership in the Franz Edelman Academy.



The Edelman Academy

Each year, a limited number of organizations may be inducted as members of the Franz Edelman Academy.

The primary client organization, or beneficiary of the finalist work, is inducted into the Academy at the annual Edelman Gala.

In addition, organizations that played a major role in the work, and therefore deserve academy membership, may also be inducted. The most common example would be an organization that provided the professionals who did the majority of the analytical work.

The membership of the Franz Edelman Academy represents 46 years of extraordinary contributions to society through the innovative application of operations research.

METRON
SCIENTIFIC SOLUTIONS

Congratulations to the 2017
Franz Edelman Finalists!

Applied Mathematics, Physical Modeling, and Computer Science
www.metsci.com

Introduced in the pages that follow are the six finalists for the 2017 Franz Edelman Award.

Over the past several months these teams have demonstrated to the judges that their work is among the finest examples of operations research practice in the world. One of these organizations will be recognized as the best in class, the first-place recipient of the 2017 Franz Edelman Award.

Each finalist's work is described here in a shortened summary. Full papers will be published in the January/February 2018 issue of *Interfaces*, the INFORMS journal dedicated to improving the practical application of operations research and advanced analytics in today's organizations and industries.

The Finalists for the 2017 Franz Edelman Award are:

American Red Cross

Barco

BHP Billiton

General Electric and Norfolk Southern

Holiday Retirement

New York City Department of Transportation

American Red Cross

Analytics-Based Methods Improve Blood Collection Operations

More than 36,000 blood donations are needed daily in the U.S., accounting for nearly 21 million annual blood component transfusions. The demand for blood transfusions is ample due to high prevalence of chronic diseases and ageing of the population. The margin between blood need and transfusable blood product availability has been critically tight, and warnings of blood shortages have received extensivemedia coverage.

Due to the limited supply and perishable nature of blood products, effective management of blood collection is critical for high quality healthcare delivery. After collection, whole blood can be processed into different blood components including red blood cells, platelets, plasma, and cryoprecipitate. Among these products, the collection of cryoprecipitate (or "cryo") is particularly challenging. To be processed into cryo units, the collected whole blood has to be shipped to the production facility and be processed within eight hours after collection. Almost all other blood products can be processed within 24 hours of collection. This tight time constraint between collection and production can only be satisfied with extra courier services, which makes the collection of cryo units more costly than other products.

Cryo plays a critical role in clotting and controlling hemorrhaging and is often used in the treatment of massive trauma and major diseases, including metastasized cancers, cardiac diseases, hepatic failures, and organ transplants. From 2000 to 2010, the use of fresh-frozen plasma, the raw material for cryo







production, increased tenfold and grew to more than 2.4 million units used annually in the United States.

In this study, we describe and analyze a regional level cryo collection problem faced by the American Red Cross Douglasville Blood Processing Center (Georgia), one of the Red Cross's largest supplier of blood products serving the Red Cross Southern Region (Atlanta-area) hospitals. In particular, this project focused on determining when and from which mobile collection sites to collect blood for cryo production and how to schedule the courier services such that the collection targets are met and the total collection costs are minimized.

A regional level cryo collection problem imposes several challenges: i) if the blood collected is to be processed into cryo units, it has to be processed within eight hours after collection; ii) the collection quantities are uncertain due to donor no-shows, random walk-ins, and random yields in production; and iii) collection schedules need to be made in advance and may need to be dynamically adjusted depending on the realizations of uncertainties.

To formally analyze the problem and optimize the collection schedules, we first formulated a large-scale stochastic dynamic program (DP), which considers all collection sites and dynamically determines the sites for cryo collection over the week. However, given the size of the problem, the corresponding DP is computationally intractable. To solve the problem, we structurally analyzed this model, proved several structural properties, and developed a near optimal solution algorithm. To facilitate implementation, we also developed a decision support tool (DST) to systematize the selection of the collection sites, which is now used in practice in the Red Cross Southern Region.

The implementation of the DST in the Red Cross Southern Region led to an increase in the number of whole blood units satisfying the eight-hour collection to process constraint for cryo production (capacity expansion). In particular, during the fourth quarter of 2016, the Red Cross was able to process about 1,000 more units of cryo per month (an increase of 20 percent) at a slightly lower collection cost (cost avoidance), resulting in an approximately 40 percent reduction in the per unit collection cost for cryo.

Finally, these findings have been recently presented to other Red Cross Biomedical Services executives at a national Red Cross conference, and plans are in place to extend the implementation of the DST to the 11 other Red Cross cryo processing facilities in the future.

Organization

American Red Cross

The American Red Cross prevents and alleviates human suffering in the face of emergencies by mobilizing the power of volunteers and the generosity of donors. American Red Cross Biomedical Services plays a critical role in our nation's health care system. It is the largest single supplier of blood and blood products in the United States, collecting and processing approximately 40 percent of the blood supply. Last year the Red Cross collected more than 4.8 million units of blood from nearly 2.8 million volunteer donors. These donations were then processed into approximately 6.8 million blood products for transfusion to meet the needs of patients at approximately 2,600 hospitals across the country.

The Red Cross also plays a leading role in protecting the safety of donors and patients and increasing the availability of blood. It has been among the first to help develop and implement testing for infectious diseases and is frequently the single major contributor to clinical trials to improve blood safety. Providing life-saving blood and blood products to patients is a key component of the Red Cross mission to help people in times of emergency and disasters. In addition to being the single largest supplier of blood in the U.S., the Red Cross is a leader in research and testing to protect the safety of the blood supply. The Red Cross was among the first to develop and implement testing for many infectious diseases including, HIV, hepatitis B and C viruses, West Nile virus, Trypanosoma cruzi, the agent of Chagas disease, and most recently Zika virus.

Georgia Institute of Technology and the H. Milton Stewart School of Industrial & Systems Engineering

The Georgia Institute of Technology is one of the nation's premier research universities, ranking seventh among *U.S. News & World Report's* top public universities. Georgia Tech's more than 25,000 students are enrolled in its Colleges of Computing, Design, Engineering, and Sciences, the Ivan Allen College of Liberal Arts, and the Scheller College of Business. Georgia Tech offers research opportunities to both undergraduate and graduate students and is home to more than 100 interdisciplinary units plus the Georgia Tech Research Institute. The university is a national and international leader in scientific and technological research and education.

The H. Milton Stewart School of Industrial & Systems Engineering (ISyE) was established in 1924 as a program in Mechanical Engineering at Georgia Tech and became a School in 1945. Ranked as the number one undergraduate and graduate program in industrial engineering for more than two consecutive decades by the *U.S. News & World Report*, ISyE is the largest industrial engineering program in the United States. With more than 1,700 students currently enrolled, ISyE graduates over 10 percent of the world's industrial engineers.

Barco

Platform-Based Product Development Enhances Barco's Healthcare Division

Like in many other companies, the product portfolio at Barco has been growing over the last few years to tap into opportunities in global markets, strengthen the competitive position, and respond to strong customer requests and rapidly evolving technological innovations. Barco is a global technology company that designs, develops, and produces networked visualization products for entertainment, enterprise, and healthcare markets. Barco's Healthcare Division offers displays that are used by medical professionals for diagnostics in mammography, surgery, and dentistry.

While the increased product proliferation in 2010 had a positive impact on customer satisfaction, it led to an increase in Barco Healthcare's product and process complexity, operational costs, and R&D effort. Barco Healthcare's supply chain department suffered from high costs of obsolescence due to scrap (end of life) inventory. The high variety in components also led to increased material management and sourcing related costs, such as supplier management, purchase execution costs, less volume discounts, as well as more quality inspection costs on the incoming material deliveries. Finally, the delivery performance suffered as a result of the challenges in operations.

Barco introduced platforms in 2014 to cope with the product variety in its medical displays. The most common application of platforms is within the automotive industry. Barco's previous attempts to implement one common platform led to excessive costs and



quality deficiencies. The researchers developed operations research models to support Barco in the optimal platform configuration. These models are unique in that they include all relevant supply chain costs impacted by platforms, which makes it an objective tool that takes into account the input from marketing, sales, R&D, operations, and supply chain.

The new platform-based approach is now fully embedded in the R&D planning process. Formerly, each product was developed from scratch, but now R&D starts from the current platforms to develop new products. This new approach allows for more consistency and more reuse of components, but foremost a shorter time to market. Although it took a long time to initially develop the platforms, it enabled Barco to introduce follow-up product variants, including more features, using the same platform at a record-high pace. While keeping R&D costs stable in combination with a more efficient introduction of new products, Barco realized a material gain on gross profit and operational expenses.

Due to the commonality and reuse of components, safety stocks have so far been brought down, and an additional gain is to be expected by 2018, once the old products are phased out. Due to the shorter throughput times, roughly 5 percent of the turnover can be collected one month earlier. This leads to a working capital improvement of around half a million dollars.

Moreover, the improved product introduction time allows Barco to spread new technologies faster toward hospitals and patients. Early detection increases the survival rate by 3-4 times, and having the latest technology available in healthcare can literally save thousands of people.

Organization

Barco
Barco is a global technology company that designs and develops visualization and collaboration solutions for a variety of selected professional markets, including enterprises, healthcare, and entertainment. Founded more than 80 years ago, Barco has pioneered a large variety of visualization technologies, most notably in projection and display markets. In recent years, the company has added networking and collaboration technology to its focus areas. Barco's products and solutions are renowned for their top quality, user friendliness, and excellent after-sales service.

Vlerick Business School
Vlerick Business School is a triple-accredited, international business school in the heart of Europe – ranked number one in the Benelux for executive education and 15 in Europe. Each year we welcome 740 MBA and master's students from 50 countries into our world-class programs in Brussels, Ghent, Leuven, and Beijing. More than 8,500 executives from across the globe join our executive education and customized programs.

IÉSEG School of Management
Established in 1964, IÉSEG School of Management is one of the top business schools in France, and ranked 17th in 2016 in the *Financial Times* ranking of Master in Management Programs. As a French Grande École and member of the Conférence des Grandes Écoles, IÉSEG is one of the most prestigious higher education institutions in the country. It has also been awarded the triple crown of international accreditations: AACSB, AMBA, and EQUIS.

KU Leuven
Founded in 1425, the University of Leuven (KU Leuven) has been a center of learning for almost six centuries. Today, it is Belgium's largest and highest-ranked university as well as one of the oldest and most renowned universities in Europe. The Faculty of Economics and Business of KU Leuven capitalizes on the full potential of a multi-campus organization. Its program portfolio ranges along a continuum from a solid emphasis on analytical rigor to more inductive evidence-based and practice-driven programs.







