
The Supernetwork Sentinel

The Newsletter of the Virtual Center for Supernetworks

Summer 2007



Welcome to the Summer 2007 edition of **The Supernetwork Sentinel**, the newsletter of the Virtual Center for Supernetworks at the Isenberg School of Management, UMass Amherst. **The Supernetwork Sentinel** is published in Fall, Winter, and Summer editions. Its purpose is to keep you informed of events, activities, and successes of the Virtual Center for Supernetworks, the Center Associates, and the Supernetworks Laboratory for Computation and Visualization. In this newsletter, we include an essay by Professor Anna Nagurney on the UMass Amherst INFORMS Student Chapter. We also share and celebrate the achievements of our hard-working Center Associates, whose research is being recognized internationally. As always, we also provide a list of our recent publications.

We wish everyone a terrific summer!

Anna Nagurney
John F. Smith Memorial Professor
Director – Virtual Center for Supernetworks
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Professor Nagurney with Professors Berc Rustem and Stratos Pistikopoulos at Imperial College, London, England, before Nagurney's Inaugural Lecture on April 24, 2007 of the Systems Engineering Seminar Series

Inside

The UMass Amherst INFORMS Student Chapter -- Building Community

Nagurney and Qiang's Research on Network Efficiency and Vulnerability Featured in *NetworkWorld*, *ComputerWorld*, and *LinuxWorld*

Dr. Stavros Siokos Headlines TradeTech2007 in Paris, France

Highlights from the Women in Science Event

Kudos, Congratulations, and News

Exciting Upcoming Conferences

Recent Center Publications

Congratulations to President Drew Gilpin Faust of Harvard University!



2007 UMass Amherst Commencement



Professor Nagurney and Center Associates Celebrating the Graduates

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UMass Amherst INFORMS Student Chapter Officers for 2006-2007 are Recognized for their Outstanding Service



Members of the Chapter and their Guests at the End of the Year Party May 10, 2007

The UMass Amherst INFORMS (Institute for Operations Research and the Management Sciences) Student Chapter -- Building Community for Interdisciplinary Research and Fellowship

Anna Nagurney

Summer is a time in which those of us who are in academia tend to assume a different pace than that which characterizes the academic year with the academic's responsibilities of teaching, research, and service. It is a time in which research and the supervision of graduate students can be conducted with fewer interruptions, travel to conferences and meetings with colleagues from around the world can take place at a more leisurely pace, more time is available in which to revise courses and instructional materials, and to also reflect on the varied activities and events of the previous year.

Let me begin by sharing with you some of the special activities and accomplishments of the UMass Amherst INFORMS Student Chapter; <http://student.som.umass.edu/informs/> that I have the privilege of serving as a Faculty Advisor of. First, I will share with you some background that will help to place this information in the context of recent newsworthy events.

In 2004, I almost left UMass Amherst since I was offered the department chair position at the Department of Industrial and Systems Engineering (I&SE) at Virginia Tech in Blacksburg, VA, and a named chaired professorship. Despite also a wonderful offer for my husband, Dr. Ladimer Nagurney, for various reasons, I decided to remain at UMass Amherst. Nevertheless, the bond to Virginia Tech was made. What became apparent to me during the extended and enjoyable interviewing process was that UMass Amherst needed a forum in which students across disciplines of operations research and the management sciences could interact with one another both professionally and socially. The natural forum would be through a Student Chapter and, along with, Tina Wakolbinger, a Center Associate, we went through the process of revitalizing and reestablishing the UMass Amherst INFORMS Student Chapter, which had been moribund for over a decade. Wonderful support in revitalizing the chapter was provided by INFORMS itself; see <http://www.informs.org>.

The chapter's various activities center around its Speaker Series, which brings outstanding speakers to the Isenberg School of Management. The speakers this past Spring 2007 semester were: Professors Asu Ozdaglar, Richard Larson, and Karen R. Polenske of MIT; Professor David Parkes of Harvard, and Professors David McLaughlin and Daiheng Ni of UMass Amherst. Those interested can view the following link for more information on the speakers, the titles of the presentations, and the abstracts: <http://supernet.som.umass.edu/informs/speakernew.html>

The UMass Amherst Speaker Series Coordinator for 2006-2007 was Doctoral Student Center Associate Trisha Woolley. We thank all the speakers for their outstanding presentations and for taking time out of their very busy schedules to come and speak and to meet with interested students, faculty, and guests in the audience!

