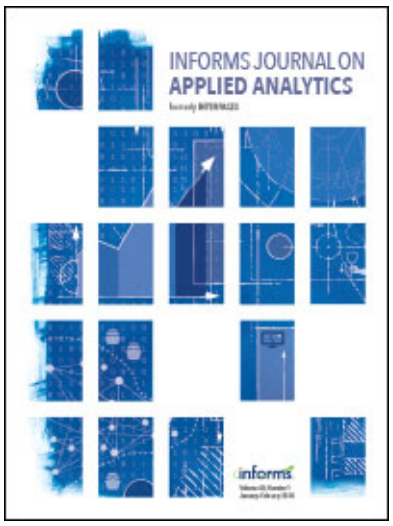

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Franz Edelman Award for Management Science Achievement

I have been involved with the Edelman Award in various capacities for several years. My roles included participating in the submission review process and acting as a coach for several finalists. I have found all of these experiences to be educational and rewarding. This year it was my pleasure to serve as chairman of the 28th annual competition for the Franz Edelman Award for Management Science Achievement.

The competition is sponsored jointly by INFORMS and its practice section, the College for the Practice of the Management Sciences (CPMS). The primary purpose of the competition is to recognize outstanding accomplishments in the practice of our profession. The prizes recognize verifiable results that had a major impact on the client organization. The awards are given to both the client organization, which receives the award citation, and the individuals producing the work, who receive the cash awards. This year, the prize money totaled $15,000 with $10,000 going to the first prize winner. More important, all prize winners have the honor of knowing their work has been recognized by their peers as the best in the business. In addition to having their efforts described in this special issue of *Interfaces*, all of the finalists will have their presentations added to the Edelman Prize videotape collection.

This year's competition continues a tradition of spotlighting excellence in management science practice that goes back to the first award in 1972 when the winner received a grand total of $200. (With such a cash windfall, I have often wondered if they immediately announced their retirements.)

The award is named in honor of Franz Edelman. Dr. Edelman established the operations research group at RCA, which was one of the earliest industrial OR/MS groups in North America. He worked for over 30 years at RCA and is counted among the fathers of innovation in management science. When I first completed my graduate school work, I had the good fortune of working in Franz's group at RCA for a brief time before he retired. I can tell you he was a charismatic leader, full of excitement and vitality, and he was a great mentor to all of us in the profession who knew him.

It has been a long journey to reach this final chapter in the 1999 award. The process began with a call for papers in mid-1998. Over 30 entries were submitted. These nominations were reviewed by an award committee that selected the most noteworthy for careful verification. After a comprehensive review, the committee chose seven finalists to give presentations at an all-day session held in conjunction with the Cincinnati INFORMS meeting on Sunday, May 2, 1999.

In keeping with the traditional award process, all finalists were assigned a coach to assist them. These coaches play a criti-

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cal role in the competition. They become both the greatest critics of the finalists as well as their strongest advocates, helping them to polish the presentation and bring out the very best of each finalist. I would like to thank the coaches who served this year: Tony Brigandi (coach for Spicer), Fred Murphy (coach for Towers Perrin), Randy Robinson (coach for Visteon), Bob Smith (coach for IBM), Tom Spencer (coach for British Telecom), Steve Strauss (coach for AT&T), and Bill Stripling (coach for Mason and Hanger).

The judges also devote a great deal of time to the competition, reading and becoming familiar with the work of the finalists. Immediately after the presentations, the judges began their deliberations, which continued late into the night until they reached unanimous agreement. I would like to thank the judges who joined me this year: Joseph Discenza (Wagner Associates), Howard Finkelberg (BBDO), Newton Garber (Garber Associates), Steven Graves (MIT), Yoshiro Ikura (Saitech), Peter Norden (Columbia University), Rick Rosenthal (Naval Postgraduate School), and Michael Rothkopf (Rutgers University).

All seven finalists this year were outstanding. They represent a wide range of application areas, including supply-chain management, capacity planning, workforce scheduling, manufacturing, and financial modeling. They encompass a variety of industries, including telecommunications, computing, and automotive. The public sector was also represented. In addition, they span many parts of the world, with entries from the US, the United Kingdom, and Belgium. All of the finalists demonstrated their commitment to practice excellence, providing significant impact and benefits to the client organizations. I urge you to read their papers included in this issue of *Interfaces*.

First prize in the 1999 competition was awarded to IBM Corporation for "Extended-enterprise supply-chain management at IBM personal systems group and other divisions." The $10,000 cash award that goes with the first prize was presented to the authors: Grace Lin, Markus Ettl, Steve Buckley, Sugato Bagchi, David Yao, Bret Naccarato, Rob Allan, Kerry Kim, and Lisa Koenig.

Six of the finalists were designated honorable mention, with prize money of $850 awarded to each team of authors. In alphabetical order, the honorable mentions were:

—AT&T: "Optimizing restoration capacity in the AT&T network" by Ken Ambs, Sebastian Cwilich, Mei Deng, David Houck, David Lynch, and Dicky Yan.