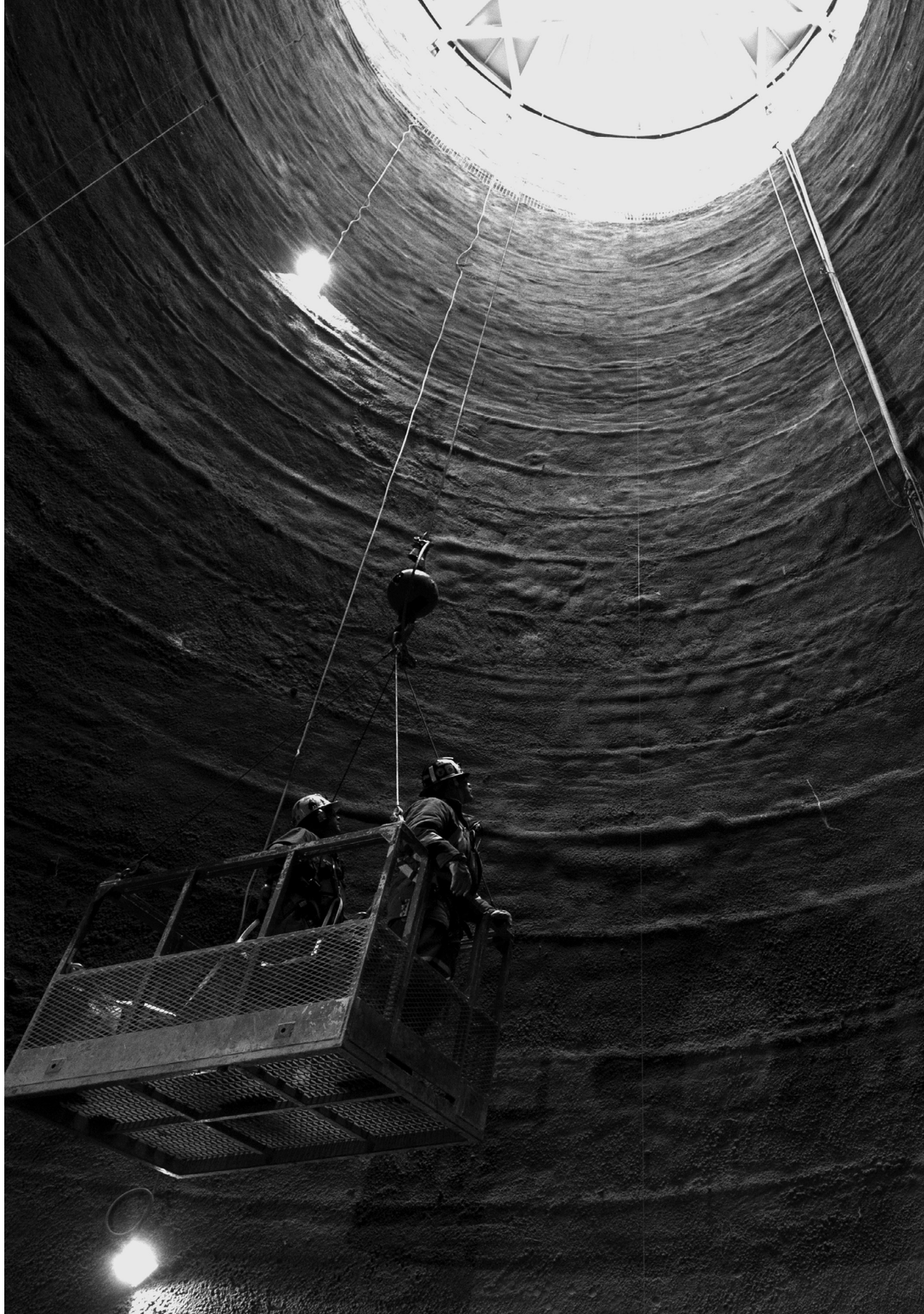
BHP Billiton

The DICE Simulation Model Unlocks Significant Value for the Jansen Potash Project

BHP Billiton plans to enter the bulk fertilizers market by developing its first potash operation, the Jansen Potash Mine, located in Saskatchewan, Canada. Jansen could be the world's newest and one of the largest conventional potash operations after multiple stages of development. An investment like Jansen typically takes years to conceive, design, approve, and construct. During the design phase, BHP Billiton has made many significant value optimization decisions that impacted Jansen's production and logistics operations. BHP Billiton engaged Amec Foster Wheeler to develop a model of the Jansen production and logistics chain to aid in understanding the drivers of production capacity to make informed design decisions.

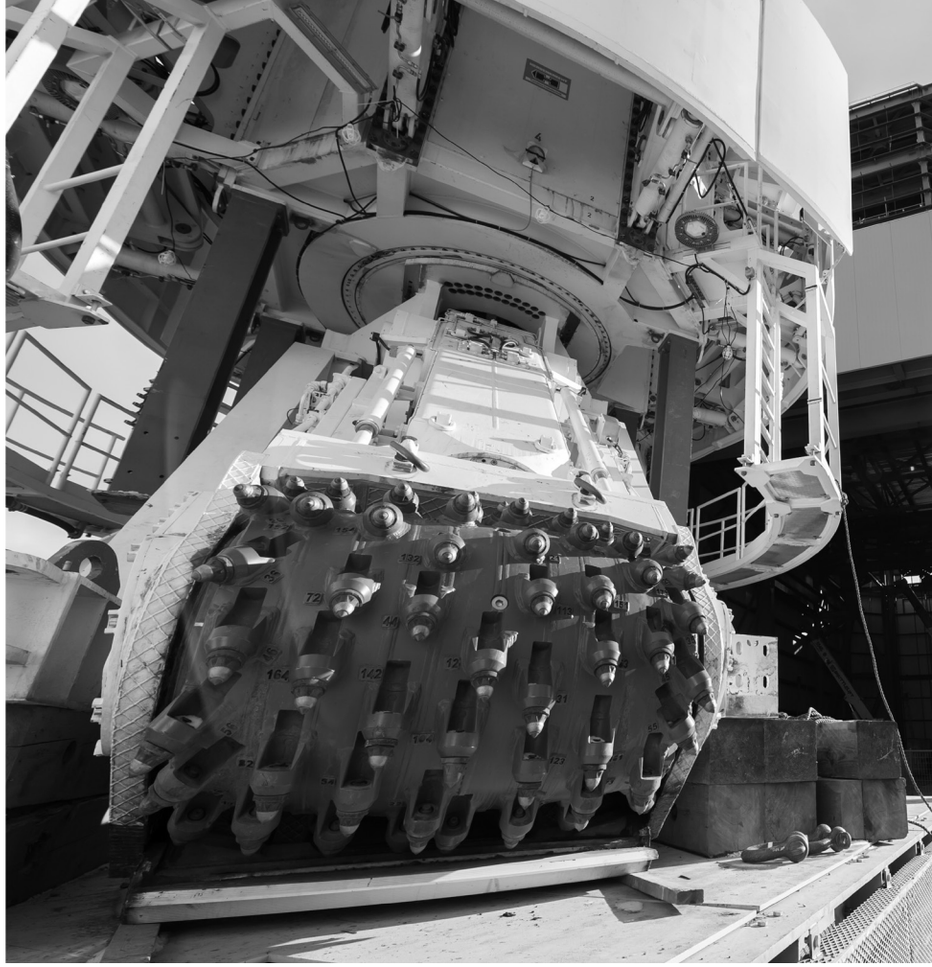
The Detailed Integrated Capacity Estimate (DICE) model is a comprehensive discrete event simulation (DES) of the Jansen operation. DICE is broad, integrated, and complex, involving upstream production (mining, hoisting, and ore processing) and downstream outbound logistics (rail, port, and customer delivery). Capturing the entire production and logistics chain was a critical attribute of DICE. It employs multiple operations research techniques to provide an unprecedented combination of complexity, granularity, and scalability. Models as integrated and complex, and used as early as the design phase, are rare in the mining industry.

Using DICE, the team examined various ways of configuring the Jansen operation with respect to the value drivers of capital cost, operating cost, production capacity, and ultimately, net present value (NPV). With respect to capital, DICE informed ore storage capacities, product









sizing infrastructure, critical equipment redundancies, and by-passes. For example, DICE confirmed the deferral from the current budget of about $300 million in capital to equip the second of two hoisting shafts. With respect to operational mode, DICE confirmed the reduction of planned maintenance frequencies and increase of the degree of mining automation.

Jansen's projected annual production in Stage 1 increased by 15-20 percent from the start of the pre-feasibility study for which they used a conventional valuation approach, to the end of pre-feasibility study for which they used the advanced approach of DICE. Two thirds of this gain was credited to DICE. This additional production would translate into significant additional annual revenue, adding more than $500 million to the NPV of Jansen Stage 1.

DICE also uncovered more hoisting capacity from the two shafts presently under construction. This would bring forward production scheduled for later in the life of Jansen, increasing the NPV of Jansen's future stages combined by 12-16 percent. DICE significantly improved the appeal of the Jansen investment, increasing the probability of positive NPV by 30 percent for Stage 1. In consideration of this amongst other factors, the BHP Billiton Board of Directors approved the progression of Jansen from pre-feasibility study to feasibility study.

DICE now extends into the feasibility phase as a tool to support detailed design decisions, which could yield further gains in production capacity and project value in addition to the optimization achieved during the pre-feasibility study.

Organization

BHP Billiton
BHP Billiton is a world leader in the diversified resources industry, including iron ore, metallurgical coal, copper, and uranium commodities, as well as substantial interests in oil, gas, and energy coal.
BHP Billiton extracts and processes minerals, oil, and gas from production operations located primarily in Australia and the Americas. Its products are sold worldwide, with sales and marketing led through Singapore and Houston, Texas, USA. With a team of more than 65,000 employees and contractors, BHP Billiton prioritizes its people's health and safety and strives to create an environment free from fatalities, injuries, and occupational illnesses.

Amec Foster Wheeler
Since 1997, Amec Foster Wheeler has been developing discrete-event simulation models for the mining, mineral processing, transportation, and supply chain industries. These have included studies for surface and underground mines, process plants, and multimodal transportation systems. In some cases, 'mine-to-market' models have been used to optimize system design from the mine face right through to the customer. Employing around 36,000 people in more than 55 countries and with 2015 revenues of £5.5 billion, the company operates across the oil and gas industry – from production through refining, processing and distribution of derivative products – and in the mining, clean energy, power generation, pharma, environment, and infrastructure markets.

General Electric and Norfolk Southern

RailConnect 360 Revolutionizes Approach to Train Scheduling

Each of the seven major railroads in North America (called the Class I railroads) own between 20,000 and 50,000 miles of track and run about 2,000 trains per day. The railroads handle a range of traffic that includes intermodal, automobile transport, manifest freight, and passenger, all with unique priorities and scheduling requirements. Typically, rail operations are managed by geographic area from centralized dispatch centers. Each dispatcher in a dispatch center controls a section of the track and manually plans all activities associated with moving trains over that section.

Manual dispatching of trains leads to suboptimal operations. A dispatcher focuses only on a small track section and does not have a global view of the entire rail network. Therefore, what looks locally optimal may harm the network. Moreover, the complexity of the system makes it difficult to make even locally optimal decisions. As a result, trains end up waiting for long periods of time at meet-and-pass locations, and require activities such as crew changes to be performed at expensive locations. Currently, freight trains in North America travel at an average speed of around 20 miles per hour. Increasing this speed by one mile per hour saves a typical Class I railroad over $200 million per year.

The optimal dispatching of trains requires quick and efficient generation of movement plans in real time. A movement plan is a detailed plan for dispatching trains on a rail network. It is also called a meet-pass plan as it involves planning meet locations where trains



traveling in opposite directions can get past each other, and determining pass locations where a fast train can overtake a slower train traveling in the same direction. Generating a movement plan is a complex optimization problem requiring many decisions including the path that each train needs to take from origin to destination, the meet and pass locations in the planning horizon, the locations for crew changes, etc. Generating even a good feasible solution for real-world problems using existing techniques is very difficult. Many attempts that were made earlier to solve this problem met with limited success, and there is no evidence of any other successful implementation of movement planner at any railroad.

General Electric (GE) partnered with Norfolk Southern (NS) Railway to develop and implement a novel algorithm that exploits the problem structure to systematically search the feasible space to generate a robust plan in real time. It employs a hybrid combination of heuristic methods, local optimization techniques, and backtracking methods to develop a near-optimal plan that significantly improves a railroad's performance metrics. NS railroad currently uses this algorithm to dispatch trains over its 11 divisions comprising 20,000 miles of track resulting in a 2 mph increase in average speed, and saving NS over $400 million per year. The capacity of the rail network improved without laying additional track and crew expirations have decreased by 60 percent. On average, freight trains now arrive at their destinations eight minutes early. Prior to the implementation of the algorithm, they were 100 minutes late on average.

GE is implementing this algorithm at two other railroad companies and is in talks to deploy it at several other railroads in the U.S. and abroad. To date, revenues to GE from this product are well over $100 million.

The success of the movement planner algorithm led to a major growth in the optimization-based solutions business of GE. GE Transportation now offers a connected suite of solutions to the railroad industry under the brand name RailConnect 360 to minimize fuel consumption, increase network throughput, improve productivity, and maximize asset utilization.