Members of the UMass Amherst INFORMS Student Chapter include students from the Isenberg School of Management, the School of Engineering (notably, the Department of Mechanical and Industrial Engineering and the Department of Civil and Environmental Engineering), the Department of Resource Economics, and the Department of Computer Science. The chapter provides a forum in which the students (and interested faculty and guests, as well) can meet and have lunch with the speakers in our series, attend various social events, which help to mark the academic year calendar, and develop friendships. Former members of our chapter have assumed academic and industrial positions not only in the US but also in Canada, Europe, and even Australia. The networks established through the student chapter continue to grow as the former members assume their new professional lives after graduation.

This past year, Tina Wakolbinger received the Judith Liebman Award from INFORMS for her activities with the UMass Amherst INFORMS Student Chapter. An interview with her appeared in *ORMS Tomorrow*; see: <http://ormstomorrow.informs.org/>

In 2005, I was honored with the Moving Spirit Award, also given by INFORMS, for my service as the Faculty Advisor of our chapter. This recognition is truly meaningful to me personally since it signifies that service to the profession and especially to our students does get recognized. Nevertheless, the greatest reward is seeing so many of our students enjoy one another both professionally and socially and support one another throughout their studies.

To quote Charles Dickens, *It was the best of times, it was the worst of times*. On April 16, 2007, the world mourned the great tragedy at Virginia Tech (VT) and we, as a chapter, mourned as well, with our colleagues and students of the Virginia Tech INFORMS Student Chapter. Our chapter sent a letter and a memorial contribution to the VT student chapter in memory of those who lost their lives and we received a very personal and touching letter from Professor Don Taylor, the chair of the I&SE department there, who also happens to have a PhD from UMass Amherst. Through this horrific tragedy at VT let us all remember how important it is to build and strengthen our communities.

Nagurney and Qiang's Research on Network Efficiency and Vulnerability Featured in *NetworkWorld*, *ComputerWorld*, and *LinuxWorld*

Professor Anna Nagurney and Patrick Qiang's research on network efficiency/performance measurement and the identification of critical nodes and links and their rankings has received major attention recently in the press. Articles on their research, based on interviews conducted with Professor Nagurney, have appeared in *NetworkWorld*, *ComputerWorld*, and *LinuxWorld*, and have also been translated into other languages, including Swedish. Professor Nagurney has also been interviewed on the major study by the German press. Please see: <http://supernet.som.umass.edu/media/media.htm> for additional information.

Papers co-authored by Nagurney and Qiang and based on their major study, which was funded by the National Science Foundation, under the Management of Knowledge Intensive Dynamic Systems program, are now in press in *Optimization Letters* and the *Journal of Global Optimization*. The authors have applied their results to congested urban transportation networks, electric power supply chains, as well as to a dynamic model of the Internet.

Dr. Stavros Siokos Headlines TradeTech2007 in Paris, France

Center Associate Dr. Stavros Siokos, who is the Managing Director of Citigroup and is based in London, England, was the headline speaker at the TradeTech2007 conference held in Paris, France, on April 25, 2007. Dr. Siokos spoke on **Effectively Preparing for New Market Structures: Examining the Drivers of Change in Today's Market**. More information is available at: <http://wbresearch.com/tradetecheurope/agenda.html>

Professor Nagurney met up with Dr. Siokos immediately before TradeTech2007 in Geneva, Switzerland, where both were attending the Computational Management Science (CMS) Conference, held April 20-22, 2007. Together they also serve on the Advisory Board of the COMISEF project funded by the European Union, which held a meeting after the CMS conference.

