Franz Edelman Award for Management Science Achievement

It was my pleasure to serve as chairman of the 26th 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 to the individuals who produced 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.

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. The finalists in this year’s competition have all demonstrated their commitment to practice excellence. In addition to having their efforts described in this special issue of Interfaces, all six finalists will have their presentations added to the Edelman Prize videotape collection.

The award is named in honor of Dr. Franz Edelman. Dr. Edelman was responsible for management sciences at RCA, one of the earliest industrial OR/MS activities in North America. He worked for 30 years at RCA and is counted among the fathers of innovation in management science.

The prize competition began with a call for nominations in mid-1996. Approximately 25 entries were submitted. These were reviewed by an award committee which selected the most noteworthy for careful verification. After a comprehensive review, the committee chose six finalists to give presentations in an all-day session held in conjunction with the San Diego National meeting in May 1997.

Each finalist had a coach to help with preparation. I would like to thank Robert Breitman, Anthony Brigandi, Joseph Discenza, Russ Labe, Fred Murphy, and Peter Norden for serving as coaches for the contestants.

Immediately after the presentations, the judges began their deliberations, which went on until they determined the awards. I would like to recognize those who joined me as judges this year: Howard Finkelberg, Newton Garber, Yoshiro Ikura, Bob Love, Michael Rothkopf, Amir Sadrian, and Thomas Spencer.

A common theme among the finalists in this year’s competition was the integration of management science techniques with information technology. As we move forward increasingly toward an information-based economy, it becomes obvious that
this marriage of OR/MS and IT will represent a dominant theme in the future of our profession.

This year, six finalists were truly outstanding; each is a winner and could have won first prize. Five of the finalists were designated honorable mention, with an award of $1,000. They were the following in alphabetical order:

Hewlett-Packard: Mitchell Burman and Stan Gershwin, authors, and Curtis Suyematsu, client representative and author, for Hewlett-Packard uses OR to improve the design of a printer production line. This system used OR techniques to increase the throughput of a strategically significant production line at Hewlett-Packard resulting in millions of dollars per month in increased production and sales.

Northern Telecom Wireless Network Division: Paul Brinkley, David Septo, Kristopher Haag, John Folger, Kui Wang, Kuanlian Liou, and W. David Carr, authors, for “Nortel redefines factory information technology: An OR-driven approach.” This system was an integrated real-time information-technology and OR/MS system for the Northern Telecom Wireless manufacturing facility.

Pacific Gas & Electric: Raymond Johnson, Alva Svoboda, Claudia Greif, Fulin Zhuang, and Ali Vojdani, authors, for “Positioning for a competitive electric industry with PG&E’s hydro-thermal optimization model.” This system has been the primary decision support tool for the short-term scheduling of Pacific Gas & Electric’s generation resources since 1992, resulting in benefits of $1 million per month and production savings of $3 million per year.

US Department of Energy: Detlof von Winterfeldt and Eric Schweitzer, authors, for “An assessment of tritium supply alternatives in support of the US nuclear weapons stockpile.” This assessment was the determining factor in DOE’s determination of how to develop new tritium-production facilities for the year 2011.

First prize in the competition was given to the Société Nationale de Chemin des Fer Français (SNCF), the French national railway, for “Scheduled optimization at SNCF: From conception to day of departure.” They developed and implemented operations research models and advanced decision support tools to address the problems of schedule building and train capacity allocation on SNCF’s network of high-speed electric-powered trains Grand Vitesse. These models and tools have been fully integrated into SNCF’s decision-making process, increasing revenue and profit; reducing manpower schedule development time; and improving the planning process and operations. This work positions SNCF to meet the growing challenge of competition within the European Union where the business environment is changing dynamically. Acceptance of this work has begun to change the business culture at SNCF.

The $10,000 cash award that goes with
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the first prize has been presented to the authors: Nejib Ben-Khedher, Josephine Kintanar, and William Stripling of SABRE Group and Cecille Queille, a directeur (translated as vice president) with SNCF and one of the highest ranking women in SNCF.

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I am again pleased to serve as the editor for this special issue of Interfaces. This year’s competition for the Franz Edelman Award for Management Science Achievement was as competitive as ever. There were six 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, discuss them with your colleagues, and teach them in your classrooms.

The finalists are as diverse as ever this year: a labor management system at a fast-food chain, schedule optimization for the French national railway, the assessment of alternatives for producing tritium, the design and implementation of a shop-floor information and decision-support system for a new factory, the analysis of an automated production line, and the optimization of a power generation schedule. There are six different industries or contexts. The methodologies that are applied also vary and include simulation, stochastic modeling and analysis, and optimization. The only common theme across the papers is their excellence at using management science.