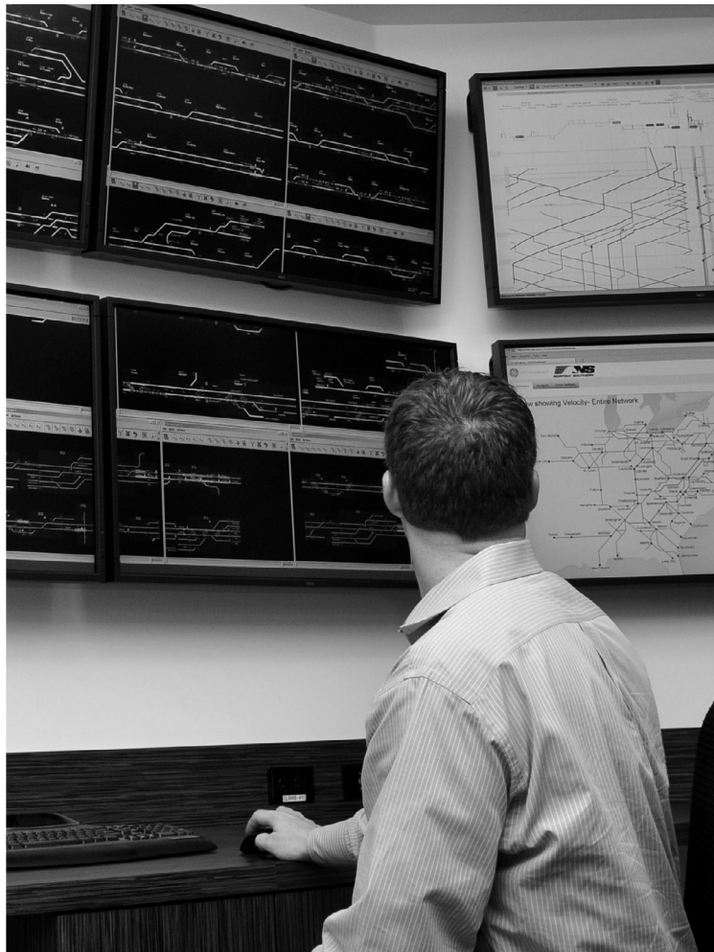
Organization

General Electric
General Electric (GE) is building the world by providing capital, expertise, and infrastructure for a global economy. GE Capital has provided billions in financing so businesses can build and grow their operations and consumers can build their financial futures. The appliances, lighting, power systems and other products built by GE help millions of homes, offices, factories, and retail facilities around the world work better.

Norfolk Southern Corporation
Norfolk Southern (NS) Corporation is one of the nation's premier transportation companies. Its Norfolk Southern Railway Company subsidiary operates approximately 19,500 route miles in 22 states and the District of Columbia, serves every major container port in the eastern United States, and provides efficient connections to other rail carriers. Norfolk Southern operates the most extensive intermodal network in the East and is a major transporter of coal, automotive, and industrial products.







Holiday Retirement

Senior Living Rent Optimizer™ (SLRO™), an Innovative Revenue Management System, Achieves Significant Revenue Gain

The accelerated rise of the aging population is fueling the dramatic growth of a multi-billion-dollar industry focused on building, owning, operating, buying, and selling "senior living facilities." These facilities fill a key chasm between living at home and being in a hospital, and range from independent living and assisted-living communities to nursing homes. The industry provides housing along with wellness programs that include dining, room services, basic healthcare services, community environments, social activities, and support networks.

For senior living facilities to be a successful component in society's solution to caring for seniors, these communities must be efficiently run and supported by a profitable business model. There is no process more foundational than the way an operator makes pricing decisions.

However, the pricing process of most senior living firms is archaic at best – inconsistent, manual, and reactive. These practices create a situation where the local sales staff has frequent requests for exceptions, leading to time spent negotiating prices, first between local and corporate staff, and then between local sales people and residents.

Holiday Retirement (Holiday) is the largest private owner and operator of independent senior living communities in the U.S., with more than 300 facilities and approximately $1 billion in annual revenue. Management recognized its conventional approach to pricing was challenging for everyone and left revenue on the table. After extensive research, Holiday selected Prorize LLC, an Atlanta-based revenue management (RM) firm, as a partner to analyze, develop, and implement the first RM system in the industry.









The resulting system, the Senior Living Rent Optimizer™ (SLRO™), is truly a state-of-the-art system based on innovative pricing science modules and processes. The system is a complete, interconnected software package with complex sets of interactions and flows, including: how data is processed; the kind of variables derived and calculated at appropriate levels; how they coalesce to produce an accurate forecast in a low volume business; the use of a forecast range versus a single point value; the use of a stochastic optimizer to consider most probable demand scenarios; and how workflow is designed to process pricing recommendations with ease; among others.

The SLRO system enables a consistent and proactive pricing process across Holiday, while simultaneously providing optimal pricing recommendations for each apartment unit in every one of their communities. It gives Holiday control over their corporate pricing process, eliminates inventory devaluation and maximizes long-term revenue. In addition, the system is a cultural difference maker. It has raised Holiday's organizational "pricing IQ" and given the salespeople the confidence that the listed price is the "right" price.

Prorize and Holiday developed a reliable and credible method of measuring system performance by live pricing experiments, comparing the results from a set of "pilot" communities that used recommendations from the RM system with results from "control" communities that did not use the system. The results showed that the RM system would provide a revenue benefit to Holiday on an average of 9.3 percent (ranging from 4.1 to 16.2 percent based on different baselines).

As a result, Holiday rolled the system out to the rest of its properties in August 2014. Since then the company experienced significant same-store revenue and occupancy gains. In dollars, Holiday experienced a total revenue increase of $85 million for the first two years of deployment (compared to the year leading up to August 2014, which was used as the baseline).

During this same period, public companies in the senior housing space reported levels of revenue and occupancy that were generally flat by comparison. Over the next three years, Holiday estimates an additional revenue benefit of $219 million (leading to a total $304 million for the initial five-year period). After that period, SLRO is estimated to deliver a sustained annual revenue contribution of $88 million.

For the first time, operations research brought revenue management techniques commonly practiced in other industries to the senior living industry and did so with great success. Holiday views this project as their most important initiative to date.

Organization

Holiday Retirement
Since 1971, Holiday Retirement has endeavored to provide its signature "Holiday Touch" to residents and their families. Today, Holiday is a trusted name in senior living and provides security, comfort, and value to independent seniors seeking a fulfilling lifestyle. Holiday operates more than 300 retirement communities, making it the second largest senior housing operator in the United States.

Prorize LLC
Established in 2006, Prorize designs, builds, and delivers enterprise pricing solutions for major corporations. Our cloud-based pricing solutions have revolutionized how companies with complex business environments set prices based on facts, data, and scientific insights and achieve sustainable revenue growth. Prorize currently focuses on pricing for rental business, including senior living and self-storage industries, helping companies achieve 5-15 percent in incremental revenue.

New York City Department of Transportation

The New York City Off-Hours Delivery Project: A Business and Community-Friendly Sustainability Program

The New York City Off-Hours Delivery (NYC OHD) program, a private-public-academic effort, is inducing receivers of freight supplies to voluntarily accept deliveries between the hours of 7pm-6am. This conceptually simple shift in delivery times, and change in focus from the carriers of freight to the receivers who generate the demand, is a shining example of what can be accomplished when forward-thinking public-sector agencies embrace cutting-edge academic research and collaborate with the private sector to advance the public good.

The direct impacts in NYC have been remarkable. Carriers who shift delivery routes to the off-hours benefit from faster and more reliable travel times, as well as lower delivery costs and parking fines, reducing their operational costs between 35-45 percent.

For every regular-hour delivery route that is replaced with OHD in NYC, carriers save $30,000-$50,000 per year. More importantly, the combined effects of faster and smoother traffic, and more direct routes lead to emission reductions, per mile traveled, in the range of 60-70 percent. For every receiver that accepts OHD, this translates to the elimination of more than 6,300 metric tons of CO_2 – one of the most potent global warming gases that exist. In reducing delivery costs, congestion, and pollution, the NYC OHD program benefits the economy, environment, and quality of life of metropolitan areas.

Implementing an OHD program as complex as the one in NYC – where multiple agents from various industry sectors interact, and are impacted by others' operational changes – requires that the



policy at its core be impeccably designed. The team conducted extensive behavioral research on how receivers and carriers would respond to policy measures intended to foster OHD, and integrated the chief findings of the research in a behavioral microsimulation (BMS). The quantification of the effects of a policy design required modeling the interactions among hundreds of thousands of economic agents that follow nonlinear dynamics (discrete choice models in the case of receivers, and vehicle routing problems and cost calculations in the case of carriers). Tens of thousands of vehicle routing problems (VRPs) had to be solved for Manhattan, to complete a single iteration of the BMS.

Widely recognized as one of the most impactful sustainability programs that exists, the NYC OHD program has proven beneficial to the private sector in reducing last-mile delivery costs and the inventories held by receivers; communities in reducing conflicts and crashes involving freight vehicles, pedestrians, and bicyclists; and the environment in reducing vehicle emissions. Moreover, with the adoption of low-noise delivery practices and technologies, there is a reduced chance that local communities may be impacted by delivery-related noise. NYC has adopted OHD as part of its city-wide sustainability plan, and yet the potential benefits of the program are not limited to New York.

The adoption of OHD in the U.S. and abroad provides a glimpse of the program's true potential, and what the future may bring. The Federal Highway Administration and Environmental Protection Agency have created a program to replicate OHD in cities throughout the country, beginning in Orlando and Washington, DC. Internationally, the City of London created an office of "Retiming of Deliveries" to foster OHD, and Copenhagen (Denmark), Brussels (Belgium), São Paulo (Brazil), and Bogotá (Colombia) have conducted successful pilot tests, and are now working to expand their OHD programs.

Organization

New York City Department of Transporation
NYC DOT's mission is to provide for the safe, efficient, and environmentally responsible movement of people and goods in New York City. The city's transportation system, from roads and bridges to subways and buses, and even the Staten Island Ferry, is controlled by patchwork of city, state, and regional agencies. Linking together this complex landscape is NYC DOT. The over 5,000 employees of NYC DOT oversee one of the most complex urban transportation networks in the world, including 6,000 miles of streets and highways, over 12,000 miles of sidewalk, and 789 bridges and tunnels.

Rensselaer Polytechnic Institute
Rensselaer Polytechnic Institute (RPI) in Troy, NY, was founded in 1824, making it America's oldest technological research university. For almost two centuries, RPI has maintained its reputation for providing an education of undisputed intellectual rigor based on educational innovation in the laboratory, classroom, and studio. Driven by talented, dedicated, and forward-thinking faculty, RPI has dramatically expanded the research enterprise. The Institute has an established record of success in the transfer of technology from the laboratory to the marketplace, fulfilling its founding mission of applying science "to the common purposes of life."







The Wagner Prize



The Daniel H. Wagner Prize for Excellence in Operations Research Practice

A History

The Wagner Prize is awarded annually in honor of the late Dr. Daniel H. Wagner. During his years as president and principal owner of Daniel H. Wagner Associates, Dr. Wagner brought many high-quality mathematicians into the operations research community. This led to significant advances in the firm's fields of endeavor and delivery of significant applications to the Navy, Coast Guard, and other clients. Many of the applications are still in service today.

Dr. Wagner earned his PhD in mathematics from Brown University in 1951. His dissertation, "On Free Products of Groups," was published in 1957 in the *Transactions of the American Mathematical Society*. Dr. Wagner joined the Navy's Operations Evaluation Group at the Pentagon, working on operations research for naval warfare. He worked there until 1956, with a one-year leave of absence for postdoctoral research on free algebras at MIT. Dr. Wagner then joined the Burroughs Research Center, where he directed a group of mathematicians performing analysis for the development of digital computers.

In 1957, Dr. Wagner and John D. Kettelle formed the partnership of Kettelle and Wagner, which was dissolved in 1963. That same year, he formed a new company, Daniel H. Wagner Associates, Inc. This company applied itself to cutting edge work in the mathematics of naval tactics, especially antisubmarine warfare, detection theory, and search planning.

After retirement from the firm he founded, Dr. Wagner held various teaching and research positions with the U.S. Naval Postgraduate School and the U.S. Naval Academy.

Dr. Wagner was a member of INFORMS/ORSA for more than 40 years. He passed away in March 1997.

2016 Wagner Prize Committee

C. Allen Butler, Chair, Daniel H. Wagner Associates, Inc.
Ann Bixby, Aspen Technology
William J. Browning, Applied Mathematics, Inc.
Terry P. Harrison, CAP, Pennsylvania State University
Kathy Lange, Business Analytics Practice SAS
Patricia Neri, SAS Institute
Alexandra Newman, Colorado School of Mines
Randall S. Robinson
Lawrence D. Stone, Metron, Inc.

The Daniel H. Wagner Prize for Excellence in Operations Research Practice

2016 Finalists

The final component of the 2016 Wagner Prize competition took place at the INFORMS Annual Meeting in Nashville, TN. There, six teams gave presentations to the Practice Section of INFORMS judging committee seeking to demonstrate that the quality and coherence of their analysis in a real-world application qualified them to win this prestigious award for outstanding practice of operations research and advanced analytics.