Highlights from the Women in Science Event

On April 17, 2007, a panel on **Women in Science: Changing the Climate from the Bottom Up to the Top Down** was held from 5-7PM at the Isenberg School of Management at UMass Amherst. Participants came from throughout Massachusetts and numbered over 150! Dr. Barbara Pearson of RL&D at UMass

Amherst spearheaded this effort. Panelists included Dr. Joanne Kamens, the President of MassAWIS (Massachusetts Association for Women in Science), Professors Anna Nagurney and Sandy Petersen of UMass Amherst, along with Graduate Student Liesell Trudell. The Virtual Center for Supernetworks was pleased to help in co-sponsoring the event, with additional support provided by the UMass Amherst INFORMS Student Chapter, RL&D, NEAGAP, TWIST, and CPPA. The presentations of the panelists are available at:
<http://umass.edu/research/rld/massawis/womenscience.html>

The Women in Science Panel



Kudos, Congratulations, and News

While attending the Computational Management Science Conference in Geneva, Switzerland, April 20-22, 2007, Professor Anna Nagurney was informed by Professor Roger Stough that she was one of five Fellows of the Regional Science Association International (RSAI) elected in 2007. This is a great honor and Professor Nagurney is deeply humbled to have this recognition. Other elected members in 2007 are: Professors Yoshitsugu Kanemoto, Harry Kelejian, Yorgos Papageorgiou, and Alan Wilson. Professor Nagurney has chosen to receive the award at the North American RSAI Meeting to be held in November 2007 in Savannah, Georgia. According to Dr. Stough, the President of RSAI, "This is an award of the highest significance in our field of regional science and is made in honor of the extensive, meaningful and continuing contributions you have made to the intellectual base of the field of regional science." Previously elected RSAI Fellows include such good friends of the Virtual Center for Supernetworks as Professors David E. Boyce and Karen R. Polenske.

Congratulations to Center Associate Tina Wakolbinger, who on April 30, 2007 successfully defended her doctoral dissertation, entitled, **A Dynamic Theory for the Integration of**

Social and Economic Networks with Applications to Supply Chain and Financial Networks! Her dissertation committee consisted of Professors Julie Caswell, June Dong, Ana Muriel, and Anna Nagurney as chair. Dr. Wakolbinger will be an Assistant Professor at the Fogelman School of Business at the University of Memphis in Tennessee, beginning in the Fall 2007. The institution is home to the renowned Fedex Center and the city is a transportation hub and home to St. Jude's Hospital for Children.

Congratulations to Center Associate Zugang Liu who this past semester successfully defended his doctoral dissertation proposal, entitled, **Transportation and Dynamic Networks: Models, Theory, and Applications to Supply Chain, Electric Power, and Financial Networks!** Professor Anna Nagurney is chairing his dissertation committee.

Kudos to Center Associate Qiang "Patrick" Qiang who received a Graduate Fellowship from the organizers of the World Conference on Transport Research (WCTR) to be held in Berkeley, California, June 24-28, 2007. Patrick will be delivering the paper, **A Transportation Network Efficiency Measure that Captures Flows, Behavior, and Costs with Applications to Network Component Importance Identification and Vulnerability Analysis**, co-authored with Anna Nagurney, at the conference and will also be assisting the organizers there with the conference.

Congratulations to Dr. Dmytro Matsypura, who assumed his position as Lecturer (equivalent to a US Assistant Professor position) at the University of Sydney in 2007! Dr. Matsypura is teaching this term and has also been busy giving invited talks and seminars.

Congratulations to Center Associate Dr. Fuminori Toyasaki, who is completing his postdoctoral fellowship at McGill University! For the past two years he has been working with Professors Vedat Verter and Tamer Boyaci. Dr. Toyasaki will be joining the faculty of York University in Toronto, Canada as an Assistant Professor in the Fall of 2007.

