

Finance and Quantitative Decision Making

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A History of Success

Systems Engineering has contributed significantly to many service industries:

- Finance
- Transportation
- Energy
- Hospitality
- Rental Agencies



Energy

Manne, A., Richels, R., Weyant, J. 1979, "Energy Policy Modeling: A Survey", Operations Research, 27(1), 1-37.

"Inherently, energy policy is an interdisciplinary field. It involves ... methodologies that are already familiar to the operations researcher: optimization algorithms, simulations, decision analysis and econometric estimation."



Transportation Systems

Smith, B., Leimkuhler, J., Darrow, R. 1994, "Yield Management at American Airlines", *Interfaces*, 22(1), 8-31

"In its 1987 Annual Report American Airlines broadly described the function of yield management as "selling the right seats to the right customer at the right prices" "



Magic Kingdom

“Operation everything: It stocks your grocery store, schedules your favorite team's games, and helps plan your vacation...”

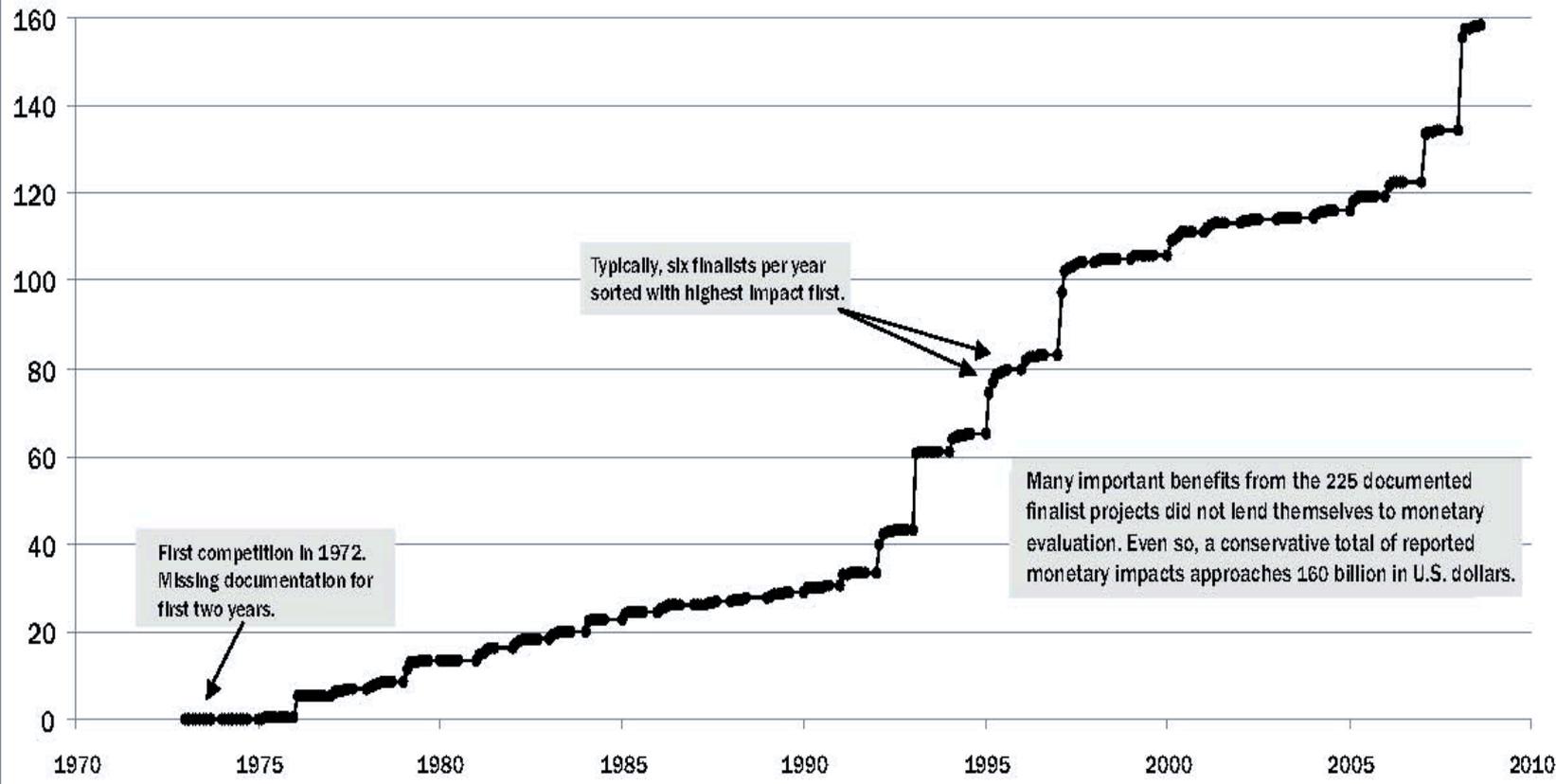
The Boston Globe



Measuring the Benefits

Grand Total Benefits in \$US Billions from Edelman Finalist Projects, 1972 through 2008

(Conservatively quantified benefits from documented projects, realized plus at most 2 years anticipated, in 2009 dollars)



Current Research: Health Care Delivery

- Appointment systems
- Emergency department patient flow
- Emergency vehicle location and routing
- Hospital bed management
- Pharmacy inventory management
- Surgery planning and scheduling

Current Research: Medical Decision Making

- Liver and Kidney transplant allocation
- Cancer screening policies
- HIV treatment
- Sepsis management
- Intensity modulated radiation therapy
- Diabetes treatment
- Vaccination policies



Finance

Vision: A health care system that provides incentives to:

- clinicians to keep their patients healthy
- patients to stay healthy
- providers to be efficient



Quantitative Decision Making

Vision: Advances in modeling and methodology to enable new best practices

- Guide policies for disease treatment and screening
- Predict the performance of new health care delivery systems
- Evaluate major policy changes



Broader Impact

- Industrial & Systems Engineering can help healthcare and vice versa:
 - Attract U.S. citizens and under represented minorities into engineering
 - Catalyze the development of new engineering methods