All finalists' presentations can be viewed at the INFORMS Video Library by scanning the QR code to the left. A special issue of *Interfaces* will publish the winning paper along with those of the other five finalists:

Data-driven Optimization For Multidisciplinary Staffing in Mayo Clinic Improves Patient Experience

Mutafa Y. Sir, David M. Nestler, Thomas R. Hellmich, Micheal J. Laughlin, Michon Dohlman, Devashish Das, and Kalyan Pasupathy, Mayo Clinic

Vungle Inc. Improves Monetization Using Data Analytics

Ioannis Fragkos, Erasmus University
Bert De Reyck, University College London
Yael S. Grushka-Cockayne, Darden School of Business
Casey Lichtendahl, University of Virginia
Hammond Guerin, Vungle Inc.

Optimizing New Vehicle Inventory at General Motors

Robert Inman, Michael Frick, Thomas Hitchman, Robert Muiter, Jonathan Owen, CAP, and Gerald Takasaki, General Motors

IBM Cognitive Technology Helps Aqualia Reduce Costs and Save Resources in Wastewater Treatment

Alexander Zadorojniy, Segev Wasserkru, Sergey Zeltyn, and Vladimir Lipets, IBM Research

Implementation of the Genetic Gain Performance Metric Accelerates Agricultural Productivity

Joseph Byrum, Craig Davis, Greg Doonan, Tracy Doubler, Von Kaster, and Ronald Mowers, Syngenta
Bill Beavis, Iowa State University
Sam Parry, Arizona State University



The Daniel H. Wagner Prize for Excellence in Operations Research Practice

2016 Winner

The first place winners are Mikael Rönnqvist, Université Laval; Gunnar Svenson and Patrik Flisberg, The Forestry Research Institute of Sweden; and Lars-Erik Jönsson, SDC, Sweden.

Their paper, "Calibrated Route Finder - Social, Safe, Environmental and Cost-Effective Truck Routing," is outstanding work in the development and implementation of an online route generation system, Calibrated Route Finder (CRF), for improving multiple aspects of the Swedish forest industry. A key component in the system is the use of an innovative inverse optimization process that establishes more than 100 weights to balance distance, speed, social values, environmental impacts, traffic safety, stress, fuel consumption, CO_2 emissions, and costs. CRF has resulted in a paradigm shift from manual, imprecise, and unilaterally determined routes to automatically determined routes decided jointly between the parties. These routes balance a generic set of objectives, including stress, safety, economy, and the environment. Today, CRF is used by all major forest companies and in 60 percent of transports in the sector.



University of CINCINNATI | CARL H. LINDNER COLLEGE OF BUSINESS

The Center for Business Analytics congratulates the

2017 Franz Edelman Award Finalists

The American Red Cross
Barco
BHP Billiton
General Electric
Holiday Retirement
New York City Department of Transportation

To learn more about the UC Center for Business Analytics:

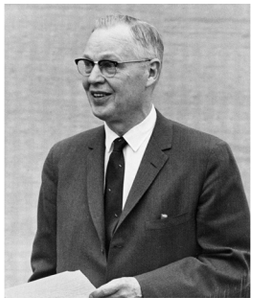
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@UCBusAnalytics
UC Center for Business Analytics
business.uc.edu/analytics-center

The UPS George D. Smith Prize



The UPS George D. Smith Prize

A History



The UPS George D. Smith Prize is awarded to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics. It is accompanied by a $10,000 cash award.

The prize committee is pleased to announce the finalists for 2017

- Haslam College of Business, University of Tennessee
- Institute for Advanced Analytics, North Carolina State University
- Operations Research Program, United States Air Force Academy

The UPS George D. Smith Prize is an exciting award created in the spirit of strengthening ties between industry and the schools of higher education that graduate young practitioners of operations research.

The UPS George D. Smith Prize is named in honor of the late UPS chief executive officer who was a patron of operations researchers at the leading Fortune 500 corporation. George D. Smith was the second CEO of UPS, holding the position from 1962–1972. He joined UPS as an accountant in 1925 and at some point in his long and illustrious career held almost every functional title within the company.

While his background was steeped in finance, George Smith had a keen engineering mind. In the late 1940s, after learning about operations research, George Smith realized that intuition alone would not be enough to help UPS master the many issues it faced as it grew in size from a regional to nationwide carrier.

George Smith recognized O.R. as an engineering approach to making decisions, and started advocating the use of operations research concepts at UPS. Quantitative analysis became the bedrock on which the UPS engineering function was built. Because of George's vision, UPS now employs thousands of engineers whose focus is efficiency, sustainability, and service.

He was a strong believer in investing in our younger generation. For him, nurturing them was the key to sustained prosperity. This prize embodies George Smith's beliefs: to recognize the importance of operations research in practice, and ensure that our younger generation gets proper exposure to its value, and in turn benefit society.

The UPS George D. Smith Prize

About this Year's Competition & 2017 Finalists

Since the first days of operations research there have been highly divergent opinions about how effectively our universities are preparing students to be effective practitioners. From the perspective of the committee charged with administering the UPS George D. Smith Prize this year, there is strong evidence that overall our universities are doing very well in this area.

The Prize Committee members feel confident that there will be a truly outstanding winner this year and for many years to come. It was hard but rewarding work to choose the finalists. Selecting the winner from the finalists will also be very difficult.

Seeing the diversity, quality, and innovation of these entries has given the committee a unique and encouraging picture of how well we, as a profession, are preparing future practitioners. Please look at the following pages for additional information about the finalists. We will announce the winner tonight. Plan to attend the special presentation at the conference on Tuesday in which the winning team members will describe their programs in more detail. All of us will undoubtedly learn something about how to better prepare practitioners, and also experience a taste of the many reasons that the committee is so excited about the overall state of academic practitioner training.

UPS George D. Smith Prize Winners

2016
H. John Heinz III College of Information Systems and Public Policy at Carnegie Mellon University

2015
Sauder School of Business, University of British Columbia - Center for Operations Excellence

2014
MIT, Leaders for Global Operations

2013
Naval Postgraduate School

2012
University of Michigan, Tauber Institute for Global Operations

2016 UPS George D. Smith Prize Committee

Robin Lougee, Chair, IBM
Robert Dell, Naval Postgraduate School
Pooja Dewan, BNSF Railway
Terry P. Harrison, CAP, Penn State University
Georgia Perakis, MIT
Olga Raskina, Juno Therapeutics
Rina Schneur, Verizon Laboratories
Lawrence Seiford, University of Michigan

MASTER OF SCIENCE IN BUSINESS ANALYTICS

HASLAM COLLEGE OF BUSINESS
THE UNIVERSITY OF TENNESSEE, KNOXVILLE

ANALYTICS MUST BE TAUGHT IN CONTEXT

The core premise of the Haslam College of Business's Master of Science in Business Analytics (MSBA) is that analytics must be taught in the context it will be used—a business environment—in order for students to become effective practitioners.

The program was the first analytics masters launched within a business school. It was developed to meet the industry's need for professionals who not only analyze large, complex data sets, but also leverage insights from data for competitive business advantages.

INDUSTRY CONNECTION

A REAL-WORLD ANALYTICS PERSPECTIVE

Students learn methodologies not merely from a textbook, but from a faculty with extensive analytics experience in a variety of service and manufacturing industries. Our faculty members are Edelman and Wagner Prize honorees, consult for a wide array of organizations, write impactful practitioner books, and teach in UT's programs for business executives.

BUSINESS ANALYTICS FORUM

The Business Analytics Forum convenes twice a year and brings industry practitioners to campus for a two-day fall conference with approximately 200 attendees. It aims to expand the analytics knowledge of industry partners, faculty, and students; share best practices in analytics; and provide a mechanism for students to learn from industry partners about current issues they face.

INDUSTRY PARTNERS HAVE INCLUDED:

- Accenture
- Amazon
- Belk, Inc.
- BlueCross BlueShield of Tennessee, Inc.
- Bush Brothers & Company
- Capital One
- Caterpillar Inc.
- Clayton Homes
- The Coca-Cola Company
- Dell EMC
- Delta Air Lines
- Eastman Chemical Company
- EY
- Fifth Tribe
- Google
- Hanesbrands Inc.
- IBM
- Jewelry Television
- KPMG
- The Kroger Co.
- Netflix
- Pilot Flying J
- Procter & Gamble
- PYA Analytics
- Regal Entertainment Group
- Scripps Network Interactive
- State Farm
- Teradata
- Tableau

CURRICULUM

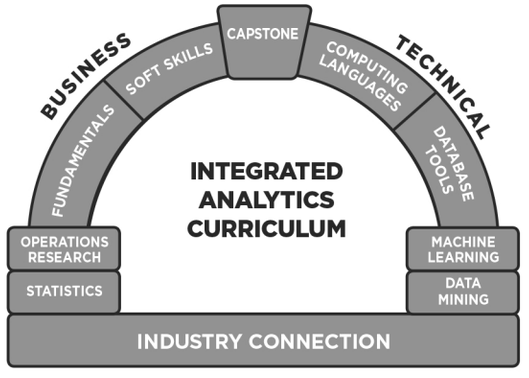
Our core curriculum combines cutting-edge analytics with the fundamentals of business strategy. Students develop accounting, marketing, operations, and supply chain knowledge along with skills in data visualization, analytic software tools, and big data technologies. We also teach students soft skills like teamwork, project management, leadership, and the ability to communicate the results of complex analyses in a way that any manager can understand.

CAPSTONE EXPERIENCE

Our students gain real-world experience throughout the program, interacting with practitioners through a variety of touch points the culmination of which is the capstone experience. During the capstone, student teams work through a challenging analytics project with a corporate client.

The experience simultaneously sharpens their technical, strategic, and soft skills. At the project's end, teams present their recommendations to executives from client companies, most of which are Fortune 500.

HASLAM MSBA CURRICULUM





Institute for ADVANCED ANALYTICS

The Institute for Advanced Analytics has been preparing data savvy professionals for leadership in a digital world since 2007. Its mission is to produce the world's finest practitioners of analytics — individuals who have mastered complex methods and tools for large-scale data modeling, who have a passion for solving challenging problems through teamwork, who are guided by intellectual curiosity, honesty and integrity, and who strive to attain the highest level of professionalism through continuous self-improvement.

Founded at North Carolina State University, the Institute serves as the focal point for interdisciplinary collaboration among faculty from several departments. The Institute's flagship program is the nation's first Master of Science in Analytics (MSA) degree. The MSA is an intensive, full-time, 10-month learning experience with an innovative curriculum developed exclusively for students in the program. Enrolling 120 students annually, the MSA is NC State's leading master's degree measured in terms of student outcomes and its graduates are among the University's most sought-after and highly compensated. The success of the MSA has made it the archetype for other programs around the world.

The MSA prepares students for the challenging task of deriving insights from vast quantities of structured and unstructured data. At the core of the MSA curriculum is the Practicum: a team-based learning experience that gives students the opportunity to conduct real-world analytics projects using data from sponsoring organizations. Past projects now total 134 with over 100 sponsors spanning virtually every industry segment: aerospace, agriculture, apparel, banking, financial services, chemicals, computers, consumer goods, entertainment, energy, government, healthcare, insurance, heavy machinery, Internet, lodging, nonprofits, professional sports, retail merchandising, pharmaceuticals, telecommunications, and transportation—and include some of the world's leading organizations and best known brands.



NC STATE UNIVERSITY

OPERATIONS RESEARCH

U. S. AIR FORCE ACADEMY

OPERATIONS RESEARCH PROGRAM

"To educate, train and inspire men and women to become officers of character motivated to lead the United States Air Force in service to our Nation."
- U.S. Air Force Academy Mission

The United States Air Force Academy offers a four-year Bachelor of Science degree in Operations Research (O.R.). Our interdisciplinary O.R. program is jointly administered by four academic departments to leverage the combined strengths of Computer Science, Economics, Management, and Mathematics.

BY THE NUMBERS

Total enrollment of **4,000** cadets

4-year B.S. with **146** total semester hours

50% of all cadets take at least one O.R. course

42 semester hours in the O.R. major

4-5% of all cadets major in O.R.

8:1 student-to-faculty ratio in O.R. major

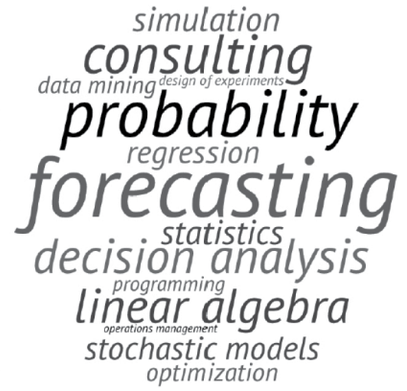
25% of O.R. students are Division I athletes

WORLD CLASS FACULTY

With more than 30 members, our faculty consists of civilian professors, senior military members, and junior military instructors. Civilian faculty members bring many years of expertise in their respective fields, while nearly all of our military faculty members are operations research analysts who bring recent operational experience to the classroom.