On March 3, 2007, Professor Nagurney gave an invited talk in the Brown University Symposium for Undergraduates in the Mathematical Sciences (SUMS) in Providence, Rhode Island. This year's theme was Operations Research. Professor Nagurney's presentation was: **Operations Research and the Captivating Study of Networks and Complex Decision-Making**. More information, including several videos and presentation slides, can be found at:
<http://www.math.brown.edu/SUMS/index.php?page=details>

On April 4, 2007, Professor Nagurney spoke at MIT in the Agent-Based Modeling Seminar Series in the Division of Urban Studies and Planning (DUSP) upon the invitation of Professor Karen R. Polenske. The title of Professor Nagurney's presentation was: **Multi-Agent Network Models, Dynamics and Applications to Vulnerability Analysis.**

Professor Anna Nagurney on April 24, 2007, gave the inaugural lecture in the Systems Engineering Seminar at Imperial College, London, England. The title of her talk was **Critical Infrastructure Networks and Supernetworks: New Tools for Dynamics, Network Efficiency Measurement and Vulnerability Identification.** Professor Nagurney met with Professors Berc Rustem, John Polak, and Stratos Pistikoupoulos while at Imperial and she thanks them all for their extraordinary hospitality, which was truly "imperial!"

Congratulations to Center Associates: Zugang Liu, Patrick Qiang, and Trisha Woolley, all of whom traveled to the POMS Conference in Dallas, Texas, held May 4-7, 2007 and presented papers! Trisha also presented the paper, **Spatially Differentiated Trade of Permits for Multipollutant Electric Power Supply Chain Networks**, at the 7th Meeting on Game Theory and Practice Dedicated to Energy, Environment and Natural Resources held May 28-30, 2007 in Montreal, Canada.

For online presentations of the Center Director and Associates at a variety of forums, see: <http://supernet.som.umass.edu/visuals.html>



Center Associates Patrick Qiang, Trisha Woolley, and Zugang Liu with Professor Anna Nagurney at the POMS Conference in Dallas, Texas, May 4-7, 2007



Exciting Upcoming Conferences

San Juan, Puerto Rico - Venue of the Upcoming INFORMS International Conference

The Center Director, Professor Anna Nagurney, and Associates will be presenting at several forthcoming conferences:

13th International Conference on Computing in Economics and Finance, Montreal, Canada, June 14-16, 2007,

World Conference on Transport Research 2007 Berkeley, California, June 24-28, 2007, and

INFORMS International Meeting 2007, Puerto Rico, July 8-11, 2007.

For more information on these conferences, see: <http://supernet.som.umass.edu/conferences.html>

Recent Center Publications

Copies of these (and other) center articles may be found at:

<http://supernet.som.umass.edu/dart.html>

Sustainable Supply Chain and Transportation Networks, A. Nagurney, Z. Liu, and T. Woolley, *International Journal of Sustainable Transportation* (2007), **1**, 29-51.

Modeling of Electric Power Supply Chain Networks with Fuel Suppliers via Variational Inequalities, D. Matsypura, A. Nagurney, and Z. Liu, *International Journal of Emerging Power Systems* (2007), **8**, issue 1, article 5.

Networks, A. Nagurney, in *Mathematical Models in Economics, Encyclopedia of Life Support Systems (EOLSS)* (2007), W.-B. Zhang, editor.

A Transportation Network Efficiency Measure that Captures Flows, Behavior, and Costs with Applications to Network Component Importance Identification and

Vulnerability, A. Nagurney and Q. Qiang, *Electronic Proceedings of the 2007 POMS Meeting, May 4-7, Dallas, Texas*.

Projected Dynamical Systems, Evolutionary Variational Inequalities, Applications, and a Computational Procedure, M.-G. Cojocaru, P. Daniele, and A. Nagurney, in *Pareto Optimality, Game Theory, and Equilibria*, A. Chichuluun, A. Migdalas, P. M. Pardalos, and L. Pitsoulis, editors, Springer, Berlin, Germany (2007), pp. 169-188.

Statics and Dynamics of Global Supply Chain Networks with Environmental Decision-Making, A. Nagurney, J. Cruz, and F. Toyasaki, in *Pareto Optimality, Game Theory, and Equilibria*, A. Chichuluun, A. Migdalas, P. M. Pardalos, and L. Pitsoulis, editors, Springer, Berlin, Germany (2007), pp. 611-646.