—British Telecommunications UK Customer Service: "Dynamic workforce scheduling for British Telecommunications plc" by David Lesaint, Christos Voudouris, and Nader Azarmi.

—Mason and Hanger Corporation: "Swords into plowshares: nuclear weapon dismantlement, evaluation, and maintenance at Pantex" by Edwin Kjeldgaard, Dean A. Jones, George F. List, Mark A. Turnquist, James W. Angelo, Richard D. Hopson, John Hudson, and Terry Holeman.

—Spicer Off-Highway Products Division of the Dana Corporation—"Brugge improves its lead-time and scheduling per-

formance" by Nico J. Vandaele, Marc R. Lambrecht, Nicolas De Schuyter, and Rony Cremmery.
—Towers Perrin: "An asset and liability management system for Towers Perrin-Tillinghast" by John M. Mulvey, Gordon Gould, and Clive Morgan.
—Visteon Automotive Systems—a division of Ford: "Visteon's Sterling plant uses simulation-based decision support in training, operations, and planning" by George Pfeil, Ron Holcomb, Charles T. Muir, and Shahram Taj.

Many people contributed to making the 1999 Edelman Award a success, and to name them all would be difficult. However, I would like to convey a special thanks to Steve Strauss (previous chairman) and Mary DeMelim (CPMS administration) for patiently answering my many questions and guiding me along the way. I also extend thanks to the INFORMS office staff who helped me with the logistics of the meeting in Cincinnati, including Cheryl Clark, Julie Eldridge, Ginni McGee, and Mary Steffens. Finally, serving as chairman would not have been possible without the support of my friends and colleagues at Merrill Lynch. In particular, I want to thank Raj Nigam, director of the Merill Lynch management science group, and Gretchen Marsh-Ferino, who provides administrative support for our group and who was a great aid to me. My sincere thanks and congratulations go out to all of the finalists and participants of the 1999 competition.

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I am honored to serve as the editor for this special issue of *Interfaces*, as it continues to represent the best of our profession. This year is no exception. The competition for the Franz Edelman Award for Management Science Achievement was as competitive as ever in 1999. There were seven outstanding finalists, each with an excellent presentation and an excellent paper. Each is a great example of the influence and impact of management science, and each is a winner in its own right. I encourage you to read these papers, and share and discuss them with your colleagues and your students.

The seven finalists cover a wide range of decision contexts, employing a full set of management science models and methods. The applications described in this volume illustrate the basic paradigm for our profession: All are directed at informing and improving decision making on how best to allocate scarce resources. The scarce resources include hardware capacity as in a manufacturing or telecommunication system, financial capital needed for inventory or financial investments, and human capital as required for service delivery, production processes, and improvement initiatives. The objectives for deciding "what's best" are equally heterogeneous—e.g., increasing the reliability of a telecommunication system, reducing cost and time in a supply chain, maximizing the effectiveness of a field engineering work force, and balancing the tradeoff between risk and return for a financial portfolio. Yet, these papers are quite alike in their shared excellence in successfully applying management science, with both tremendous impact and

innovaton.

The Edelman award went to IBM for its application of management science as part of its efforts to reengineer its global supply chain. The lead article in this issue reports on this outstanding work. In the early 90's IBM initiated a corporate-wide reengineering effort. A major thrust of this effort focused on IBM's global supply chain, where key challenges were to determine inventory targets and policies for various supply chain structures and service goals. IBM developed the Asset Management Tool (AMT) to support this initiative. AMT is a decision support system that integrates simulation and optimization to simulate the performance of a supply chain and to quantify the tradeoff between customer service levels and inventory investments. IBM has used AMT to improve the supply chains for several of its businesses. Its application for the Personal Systems Group (PSG), which manufactures and sells personal computers, is noteworthy. IBM used AMT to model various channel strategies for how and where to configure PCs to meet customer orders; this analysis has been instrumental in guiding IBM's restructuring of channel relationships to increase channel flexibility and customer service. AMT was also used to optimize PSG's inventory policies and levels, which resulted in a 50% reduction in inventory with no impact on customer service. Across IBM, the application of AMT has resulted in savings of more than $750 million in 1998.