THE LONG BLUE LINE

Our admission standards are among the highest in the nation. Our cadets are challenged with a packed schedule of military training, athletic, and academic obligations. Only the best are able to join our Long Blue Line of graduates, many of which become frontline O.R. practitioners as Air Force analysts.



APPLIED OPERATIONS RESEARCH EXCELLENCE

The secret to the success of our program is an applied senior capstone, where teams of cadets consult for military, corporate, local government, and nonprofit organizations in a year-long analysis project that addresses a real-world problem. The results of these projects have been overwhelmingly positive. Cadets routinely garner awards in competitions at student conferences, the client sponsors rave about the results (and seek to sponsor projects the following year), and the academic outcomes are met.

SELECTION OF RECENT PARTNERS

Military	Corporate	Gov't / Nonprofits
DARPA	FedEx	AlloSource
Headquarters Air Force	Hotel Eleganté	Colorado Springs Airport
Missile Defense Agency	Lockheed Martin	Healing Warriors Program
U.S. Northern Command	Walmart	Sandia National Lab

"We are awed by the intelligence and hard work of the Cadets who are placed into a completely new situation while they develop positive outcomes to our business issues. Your students have helped us become a better organization that is able to meet our mission of saving and enhancing lives across the nation."
Thomas Cycyota
President & CEO
AlloSource

For more information: http://www.academyadmissions.com/the-experience/academics/majors/operations-research-major/

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Recognizing the **Leaders and Best**

The Tauber Institute for Global Operations congratulates the 2017 UPS George D. Smith finalists.

And, we recognize INFORMS and UPS for their unwavering support of innovations in operations research, management science, and analytics.

As an inaugural recipient of the UPS George D. Smith prize, we proudly welcome this year's winner.

academia strengthening ties industry
ups george d smith prize

The **Michigan** Difference

For more than two decades, the Tauber Institute for Global Operations at the University of Michigan has been at the forefront of global operations. Each year, the Tauber Institute unites top graduate students and companies in 14-week multidisciplinary, collaborative team projects throughout the U.S. and worldwide.

Tauber Team Projects Solve Industry's Toughest Problems
Tauber Team Projects find innovative solutions for industry's toughest problems. Student teams work on site for sponsoring companies on highly visible operations-related challenges with both engineering and business components. Tauber Team Projects have historically delivered significant financial savings, as well as improvements in areas such as CO2 emissions, energy consumption, throughput time, and supply chain risk.



The Results?
Millions Saved and Earned
In 2016, Tauber Institute student teams worked on 32 projects at 23 companies, averaging $14.4 million/per project savings over 3 years. The total savings validated by our 2016 project sponsors was $460 million.

University of Michigan Award-Winning Faculty and Curriculum
The Tauber Institute develops and delivers superior talent utilizing the strengths of Michigan's top-ranked business and engineering schools. Award winning faculty from both the College of Engineering and the Stephen M. Ross School of Business work closely with students on each team project. Input from the Tauber Institute Industry Advisory Board ensures that our curriculum constantly adapts to prepare our students to be leaders of the evolving world of operations.

TAUBER INSTITUTE
FOR GLOBAL OPERATIONS
UNIVERSITY OF MICHIGAN

The Tauber Institute for Global Operations at the University of Michigan is more than a world class institute. Our mission is to be the recognized leader in Operations through knowledge generation, innovative education, and impacting practice.

The Tauber Institute is a joint venture between the University of Michigan's Stephen M. Ross School of Business and the College of Engineering, working together with industry partners to facilitate cross-disciplinary education in global operations management.

Tauber Institute Industry Advisory Board

3M Company
American Industrial Partners
A.T. Kearney Inc.
Alcoa Inc.
Amazon
The Boeing Company
BorgWarner Inc.
Cardinal Health
Cisco Systems Inc.
ConAgra Foods
Stanley Black & Decker
Dell Inc.
The Dow Chemical Company
DTE Energy Company
Ford Motor Company
General Motors Company
Infosys Technologies
Masco Corporation
Mayo Clinic
McKinsey & Company
Microsoft
National Center for Manufacturing Sciences
Pfizer Inc.
Pacific Gas & Electric
Precision Castparts
SRG Global Inc.
Steelcase North America
UPS
Whirlpool
Chagrin Consulting Associates
Tauber Enterprises

THE INFORMS PRIZE



The INFORMS Prize

A History

This is the 10th year in which the INFORMS Prize has been honored during the Edelman Gala. While the Edelman Award and the Wagner Prize recognize single projects that demonstrate outstanding accomplishments in O.R. practice, the INFORMS Prize complements them by recognizing long-term, multiproject achievements.

The INFORMS Prize is awarded annually to recognize effective integration of operations research into organizational decision making. The award is given to an organization that has repeatedly applied the principles of O.R. in pioneering, varied, novel, and lasting ways.

INFORMS Prize Winners

2017 The Walt Disney Company & U.S. Air Force
2016 General Motors
2015 Chevron
2014 Mayo Clinic
2013 Ford Motor Company
2012 Memorial Sloan-Kettering Cancer Center
2011 Sasol
2010 Jeppesen
2009 Intel Decision Technologies Group
2008 GE Global Research Risk & Value Management Laboratory
2006 Schneider National, Inc.
2005 Air Products & Chemicals, Inc.
2004 Procter & Gamble
2003 UPS
2002 Hewlett-Packard
1999 IBM
2002 Hewlett-Packard
1999 IBM
1998 Lucent Technologies
1997 Merrill Lynch Private Client Group
1996 Pfizer Inc
1995 Bellcore
1994 AT&T and US West Technologies
1993 New York City Office of Management and Budget and United Airlines
1992 San Miguel Corporation
1991 American Airlines and Federal Express

Notes:
Prior to 1995, the award was called the ORSA Prize. No prize recipients were chosen in 2000 and 2001. To adjust to the new INFORMS Prize presentation schedule, no award was given in 2007.

2017 INFORMS Prize Committee

Tarun Mohan Lal, Chair, Mayo Clinic
Julia Morrison, Past Chair, Marriott International
Hande Benson, Drexel University
Manoj Chari, SAS
Margery Connor, CAP, Chevron
Bill McDaniel, Johns Hopkins Labs
Dave Morton, Northwestern University
Jennifer Rausch, Jeppesen
Peiling Wu-Smith, General Motors

UPS Congratulates the
2017 INFORMS UPS George D. Smith Prize Finalists

Haslam College of Business, University of Tennessee
Institute of Advanced Analytics, North Carolina State University
Operations Research Program, United States Air Force Academy



The INFORMS Prize

Criteria

Variety of Applications of O.R. The demonstrated use of a wide set of disciplines and application areas led to a richer set of offerings, leading to greater opportunities for impacting the winning organization.

Competitive Advantage to the Organization. O.R. adoption within an organization is clearly varied among organizations. There are examples where O.R. permeates the parent organization's operations and was considered integral and of strategic competitive advantage for the organization. Companies that soundly demonstrate this type of adoption were rated higher by the prize committee.

Impact. There are several ways that O.R. professionals can quantify and qualify the impact their work is having on the organization as a whole. The prize committee took one-off project impacts into consideration, as well as those O.R. applications that were used in a sustained, systemic manner and the quantifiable value they delivered. Some applicants demonstrated instances in which O.R. made fundamental changes to the client organization's overall business model and/or organizational structure, and the prize committee considered these examples in which O.R. truly made an impact on the organization's operations.

Model for Success. Applicants' business models vary based on different industries. Some are represented very well, including marketing, budgeting, cost recovery, research funding approaches, and strategic planning. This provides a sense of sustained, growing capability, and direction for O.R. in the organization.

Endorsements. Strong submissions include personally written endorsements from top-level organization management.

Overall Quality of the Application. The best applicants clearly put extra effort into creating a singular submission with all supporting references and endorsements. A well-written application, taken together with the overview statement, aids the prize committee and, in turn, the applicant.

2017 INFORMS Prize Winner

The Walt Disney Company

The 2017 INFORMS Prize is awarded to The Walt Disney Company for presenting a world of opportunities for pioneering, impactful and innovative analytics. What sets analytics at Disney apart is the diversity of applications that could only be found by combining a variety of different industries. Analytics has found rich opportunities in the areas of consumer and guest experience, creative content generation, operational excellence and more. Even though Disney's applications are diverse, the core operations research principles transcend across multiple lines of business. For instance, simulation is used to optimize attractions, textiles facilities and transportation systems. Forecasting applications are rich, from attraction wait times to guest experience, to box office receipts for *Star Wars: The Force Awakens*, and to TV viewership of college football games. Stochastic process and queuing theory are used to optimize guest attraction experience, call center performance, and demand management across the enterprise product portfolios. Optimization is ubiquitous throughout the company. Examples include optimizing schedules for over 90,000 hourly cast members every day, optimal fleet sizing for transportation assets, maximizing sales efforts through channel optimization, optimizing the advertising sales process at Disney's media networks, and the implementation of yield management techniques for *The Lion King* on Broadway. Analytic solutions at Disney regularly require a fusion of operations research, statistics, econometrics, machine learning, big data analytics, with implementations leveraging knowledge and advancement in computer science and other science disciplines.

The number of analytical professionals has grown nearly three-fold over the past decade to approximately 1,000 total employees with more than 30 executives leading the organizations. With such a prominent analytics culture, Disney is focused on giving back to the analytics community. One way of doing that is by sponsoring The Disney Data and Analytics Conference, an annual event for analytic professionals to share best practices, learn from industry leaders, celebrate successes and connect with each other. The Conference has grown to include a year-round initiative that promotes the evangelization of analytics – "Evangalytics" – through a speaker series, opportunities for continuing education, bi-monthly newsletters, and a new sponsorship program that encourages women in business programs at leading U.S. universities to pursue post-graduate studies and careers in management science.

Analytics plays a key role in not only creating innovation and value throughout The Walt Disney Company, but also provides a foundation for the company's future strategic initiatives and decision making. From Disney Research providing the innovation and technology engine that drives many creative products to many teams enhancing the guest experience in Parks and Resorts, there is a large direct, measurable impact on business results. Storytelling has always been a core value at Disney. The use of analytics helps shape Disney's future stories through informed decisions that improve overall business performance and will create magic for years to come.

2017 INFORMS Prize Winner

U.S. Air Force

The 2017 INFORMS Prize is awarded to the United States Air Force for consistently applying advanced analytics and operations research/management sciences for the past 75 years. Air Force leaders have relied on sound operations research counsel for their most important defense decisions from the uniformed service's founding in the 1940s to the present. The Air Force's history of utilizing analytics principles dates to 1942, when the Commanding General of the Army Air Force Henry "Hap" Arnold directed the establishment of an operations research unit in each of his major combat headquarters. Over the decades, Air Force analyses and research have been the driving force behind many advances, such as the simplex algorithm, which was developed by Air Force analyst Dr. George Dantzig.

While employing over 647,000 Total Force Airmen composed of Active Duty, Air National Guard, Reserves, and government civilians, the Air Force's commitment to impactful, applied advanced analytics continues. Air Force leaders consistently depend on 539 military and 849 civilian operations research analysts serving in 300 organizations to produce strong analytics to make fiscally responsible decisions on a budget of $163.1 billion. Over the years, Air Force operations research analysts have been recognized for numerous prestigious awards, even though much of the work is classified and cannot be disclosed.

The Air Force also advances scientific research. The United States Air Force Scientific Advisory Board, originally known as the Army Air Forces Scientific Advisory Group, was established in 1944. For more than 70 years, this board has enabled Air Force leadership to maintain a "vision into the future" of technology-enabled capabilities. In 1951, the Air Force founded the Office of Scientific Research—from 2006 through 2014 it awarded $298 million to operations research projects, yielding about 1,500 published journal articles.

Over the past seven-plus decades, operations research professionals have guided and shaped the Air Force from the Cold War to today's dynamic and complex global operations. They provided timely, credible, and defendable analyses when and where they were needed. Air Force operations research analyses have been and continue to be essential to informing decisions in diverse areas such as logistics, infrastructure, manpower, operations, acquisition of new systems, and cost effectiveness. As former Chief of Staff of the Air Force General Mark Welsh put it, "From factories to flight lines and concepts to constellations, operations research underscores every step we take toward safeguarding our Airmen, our allies, and our assets."



