MEMBER PROFILE: ANNA NAGURNEY

Anna Nagurney is the John F. Smith Memorial Professor in the Department of Finance and Operations Management at the Isenberg School of Management at the University of Massachusetts at Amherst. She also holds appointments in the Department of Civil and Environmental Engineering and the Department of Mechanical and Industrial Engineering. She received her AB degree in Russian Language and Literature, and her ScB, ScM, and PhD degrees, all in Applied Mathematics, from Brown University in Providence, Rhode Island. Her doctoral specialization was in Operations Research. Anna's dissertation supervisor at Brown was Stella Dafermos, the second female to receive a PhD in OR, which she obtained from Johns Hopkins University. Stella held appointments in the Divisions of Applied Mathematics and Engineering at Brown.

Anna's passion is the study of networks from an interdisciplinary perspective, a subject she has been drawn to since her undergraduate days. After receiving her undergraduate degrees she worked for several years in high tech consulting for the defense sector in Newport, Rhode Island, while working on her Master's degree at Brown and also finding time to run marathons. The network theme continued since she was involved in developing a variety of models and algorithms (implemented in assembly language) for submarine transit and detection avoidance. Her first paper presentation was at a conference at the Naval Postgraduate School for an audience filled with military brass.

Anna soon realized that she did not like "having a boss" especially since she would complete projects ahead of schedule, much to the consternation of some of her supervisors, so she matriculated full-time as a doctoral student at Brown. The match-up with Dafermos was a natural one, since Stella needed a student with a lot of computational experience and Anna liked the idea of working for the only female faculty member in Engineering and Applied Math (not to mention that Dafermos was an expert in transportation science and networks). The experience of working with Dafermos, who was so ahead of her time, was incredible and the standards instilled in Anna she strives to meet to this day. Anna especially enjoyed TAing Stella's courses in OR and transportation – not to mention being Irv Lustig's TA at Brown while he was an undergraduate. Stella Dafermos passed away on April 5, 1990 and her obituary written by Anna appeared in Operations Research.

Along with Dafermos, Anna published several papers on sensitivity and stability analysis of network equilibrium problems using variational inequality formulations that Dafermos had been instrumental in discovering and advancing. Those papers that appeared in Operations Research, Mathematical Programming, and Transportation Research, have now (twenty years later) drawn interest from the computer science community due to the parallels between flows on transportation networks and telecommunication networks; notably, the Internet. Such interest has been also stimulated by the Braess paradox and the theme of the "price of anarchy" which is motivating further research is network games and pricing. Anna, along with Braess, and a doctoral student of hers, Tina Wakolbinger, have now translated the classical Braess article from German to English (in *Transportations Science*, November 2005) Learning different languages is a hobby of Anna's that comes in handy in her research and also in her many travels.

Anna has been drawn to computing since her undergraduate days at Brown and after receiving her PhD was also very active in supercomputing and parallel computing and utilized the resources of several National Supercomputing Centers including Cornell's and Illinois'. She also served on Cornell Theory's Center National Allocation Committee and would spend weeks of many a summer being "trained" at various supercomputing centers in the US. The INFORMS Computing Society is, hence, a natural "home" for Anna, along with the INFORMS Transportation Science & Logistics Section. She has served on several prize committees for both the Computing Society and the TSL Section.

Anna's passion for networks (and transportation, including travel) has been realized also in numerous visiting appointments. She has held visiting appointments at MIT (Center for Transportation and the Sloan School), at Brown University, at the Royal Institute of Technology (KTH) in Stockholm, Sweden, and at the University of Innsbruck, Austria as a Distinguished Faculty Chaired Professor under the Fulbright program. In March 2004, Anna organized a research team residency at the Rockefeller Foundation's Bellagio Center on Lake Como, Italy. The project was focused on dynamic networks with applications to global supply chains and financial networks with intermediation. It was the first research team funded in applied math/operations research/ management science since the founding of the center in 1959.

Anna's first book, Network Economics: A Variational Inequality Approach, was published in 1993 with the second and revised edition appearing in 1999. She has since authored books on Financial Networks (with Stavros Siokos), Environmental Networks (with K. Kanwalroop Dhanda and Padma Ramanujam), Sustainable Transportation Networks, and Supernetworks (with June Dong). She has also edited several books. She is co-editor with Hans Amman of the journal Netnomics. She serves on the editorial boards of several journals and is editor of the book series: New Dimensions in Networks for Edward Elgar Publishing. She has published extensively in leading OR and economic journals.

In 2001, Anna founded the Virtual Center for Supernetworks and serves as its Director, along with the Supernetworks Laboratory for Computation and Visualization. The center website has articles, Fulbright network course lectures, fascinating facts, and other information on network-based topics.

Networking by Lake Como - the Bellagio dynamic networks team. Anna with Patrizia Daniele and Monica-Gabriela Cojocaru

Some recent awards that Anna has received are: the College Outstanding Research Award (2004-2005), two AT&T Industrial Ecology Fellowships (2002 and 2001), the Chancellor's Medal from the University of Massachusetts (2000), and the Eisenhower Faculty Fellowship from the National Highway Institute (1999).

Anna serves as the Faculty Advisor for the UMass Amherst INFORMS Student Chapter http://student.som.umass.edu/informs/ which this year was the spotlight chapter in ORMS Tomorrow; http://ormstomorrow.informs.org/spotlightchapter.htm. The chapter is very active, hosting a speaker seminar series, and many activities, including a variety of social activities. Anna was awarded a "Moving Spirit Award" at the San Francisco INFORMS meeting for her work with the Student Chapter. Anna also heads the Management Science doctoral track of the PhD in Business Administration at the Isenberg School of Management.

In her spare time, Anna enjoys running, painting, reading, and spending time with her family, which includes a much-traveled husband and daughter.

This Fall Anna is on a one year sabbatical at the Radcliffe Institute for Advanced Study at Harvard University as a Fellow (one of 48 fellows selected from across the country and abroad, representing 24 different academic, professional and artistic fields). The mission of the Radcliffe Institute is the creation of new knowledge. Anna will be continuing her research on dynamic networks, variational inequalities, and projected dynamical systems while in residence at Harvard and hopes to write another book.

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The winning team was awarded the Prize for their body of work in three papers:

- A Genetic Algorithm-Based Approach for Building Accurate Decision Trees, *INFORMS Journal on Computing* 15 (2003) 3–22.
- Genetically Engineered Decision Trees: Population Diversity Produces Smarter Trees, *Operations Research* 51 (2003) 894–907.
- Diversification for Better Classification Trees, *Computers & Operations Research* (2005) in press.

The award committee was chaired by Bob Fourer, and included also Gerald Brown and Hanif Sherali. With a total of 11 nominations the competition was very healthy.

In awarding the prize the committee gave the following citation:

"This work describes innovative methods for constructing classification trees in very large data sets. Ideas from statistics and heuristic search are combined to produce methods that are fast, accurate, and of high quality as measured by several newly proposed performance measures. These methods are applicable to a variety of data mining problems of practical size, and represent a significant contribution to knowledge and practice at the interface of operations research and computer science."

The ICS Prize award is accompanied by a plaque and a $1,000 honorarium.