Our economy and society rely more and more on telecommunication networks, and take for granted that the telecommunication system will work. That is, we'll be able to place a call, send and receive data and e-mail, and access the Internet, whenever and wherever we so desire. AT&T operates the largest telecommunication network in the world and has set the industry standard for network reliability. Ideally, AT&T achieves this reliability by designing a network that doesn't fail. However, in reality, this is not yet possible. To compensate for this, AT&T must augment the network with additional reserve capacity that is only used when there is a network failure to restore traffic flow. The challenge is to decide how much capacity is needed and where, so as to provide the most reliability at the least cost. AT&T has implemented an LP-based decision support system, RestNet, to address this challenge. The application of RestNet has resulted in cost savings and increased revenue of hundreds of millions of dollars, by better utilization of the firm's resources

Many of us have experienced the frustration of waiting at home for the telephone repairman, not knowing exactly when or if one would show up. At British Telecommunications (BT) plc, this problem is being addressed through a real-time information and planning system for workforce scheduling. BT has over 50,000 field engineers that provide a range of customer services. Scheduling this workforce must account for a variety of criteria and complications, such as minimizing travel time and overtime while assuring that an engineer's skills match the task and that these tasks are completed within customer-specified time windows. Furthermore, the scheduling function must be dynamic to accommodate the inevitable

changes to customer requirements and to engineer availability. BT introduced an information system, Work Manager, in 1993 to enable workforce scheduling. In 1996, BT enhanced the Work Manager with an improved scheduling algorithm, the Dynamic Scheduler. BT currently schedules 20,000 of its engineers with the Dynamic Scheduler, and reports both improved customer service and an annual cost saving of $150 million.

With the end of the Cold War, the United States has stopped building nuclear weapons. Instead we are now dismantling weapons to reduce our nuclear stockpile, according to our arms-control agreement with Russia. The Pantex Plant, operated by Mason and Hanger Corporation, is responsible for all dismantlement, evaluation and maintenance activities for the US nuclear stockpile. As the US negotiates arms-control treaties, many questions can arise as to the capabilities of Pantex to meet the treaty provisions. For instance, there may be questions about the feasibility of meeting a dismantlement schedule, about how quickly a set of weapons could be dismantled, or about the impact on Pantex of various verification provisions. To address these questions, Pantex developed a decision support tool for capacity planning and resource deployment, the Pantex Processing Model (PPM). This tool is comprised of a long-range planning model, plus short-range planning models for weapon evaluation and disposal. Pantex has used PPM to support and inform US arms-control negotiators, by being able to assess feasibility of various treaty provisions and the impact on Pantex. In addition, PPM has been instrumental in helping Pantex to exceed its dismantlement goals in FY 1998.

The research literature on job shop planning and scheduling is enormous. Yet the management of most job shops has not benefited much, if at all, from this body of research. The work done for the Spicer Off-Highway Products Division (SOHPD) of Dana Corporation is a superb example of how some of this research can be successfully applied. SOHPD enlisted the help of a team of management science researchers from Katholieke Universiteit Leuven to improve production scheduling of component production. The team first developed a finite scheduling algorithm for the shop. This effort identified the need for a tactical model to estimate lead times, and to model the impacts from both lot sizes and changes to the shop configuration. The team then developed a queuing network model for this purpose. These models have now been incorporated into an integrated planning and scheduling system (ACLIPS: A Capacity and Lead Time Integrated Procedure for Scheduling) that has cut lead times in half and boosted productivity by over 25%, over a time period in which sales per employee increased by 66%.

Most large corporations provide retirement benefits to their employees by means of a pension plan. These corporations must carefully plan and manage their investments in these pension plans so as to assure the retirement benefits for their employees in the most cost effective manner. Towers Perrin-Tillinghast helps companies with the evaluation and planning of their pension plans. A key tool for doing this is the Asset and Liability Management

(ALM) system, which is comprised of a scenario generator, a policy simulator and an optimization module. The system permits a firm to assess the financial performance and risk of its pension plan, by simulating its investment strategy and liability decisions; the optimization module allows a firm to find the best investment policy rules for a given risk level. Towers Perrin employs ALM worldwide with its clients, like US West, which increased its pension surplus by over $450 million. The ALM system is also used by the Tillinghast subsidiary to provide similar service for insurance companies.

Over the past few years, the North American automobile manufacturers have experienced a huge growth in demand for sports utility vehicles and large trucks. Furthermore these vehicles are highly profitable, and account for a disproportionate share of the firms' profits. Thus, there is an enormous opportunity cost when a firm can't keep up with demand. Ford was on the brink of this situation in 1997 with its four-wheel-drive trucks and sport utility vehicles. Demand had increased to 550,000 vehicles; however, the planned production capacity for a key component, namely the front axle, was only 400,000 vehicles. Closing this gap required major productivity improvements at the Visteon Sterling plant, which manufactured these front axles for Ford. Visteon organized hourly workers into self-directed teams, and empowered the teams to make improvements. To support this effort, Visteon developed a simulation-based decision support system (DSS) to provide productivity training for the teams and to serve as a tool to help the teams identify and test improvement ideas for raising productivity. The DSS has also been used to design a new front axle line. These efforts have raised productivity by 30%, and increased output by 144,000 front axles between January 1997 and July 1998.

I congratulate and commend all of the finalists for their excellent work, and thank them for their contributions to this issue and to our profession. To all the volunteers who continue to make this competition a successful event, I extend my thanks and appreciation for your participation, inputs and help. And Mary Haight continues to be the backbone of this operation, editing the papers and producing the volume; my thanks to her for her outstanding work in prodding the rest of us along, and publishing this issue.

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