About INFORMS

The Institute for Operations Research and the Management Sciences

From increased efficiency in business processes that lead to millions in savings, to lifesaving advancements in medical treatments, to revolutionized transportation and delivery systems, analytics and operations research are impacting nearly every industry sector. And the world is beginning to take notice. *U.S. News & World Report* listed operations research analyst as one of the top five business jobs for 2017. At the heart of this growing field is INFORMS, the leading professional society for a vibrant community of more than 12,500 operations research and analytics professionals, academics, and students, representing more than 86 countries around the world, whose impact on the economy and society has been and continues to be nothing short of remarkable.

INFORMS promotes best practices and advances in analytics and O.R. We are dedicated to encouraging, facilitating, and recognizing excellence in our membership. Formed in 1995 when the Operations Research Society of America (ORSA) and The Institute of Management Sciences (TIMS) merged, INFORMS strives to provide opportunities of inspiration and collaboration among our members, fostering the life-changing ideas of the O.R. and analytics leaders of the future.

Each year, INFORMS hosts a number of events across the country and worldwide, including our Annual Meeting and Analytics Conference, that provide unique forums for thousands of attendees to interact and collaborate as well as celebrate those individuals and organizations who are making the biggest impact on the world around them.

INFORMS



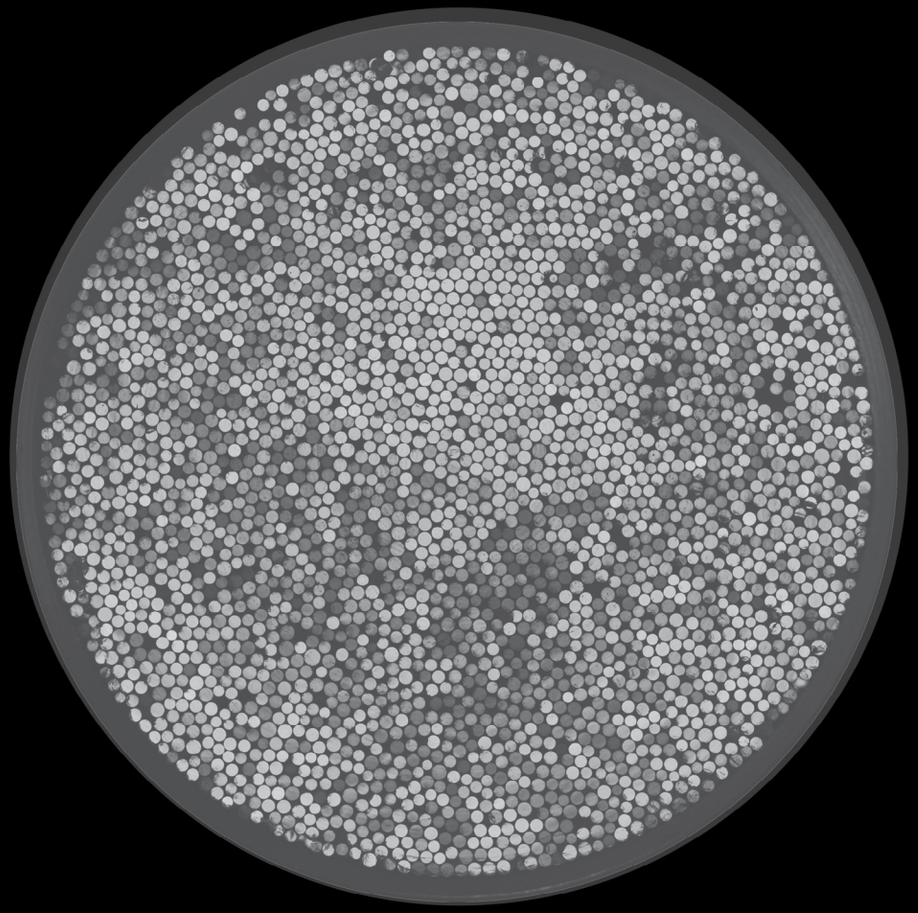
INFORMS also publishes 14 highly-cited, peer-reviewed journals, nearly half of which are featured on the *Financial Times* list of 50 top academic journals, highlighting the latest methods and applications on a full spectrum of analytics and O.R. fields. In addition, our continuing education and Certified Analytics Professional (CAP®) and Associate CAP (aCAP™) certification programs provide opportunities for professional advancement at every career stage. With 20 percent of *Fortune* 100 companies now employing CAP certified analytics and O.R. professionals, these certifications also enable industry leaders to identify and employ top talent.

INFORMS provides many resources to organizations of all sizes seeking information on the benefits of analytics, connecting them with the latest research and discoveries, as well as analytic and operational research professionals with the expertise they require. In addition, within our membership are smaller specialized subdivisions that are dedicated to a common theme or technical interest, many of which pertain directly to analytics and operations research applications for industry. Our members are embracing complex problems and unlocking the valuable data needed to enhance decision-making processes and improve day-to-day operations in almost every industry sector.

INFORMS would like to congratulate and thank this year's Edelman Award finalists, both for their incredible contributions today, as well as inspiring the great discoveries and advancements of tomorrow.



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For every problem, an answer.

Celebrating innovation

Hats off to the 46th annual Edelman Award finalists. You demonstrate the power of analytics to solve the critical challenges facing organizations and our world.

Here's to continued progress and innovation.

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Volunteering to Advance the Operations Research Profession through the INFORMS Section on Practice

By R. John Milne, Chair, INFORMS Section on Practice

Tonight we celebrate outstanding achievements in operations research practice. This gala and the competitions for the Edelman Award, the Wagner Prize, and the UPS George D. Smith Prize are all conducted by volunteers of the INFORMS Section on Practice (formerly called CPMS). Details on these competitions are described in this program book.

Whereas stewardship of the best practices competitions and gala are highlights of our section's work, we also organize a set of presentations at the INFORMS Annual Meeting in the fall and prepare and send bi-annual newsletters to section members.

You may be interested in helping us. Volunteering is a good way to work with like-minded colleagues to advance the practice of operations research, management science, and analytics. I have found these activities to be mind-opening and stimulating. I have repeatedly applied insights from this volunteer work at my paid positions—first for years at IBM and more recently at Clarkson University. People who volunteer with our Practice Section are highly capable–they would not volunteer if they were struggling with their regular jobs—and enthusiastic about helping the profession. It's a pleasure to collaborate and network with them. Because we work in so many organizations—in industry and academia—we have different perspectives to share and learn from. It is satisfying to contribute to the advancement of our profession by helping to promote and celebrate the best applied work of our profession.

If you are interested in volunteering, please send an email to me at: jmilne@clarkson.edu.

Call for 2017 Nominations

THE FRANZ EDELMAN AWARD
Achievement in Operations Research

The purpose of the competition is to recognize and reward outstanding examples of O.R. in practice.

Deadline to Submit an Application: Wednesday, October 18, 2017

THE INFORMS PRIZE
Sustained Integration of Operations Research

The INFORMS Prize is awarded for effective integration of advanced analytics and operations research/management sciences (OR/MS) in an organization. The award is given to an organization that has repeatedly applied the principles of advanced analytics and OR/MS in pioneering, varied, novel, and lasting ways.

Deadline to Submit an Application: Friday, December 1, 2017

THE DANIEL H. WAGNER PRIZE
Excellence in Operations Research Practice

The Wagner Prize is given to the authors of a previously unpublished paper detailing a real-world, provably successful application of operations research or advanced analytics that required innovative mathematical development, a unique new algorithm, or a series of coherent O.R. advances.

Deadline to Submit an Application: Monday, May 1, 2017

UPS George D. Smith Prize
Strengthening Ties Between Academia & Industry

The UPS George D. Smith Prize is awarded to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics. It is accompanied by a $10,000 cash award.

Deadline to Submit an Applicationr: Tuesday, October 31, 2017

These prizes will be awarded at the 2018 INFORMS Conference on Business Analytics and Operations Research in Baltimore, Maryland

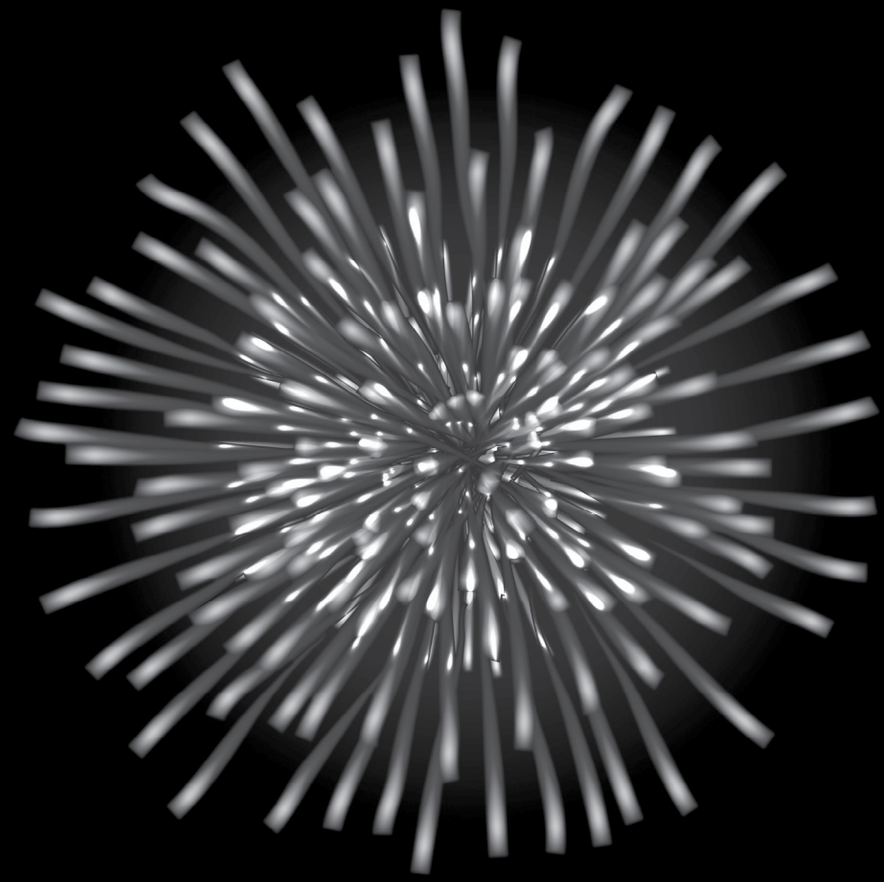
April 15-17, 2018

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to all Past and Present

Edelman
Award Finalists

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**For every insight,
an outcome.**

The state of New Mexico faced a common challenge—reducing the monetary and resource costs of improper benefits payments. The New Mexico Department of Workforce Solutions (DWS) asked Deloitte to put analytics to work on this problem, combining insights from data and behavioral science to gently nudge individuals into more honest, consistent behavior. Applying behavioral analytics, we helped the DWS improve accuracy and significantly decrease the number of improper payments. By using behavioral insights in strategic moments as people are applying for benefits, we helped put New Mexico on track to potentially save millions each year.