An Evolutionary Variational Inequality Formulation of Supply Chain Networks with Time-Varying Demands, A. Nagurney and Z. Liu, in *Network Science, Nonlinear Science and Game Theory Applied to the Study of Infrastructure Systems*, T. L. Friesz, editor, Springer, Berlin, Germany (2007), pp. 267-302.

The Internet, Evolutionary Variational Inequalities, and the Time-Dependent Braess Paradox, A. Nagurney, D. Parkes, and P. Daniele, *Computational Management Science* (2006), in press; published online by Springer, September 12, 2006.

A Network Equilibrium Framework for Internet Advertising: Models, Qualitative Analysis, and Algorithms, L. Zhao and A. Nagurney, *European Journal of Operational Research*, in press.

A Network Efficiency Measure with Application to Critical Infrastructure Networks, A. Nagurney and Q. Qiang (2007), to appear in *Journal of Global Optimization*.

A Unified Network Performance Measure with Importance Identification and the Ranking of Network Components, Q. Qiang and A. Nagurney (2007), to appear in *Optimization Letters*.

Dynamic Electric Power Supply Chains and Transportation Networks: An Evolutionary Variational Inequality Formulation, A. Nagurney, Z. Liu, M.-G. Cojocaru, and P. Daniele (2005), *Transportation Research E*, in press.

Financial Networks with Intermediation and Transportation Network Equilibria: A Supernetwork Equivalence and Reinterpretation of the Equilibrium Conditions with Computations, Z. Liu and A. Nagurney (2006), *Computational Management*

Science, in press; published online by Springer, June 27, 2006.

President Faust at the Radcliffe Institute for Advanced Study Reception in her Honor on May 22, 2007



Congratulations to President Drew Gilpin Faust of Harvard University!

In the Winter 2007 edition of **The Supernetwork Sentinel**, Center Director Anna Nagurney reflected on her sabbatical year as a 2005-2006 Science Fellow at the Radcliffe Institute for Advanced Study at Harvard University and wrote about the importance of diversity. The Founding Dean of the Radcliffe Institute, Dr. Drew Gilpin Faust, in the meantime, has been appointed as the first female President of Harvard University! We salute President Faust and wish her all the best as she assumes one of the most important and visible positions in academia in the world!

Dr. Barbara Grosz, who served as the Science Dean at the Radcliffe Institute has been appointed the Interim Dean of the Radcliffe Institute. Congratulations to Dean Grosz!

Special Thanks

The Center Director and Center Associates at this time would like to take the opportunity to thank all the staff in the Isenberg School of Management who have assisted us so wonderfully throughout the 2006-2007 academic year! Special thanks to Ms. Irene Benoit, Ms. Jo-Ann Bourguignon, Ms. Becky Jerome, Ms. Mary Parker, Ms. Ellen Pekar, Ms. Kristen Rup, and Ms. Lynda Vassallo for all the help and support!



**Celebrating Our 2007 New PhDs!
Dr. Haizheng Zhang, Dr. Tina Wakolbinger,
Dr. Jia Wang, and Dr. Diogo Monteiro-Souza**

Dr. Zhang is the husband of Center Associate, Professor Ke Ke, Dr. Wang is the wife of Center Associate Zugang Liu.

Professor Nagurney was a member of Dr. Monteiro-Souza's dissertation committee.

More photos of the graduation celebration can be found at:
<http://supernet.som.umass.edu/cfoto/graduation2007/graduation2007.htm>

**Virtual Center for Supernetworks
Eugene M. Isenberg School of Management
University of Massachusetts at Amherst**

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John F. Smith Memorial Professor

Associates

Dr. Jose M. Cruz
Dr. Patrizia Daniele
Dr. June Dong
Dr. Ke "Grace" Ke
Dr. Ladimer Nagurney
Dr. Padma Ramanujam
Dr. Stavros Siokos
Dr. Fuminori Toyasaki
Dr. Tina Wakolbinger
Dr. Ding Zhang

Doctoral Students

Emmanuel Agyei
Zugang "Leo" Liu
Qiang "Patrick" Qiang
Trisha Woolley

Center Website:

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If you would like to be put on our email list, contact supernet@som.umass.edu