This year’s lead article reports on the application of management science to optimize schedules at Société Nationale des Chemins de Fer Français (SNCF), the French national railway. SNCF, with SABRE Decision Technologies, has developed two decision-support systems for improving its schedules and its deployment of rail assets. RailPlus is a strategic schedule-planning system that is used twice a year to develop train schedules for SNCF’s high speed network, the Trains à Grande Vitesse (TGV). RailCap is a tactical capacity-adjustment system that is used daily to monitor the capacity utilization throughout the TGV system and then add or drop trains to various links to maximize profits. The application of RailPlus has resulted in a one percent increase in revenues and a two percent decrease in operating costs relative to prior manually prepared schedules. RailCap has had a similar impact, increasing the revenues associated with the capacity adjustment activity by two percent while decreasing operating costs by three percent. Furthermore, these systems are transportable to other transportation carriers; SNCF and SABRE are currently marketing the systems to other passenger-rail operators, as well as to intercity bus companies.

Over the past 15 years a popular manufacturing mantra has been that inventory is evil. But the paper from Hewlett-Packard (HP) provides a counterexample. For their ink-jet printers, HP had designed an automated production line with virtually no space for in-process inventories.
Prior to building the line, though, a stochastic analysis of the design revealed that the line could not meet the production goals. Subsequent analyses showed how to size and locate buffers throughout the line so as to increase the capacity of the line with minimal investment in space and inventory. Without this modification to the line design, HP would have lost substantial market share due to unavailability of product. HP estimates that the impact from this work in terms of increased revenue is $280 million over the life of the product family. In addition, the methodology is now used regularly in the design of production systems throughout HP.

The opportunity to build a green-field manufacturing plant comes around only so often; so when it does, an enterprise should take advantage of the opportunity to introduce state-of-the-art technology and systems in the design and implementation of the plant. Northern Telecom had such an opportunity when building a plant in North Carolina for the manufacture of cellular equipment. In particular, the firm implemented a novel enterprise information system that provides real-time information and decision support for the manufacturing operations. Furthermore, a team of operations researchers designed and implemented this system, using desktop computer technology and a web intranet; this is in contrast to a more traditional approach relying on a custom development by information system specialists and programmers. The implementation occurred in record time; the benefits include significantly lower development and support costs for the information system, and better decisions for the manufacturing operations, resulting in less inventory and rework, and improved schedule performance.

The gradual deregulation of the electric power industry has created new opportunities as well as threats for electric power companies. In particular, given the emergence of markets for selling and trading electric power, companies need to understand their generating costs and capacities. For a company like the Pacific Gas and Electric (PG&E) Company, this is complicated because of the complexity of its power-generation system. Indeed, PG&E has the most diverse hydro-thermal resource mix in the world. For these reasons, over the last 10 years PG&E developed the Hydro-Thermal Optimization (HTO) system for optimizing the weekly scheduling of these resources. The HTO system uses Lagrangian relaxation to decompose the nonlinear, integer program into more manageable unit subproblems. PG&E uses this system on a daily basis for scheduling both fossil-fuel units and hydro units, as well as for making energy trades; the Lagrange multipliers provide estimates for the marginal cost for energy on an hour-by-hour basis. This system has saved PG&E about one percent of its fuel bill. In addition, the optimization has been used to assess various auction protocols under consideration as California deregulates its power industry.

The fast-food industry is extremely competitive. To be successful requires not only good food and good service but also tight control on operating costs. At Taco Bell, labor costs correspond to about 30 percent of sales revenue and are one of the largest controllable costs. To manage these costs,
Taco Bell developed a set of management science models for planning and scheduling labor at each store. The decision support system includes a model for forecasting customer transactions for every 15-minute interval of the day, a simulation model for finding the labor requirements needed to provide a desired service level over the course of the day, and an optimization model to create an employee schedule. The initial implementation of the Labor Management System occurred in 1993, and it has now been deployed to all company-owned stores. Benefits include a reduction of one labor hour per day per store, for a total savings of $40 million in labor costs over the last four years.

Even though the cold war is over, the United States still maintains a stockpile of nuclear weapons. These weapons require tritium, a radioactive isotope of hydrogen. Since tritium decays at a rate of about 5.5 percent per year, there is a continual need to replenish tritium. Currently we have no operational reactors for producing tritium. Consequently, the Department of Energy is examining various options for ensuring a supply of tritium in the future to satisfy the needs of our nuclear weapons stockpile. The last paper in this issue describes the analysis of 10 alternatives; for each alternative the analysis had to model the reliability of the supply of tritium over 40 years, as well as the cost and environmental impact. This analysis provided the technical basis for the decision in December 1995 by the secretary of the Department of Energy to select a subset of the alternatives to pursue further. This decision also resulted in the rejection of several alternatives, which typically would lead to lawsuits by the spurned vendors; however, to date there have been no such lawsuits filed, presumably due to the soundness of the technical analysis.

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 their 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 publishing this issue.

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