For smarter insights that lead to stronger outcomes, please visit:
deloitteanalytics.com

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Acknowledgments



The Past Edelman Laureates

2016

David Aebischer
Fernando Alarcón
William Aldrich
Bradford Alex Baker
Brian Blank
Stefan Conrady
Guillermo Duran
Michael Kevin Geraghty
Gnanadeeban Gnanapandithan
Michael Grimes
Mario Guajardo
Song He
Amanda B. Hepler
Chuck Holland*
Michael Johnson
Roderick Jordan
Captain Michael Joy
Boris Kats
Katherine Lajoie
Prasad Lakshminarsimha Kompella
Evan Levine
Jack Levis*
Erika Lunceford
Suzanne M. Mahoney
Matthew Maron
Jaime Miranda
John Morik
Hugo Muñoz
Christopher Myers
Ranganath Nuggehalli, CAP*
Victor O'Laughlen
Pavithran Rajendran
Luis Ramirez
Mario Ramirez
Madhusudan Rana
Luis Reinoso
Madangopal Revoor
Carlos Reinoso
Daniel Ruble
Gary Salomon
Bob Santilli*
Denis Sauré
Matias Siebert
Eric Sonmezer
Sebastian Souyris
Anthony Tasso
Joseph A. Tatman
Jessica Tisch
Andrew Vatterott
John Vatterott
Rodolfo Villalba
Andrés Weintraub
Jeff Winters*
Darrin L. Whaley
Rodrigo Wolf-Yadlin
Gonzalo Zamorano

2015

Habib Z. Al Abideen
Brian Alford
David Basset
Aaron K. Baughman
Richard Bogdany
Joseph Byrum*
Robert W. Carroll
Kristen M. Cheman
David Culhane*
Jeffrey Curtis
Craig Davis*
Scott Davis
Greg Doonan
Tracy Doubler*
Shatiel Edwards
David Foster*
Brandon Frankel
Ferrari Griarte
Meggen Gullo
Knut Haase
Benjie Harrison
Andrew Hazlewood
Dirk Helbing
Stephen Henry
Scott Johnson
Matthew Hoffman
Mathias Kaspe
Jack M. Kloeber, Jr. *
Matthes Koch
Craig Lawton
Ni Li
Bruce Luzzi*
Stephen Mack*
Jim Martineau
Cameron McAvoy
Michael McCarthy
Darryl Melander
Reeto Mookherjee
Ronald Mowers*
Frank Muldoon
Sven Muller
Jeet Mukherjee
Brian O'Connell
Herbie Pearthree
Roy Rice
Liliana Shelton
Sandy Sun
Gerald Teper
Xiaochuan Zhang Toveyw
Clay Upton
Pamela J. Williams
Liang Xu
Bachman
Kailai Zhou
Chris Zinselmeier*

2014

Ross Anderson
Itai Ashlagi
Hany Atallah
Kristen Baker
Abel Chan
Stephen Cochi*
Radboud Duintjer Tebbens*
Peter Ferris
Chris Forbes
Joseph Forbes
Michael Forbes
David Gamarnik
Ashish Goel
Pankaj Gupta
Siva Gurumurthy
Leon Haley
John Haupert
Zengjian Hu
Paul Kennedy
Eva K. Lee
Joshua Morrison
Edmond Mount
Mark Pallansch*
Eleanor Post
John Putz
Michael Rees
Alvin Roth
Aneesh Sharma
John Sirois
Tayfun Sönmez
Yohan Sutjandra
Calvin Thomas
Kimberly Thompson*
Utku Ünver
Dong Wang
Steven Wassilak*
Michael Wright
Daniel Wu

2013

Carlijin Bak*
Tejinder Kaur Bimbraw
Brett Bonner
Ruud Brekelmans*
Graeme Case
K. Chandrasekhar
Lijun Chen
Zhi-Long Chen
Parag Chitalia
Pawan Chowdhary
Margery Connor, CAP
Robert Creek
Mark Davis
Youssef Drissi
Dick den Hertog*
Matthijs Duits*
Carel Eijgenraam*
Bob Gooby
Randhir Hebbar
Ganesh Hegde
Mary Helander
Guofen Hu
Matt Johnson
James Kalina
Kaan Katircioglu
Nick Kenaston
Jarl Kind*
Mahesh Krishnan
Wim Kuijken*
Rahul Kumar
Ted Kutz
Lin Li
Lebin Lin
Jiyin Liu
Yan Liu
Sudeep Maity
Karl Martin
Doug Meiser
Ying Meng
Nathan Mott
Murugan Pugalenthi
K. Raghava Rau
Kees Roos*
Rohit Saksena
Howard Smith
Karthik Sourirajan
Craig Stenstrom
Karthik Subbian
Sumathi Subramanian
Lixin Tang
Pieter Vermeer*
David Wagnon
Gongshu Wang
Takashi Yonezawa
Bo Zhang
Xinhui Zhang

2012

Ahmar Abdullah
Suresh Acharya
Sofia Archontaki
Bernard A. Benecke
Greg Burel
Arnab Chakraborty
Kyle Christianson
Frederic Deschamps
John Dimotikalis
Prasanna Dhore
Feryal Erhun
Phillip Finch
Hein Fleuren*
James Fuller
Chris Goossens*
Marco Hendriks*
Erik F. Hertzler

* *Indicates member of winning team*

David W. Hill
Karl G. Kempf
Iraklis Lazakis
Eva K. Lee
Marie-Christine Lombard*
Kathleen Mallery
Jacquelyn Mason
Ronald P. Menich
Ineke Meuffels*
Pelin Pekgün
Chen Peng
Ferdinand H. Pietz
John Poppelaars, CAP*
Timothy R. Rosenberg
Bharathan R. Shamasundar
Manav Shroff
Ritwik Sinha
Girish Srinivasan
Suresh Subramanian
Rohit Tandon
Osman Turan
James Van Sistine
Orestis Varelas
Takis Varelas

2011

Naoki Abe
Fernando Alarcon
Gary F Anderson
Gustavo Angulo
Alex Beiza
James J. Bennett
Cristian Berner
Brian Carlson*
Jaime Catalan
Yonghong Chen*
Brent R. Cooley
Kenneth Cooper
Jin Dong
Xing Dong Zhang
Craig Eister
Rafael Epstein
Timothy Gardinier
Edward Godlewski
Cristian Gonzalez
Guillermo Gonzalez
Jon A. Higbie
Mingguo Hong*
Sergio Hurtado
Florencio Infante
David L. Jensen
Roy Jones*
Dev Koushik
Kevin Larson*
Gregory Lee
Guo Li Jie
Xingwang Ma*
Prem Melville
Gerard Miller
Mauricio Naveas
Andres Neely
Peter Nieuwesteeg*
Cezar Pendus
Xi Quan Wang
Chandan K Reddy
Haili Song*
Kimberly Sperry*
Matthew Tackett*
Doug Taylor*
Li Thomas
Vince P. Thomas
Fernado Valenzuela
Jie Wan
Melissa Weatherwax
Andres Weintraub
Liu Xiao Hu
Ming Xie
Jun Yin Wen*
Daniel Yung
Eugene Zak*
Bin Zhang

2010

Gerkotze Bonthuys
Ebert Cawood
Jay Cunningham
Esmi Dreyer
Ingrid Farasyn
Andrea Feunekes
Ugo Feunekes
Marc Fischer
Michele Fisher, CAP
Tjark Freundt
Wolfgang Giehl
Francisco J. Herrería*
Salal Humair
Johan Janse van Rensburg
Jaco Joubert
Joel I. Kahn
Peter Kolesar
Miguel de Lascurain*
Willem Louw
John MacNaughton
Kim Mathisen
Marlize Meyer
David Fernando Muñoz, CAP*
John J. Neale
Arturo Palacios-Brun*
Steve Palmer
Hylton Robinson
Omar Romero-Hernandez*
Oscar Rosen
Ruan Rossouw
John Ruark
Luis de los Santos*
James Serio
Francisco Solis*
Gerrit Streicher
William Tarlton
Hentie van den Berg
Anette van der Merwe
Wim Van de Velde
Lorraine van Deventer
Jaime Villaseñor*
Glenn Wegryn, CAP
Sean P. Willems
Cecile Wykes

2009

Dharma Acharya
Jason Amaral*
Dirk Beyer*
Ann Brecht*
Matt Callahan
Brian Cargille*
Felipe Caro
Russ Chadinha*
Kathy Chou*
Matt Collins
Juan Correa
José Manuel Corredoira
Prashant Dave
Gavin DeNyse*
Miguel Díaz
Alexey Ershov
Graeme Everett
Qi Feng*
Chris Fry*
Jérémie Gallien
Javier García
Rune Gjessing
Michael F. Gorman
Sharon Hormby
Shailendra Jain*
Shiva Kumar
Rick Lawrence
Michele Meyers
Holger Mishal*
Marcos Montes
Julia Morrison
Thomas Olavson*
Cookie Padovani*
Claudia Perlich
Andy Philpott
Sesh Raj*
José Antonio Ramos
Saharon Rosset
David Sellers
Kurt Sunderbruch*
Robert Tarjan*
Timothy Tenca
Kjetil Vatn
Krishna Venkatraman*
Julie Ward*
Joseph Woods*
Bin Zhang*
Jing Zhou*

2008

Erwin Abbink*
Terra Baranowski
Jonathan Berry
Erik Boman
Michael Brennan
Robert Carr
Lorne Cass
Michael Cirillo
Maria Delbom
Charles B. Duke
Helga Einarsdottir
Mats Eklund
Patrik Eveborn
Pieter-Jan Fioole*
Matteo Fischetti*
Marte Fodstad
Kim Fox
George Gray
William Hart
Lars Hellemo
Jonathan Herrmann
Ken Howard
Dennis Huisman*
Robert Janke
Leo Kroon*
Miro Lehky
Vaughn Lowe
Gábor Maróti*
Kevin Morley
Regan Murray
James Oiesen
Cynthia Phillips
Cyndi Quan-Trotter
Sudhendu Rai
Lee Ann Riesen
Frode Rømo
Mikael Rönnqvist
Thomas Scheermesser
Lex Schrijver*
Adri Steenbeek*
Ved Sud
Midori Tanino
Thomas Taxon
Asgeir Tomasgard
James Uber
Jean-Paul Watson
James Wetherly
Roelof Ybema*

2007

Corne Aantjes
Deirdre Borrego
Dwight Branvold
Vinayak Deshpande
Kent Everingham
Matt Gaskins
Jerry Hwang
Tim Hyatt
Irina Ionova
Ananth Iyer
Michael Jacks
Goos Kant
Alexei Khavaev
Eva K. Lee*
Patty Mackenroth
Venu Nagali
Gary Polaski
Mark Pridgen
Frederick C. Riedlin
David Sanghera
Patrick Scholler
William V. Shearin
Michael A. Shirk
Greg Shoemaker
Jorge Silva-Risso
Tim Thurston
Marco Zaider*

2006

William Best*
Raymond H. Bittel
Richard Carnevale
Sridhar Chandrasekaran*
Louis Cox, Jr.
Ross Darrow
Stéphane Dauzère-Pérès
John Elieson
Christoper A. Forgie
Dirk Guenther
Kjetil Haugen
Ulrich Koester
William H. Lee
Per Olav Myrstad
John J. Nestor
Atle Nordli
Asmund Olstad
Robert M. Peterson
Douglas Popken
B.V. Rao
Alf Reistad
Barry C. Smith
Mandyam Srinivasan*
Geir Teistklub
Russell Wooten
Faker Zouaoui

2005

Jeffrey Alden*
Dennis Begg
D.A. Beis
Ann Bixby
Lawrence Burns*
Michael Concordia
Theodore Costy*
Brian Downs
Toshiharu Hasegawa
Rick Hughes
Richard Hutton*
Craig Jackson*
Jim Jacobs
David Kim*
Kevin Kohls*
David Levine
P. Loucopoulos
Paul Martyn
Jonathan Owen, CAP*
Y. Pyrgiotis
Tuomas Sandholm
Mihiro Sasaki
Katsushige Sawaki
Mike Self
Atsuo Suzuki
Mark Turnquist*
David Vander Veen*
K.G. Zografos

2004

Martin Barkman
John C. Butler
Alexander Chebeskov
Herman Chiu
Mathieu Clerkx
Ton de Kok
Jacques Desrosiers
Yvan Dumas
James Dyer
Thomas A. Edmunds
Rob Harlan*
Richard Hicks
Fred Janssen
Jianmin Jia
Mike Kanaley
Joshua Kanner*
Alev Kaya, CAP
Byung-In Kim
Seongbae Kim
Bob Kraas
Benoit Lacroix
Kam-Keung Lai
Edmond Leung
Yong Liu
Jiyin Liu
Richard Madrid
Sean Marshall
Theresa Metty*
Chris Milligan
Tom Moore*
Thomas Morris*
Katta Murty
Alexander Oussanov
Winfried Peeters
Alexander Popov
Kevin Potts*
Robert Pruneau
Olga Raskina*
Jeffrey Robbins*
Surya Sahoo
Quentin Samelson*
Avner Schneur*
Rina Schneur*
James Smith
Ron Sorensen
François Soumis
Sridhar Tayur
Loren Troyer
Mitchell Tseng
Jan van Doremalen
Erik van Wachem
Yat-Wah Wan
Elan Yaniv

2003

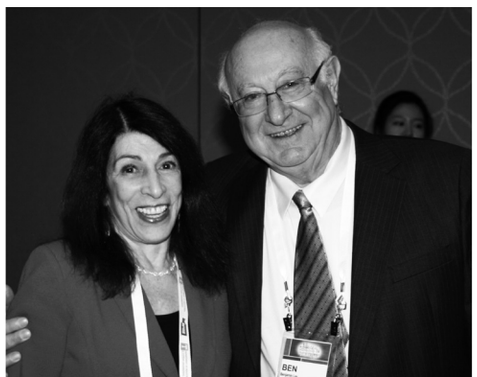
Kirk Abbott
Surain Adyanthaya
Vedat Akgun
Andrew P. Armacost
Mordecai Avriel
Cynthia Barnhart
Corey Billington
Chris Born
E. Andrew Boyd
Gianpaolo Callioni
Monica Carbajal
Rod Case*
Barrett Crane
John Fallis*
Edward Feitzinger
Chyi-Fu Hong
Phil Ireland*
Curtis Keller
Jason Kuehn*
Jin Liu
Ronit Meiri
Marc Meketon*
Wayne New
Avi Peretz
Robert Prior
Hanna Pri-Zan
Julie Unruh Rapp
Tom Rieger
John Ruark
Robert Slavens
Pat Smith
Jerry Trimarco
Carl Van Dyke*
Mark Wallace
Keith A. Ware
Trace White
Sean P. Willems
Alysia M. Wilson
Bert Winemiller
Ron Woestemeyer

2002

Chae An
Michael Argüello*
Fred Blakeley
Burçin Bozkaya
Buyang Cao
Andrew Davenport
Ralf Elsner
Wolfang Hall
Gail Hohner
Arnd Huchzermeier
Philip Jones
Jayant Kalagnanam
Greg Kegler
Gilles Kern
Jospeh Knolmajer
Manfred Krafft
Ho Soo Lee
Thierry Lemoine
Timothy Lowe
Sandra McCowan*
Ed Ng
Alain Patchong
Grant Reid
John Rich
Gao Song*
Rodney Traub
Anna White*
Gang Yu*

2001

Stuart Altschuler*
Rick Ayer
Vince Barabba
Donna Batavia*




Jeff Bennett*
Srinivas Bollagragada
Robert Butchers
José Vicente Caixeta-Filho
Hong Chen
Fred Cooke
Antonio de Pádua Wagemaker
Robert Fancher
Marc Garbiras
Tim Gibbs
Gregory Hoscheit
Chet Huber
Mark Humphresville
Jeenyoung Kang
James Knowles
Russel Labe, CAP*
Robert Leachman
Bonnie Liao*
Vincent Lin
Kevin Lyman
Raj Nigam*
Je Oh*
Mark Paich
Greg Parlier
Mary Phillips
Nick Pudar
Surya Sahoo
Michael Scholes
Jim Smith
Jan Maarten van Swaay-Neto

2000

Eric Bibelnieks
Mark Bullock
E. Rod Butchers
Deb Campbell
Kan Chang
Kenneth Chelst
Harlan Crowder
Paul R. Day
Randy Erdahl
Andrew P. Goldie
Michael Haydock
Ken Howard
Doug Johnson
Elena Katok*
Jeffrey Lockledge
Peter Lyon
Jeff A. Meyer
Demetrios Mihailidis
Stephen Miller
R. John Milne
Rick Oiesen
Robert Orzell
Alex Przebienda
Robert Rice
David Ryan
Amanda Scott
Laura Shisler
John Sidelko
Midori Tanino
William Tarantino*
Ralph Tiedeman*
Chris Wallace
Michael Wambsganss

1999

Rob Allan*
Ken Ambs
James Angelo
Nader Azarmi
Sugato Bagchi*
Steve Buckley*
Rony Cremmery
Sebastian Cwilich
Nicolas De Schuyter
Mei Deng
Markus Ettl*
Gordon Gould
Ron Holcomb
Terry Holeman
Richard Hopson
David Houck
John Hudson
Dean Jones
Kerry Kim*
Edwin Kjeldgaard
Lisa Koenig
Marc Lambrecht
David Lesaint
Grace Lin*
George List
David Lynch
Clive Morgan
Charles Muir
John Mulvey
Bret Naccarato*
George Pfeil
Shahram Taj
Mark Turnquist
Nico Vandaele
Christos Voudouris
Dicky Yan
David Yao*

1998

Henry Alden
Dean P. Angelides
Franz Behlau
Dimitris Bertsimas
Buyang Cao
James Causby
Christopher Darnell
Rafael Epstein*
Matthew J. Etzenhouser
L. Russell Fletcher
Corrie Heynen
Scott P. Holmen
R. Jaikumar
Ralph Kaiser
Albert Kuttner
Ramiro Morales*
Frederic Murphy
Murthy Murrageda
Kumar Rajaram
Jorge Seron*
Robert Soucy
Raymond Taylor
Izaak van de Wege
Franz van Esch
Michael Vasu
Don Weigel
Andrés Weintrau*
Steven Welch

1997

Nejib Ben-Kheder*
Paul Brinkley
Mitchell Burman
W. David Carr
John Folger
Stanley Gershwin
Claudia Grief
Kristopher Haag
Jackie Hueter
Raymond Johnson
Josephine Kintanar*
Kuanlian Liou
Cecile Queille*
Eric Schweitzer
David Stepto
William Stripling*
Curtis Suyematsu
Alva Svoboda
William Swart
Alireza Vojdani
Detlof von Winterfeldt
Kui Wang
Fulin Zhuang

1996

Sally Botha*
Jeffrey Camm
Roy Carr-Hill
Thomas Chorman
George Curnow
Franz Dill
A.A. Elimam
James Evans
Kevin Geraghty
Kamal Golabi
Maurice Gripis
Ivan Gryffenberg*
Geoffrey Hardman
Rauten Hofmeyr*
Ernest Johnson
Gary Kochman
S. Kotob
Jean Lausberg*
Stephen Martin
Steven Meester
Ruppert Nicolay*
Stuart Peacock
Dabashish Sarkar
Trevor Sheldon
Richard Shepard
Willem Smit*
Peter Smith
Dennis Sweeney
Stephanus Uys*
Willie van der Merwe*
Glenn Wegryn, CAP
Gysbert Wessels*
Keith Wilton

1995

Tal Barnea
Michael Barnum
Dan Benanav
Robert Benson*
David Bowen
Kabir Dutta
Ivy Eisenberg
Jim Euchner
Elissa Gilbert
Afshin Goodarzi
Shravan Kotha
Robert Leachman*
Edwin Lee
Yu-Ling Lin
Chihwei Liu*
Leon Marom
John Martin
Richard Ormerod
Justin Peterson
Randy Pope
Dale Raar*
Rangu Salgame
Sanjeev Sardana
Gary Sevitsky
Yishay Spector
Miguel Taube-Netto

1994

Bruce Arntzen
Gerald Brown
B.S. Chandrasekaran*
A. Roy Choudhury*
Zhang Chuntai
Peter Cook
Steven Cosares
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David Deutsch
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Ondria Wasem
Thawat Watanatada
Cao Wei
Yu Xiaodong
Sun Xufei
Wang Xusheng
Tsuyoshi Yoshino
Xie Zhijun

1993

Anthony Brigandi*
David Carino
Dennis Dargon*
Paul Fischbeck
Paul Katz
Terry Kent
Roy Marsten
David Myers
M. Elizabeth Paté-Cornell
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1982 Adapted 3M mainframe software to create **the world's first load control center**

1988 Installed **the industry's first satellite-supported tracking and messaging service** in entire tractor fleet

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2013 Completed Quest, next-generation IT transformation to a mainframe-free infrastructure, **largest tech implementation in company history**

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A. Dale Flowers
Earl D. Geyer, Sr.
Louis Goldring
Bruce Hoadley
Edward H. Kaplan*
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Richard Larson
Dominic Monetta
José Pablo Nuño
Elaine O'Keefe*
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Amir Sadrian
Martin Shell
Dan Shunk
Barry Silverman
Arthur Swersey

1991

Yosi Ben-Dov
John Braklow
Ingrid Busch
Michael Cerby
Ross Darrow*
Anura de Silva
Fred DiLisio
Jefferey L. Dodge
Joseph Ecker
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Donna Granfors
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Sheng-Roan Kai
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John Leimkuhler*
Cheng Liu
William Makuch
Ken Peck
Vincent Pica
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Alexander Shulman
Barry Smith*
Rajendra Solanki
Lawrence D. Stone

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Ranga Anbil
Bruce Andrews
J.T. Day
S.R. Erwin
A. A. Farley
Robert Fetter*
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Jim Griffith
K.D. Le
E. William Moore
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J.T. Wood
C.K. Yin

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Anthony Brigandi
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Armen Tekerian

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Hung-Po Chao
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Charles Clark
Calvin DeWitt
Bobbie Foote
Paul Green
Richard Grimes
Stephen Huxley*
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Allan Warren
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Susan Atherton
Richard Box
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Donald Chung
Ellen Curtis*
Amir Elger
Donald Herbe
Jonathan Jacobs
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Michael Ness*
Kenneth Nickerson
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Bell Beckert*
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Robert Breitman
Gerald Brown
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Elmer Dougherty
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Glen Graves
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Yoshiro Ikura
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Anne Litke
Joseph Miller
M.V. F. Pereira
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Norma Welch

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Douglas Cochard
Mark Daskin
David Eaton
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Paul Putzman*
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Alvin Silk
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William Westerman

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Emily Bassman
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Kamal Golabi*
Joseph Graves
Ram Kulkami*
Alan Kuritsky
John Little
W.L. McMahan
Alvin Silk
Bruce Smith
George Way*

1981

Henry Barker*
Donald Brout
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Luca Donno
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Said Hilal
S. Lakshminarayan
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Lee Brosch
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Dale Cooper
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1979

William Bingham
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1973

R.L. Anderson
L.D. Bodin
Leo Boucher
T.O. Carroll
Donald P. Coveleski*
James Fitzsimmons
Mark Grossman
Allen Lee
Robert Stark
Sally Stout
Elden D. Thomas*

1972

Donald Blumberg
Julio Bucatinsky
Richard Condon*
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Peter Salomone





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We are proud to honor innovators in operations research and analytics, and we are excited to inspire new innovations that can help grow our future.

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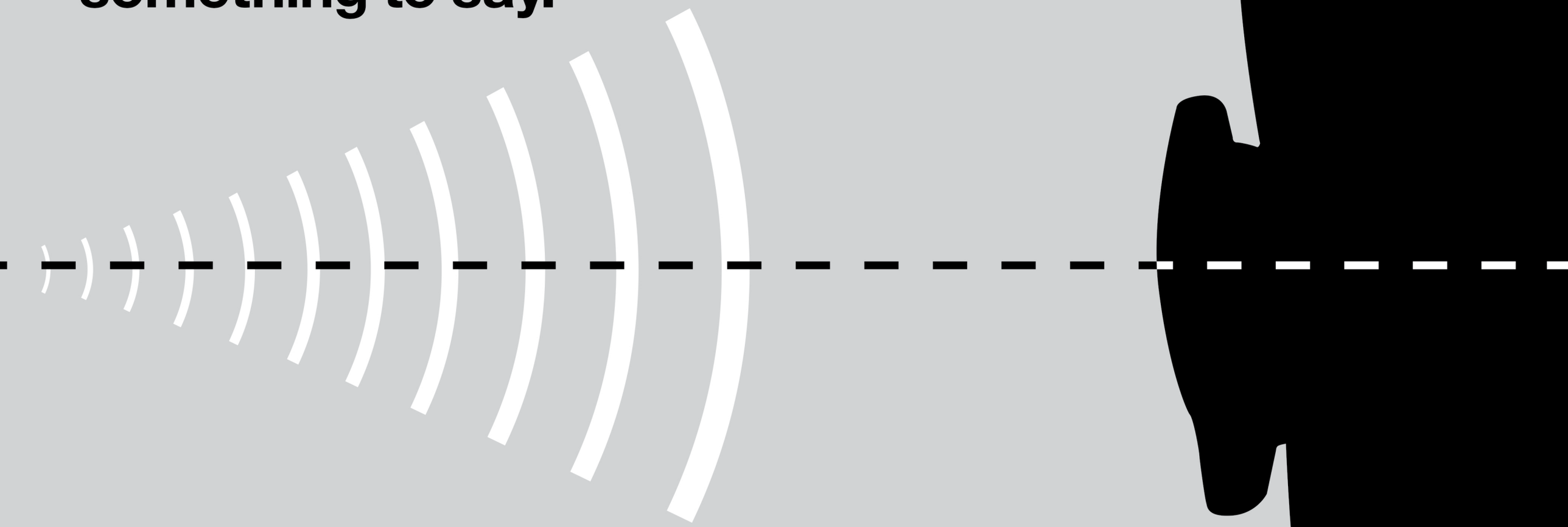







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