



The Supernetwork Sentinel

Summer 2012

Welcome to the Summer 2012 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. The newsletter's 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 highlight a new grant, new appointments, research awards, and other accomplishments of the Center Associates. As always, we include a list of our recent Center publications.

Anna Nagurney
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Professor Anna Nagurney with Professor Jonas Floden, her host at the School of Business, Economics and Law at the University of Gothenburg, Sweden, March 2012



Center Associate Dr. Min Yu after receiving her PhD at UMass Amherst with Center Director Professor Anna Nagurney

Inside

New Grant on Cybersecurity

Center Director Begins her Visiting Professorship in Sweden

Research and Teaching Accolades

TV Coverage

Kudos and News

Recent Center Publications

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New Grant on Cybersecurity

We are delighted to announce funding in the form of a new grant that was received in March 2012. The project is *Cybersecurity Risk Analysis and Security Investment Optimization*.

The motivation for the research for this project is as follows. Large organizations are challenged by an increasing variety of cybersecurity risks. These risks can be mitigated through investments in various cybersecurity technologies and services. However, these organizations also have many other sources of risk that need to be managed, therefore the role and scale of cybersecurity risks needs to be quantified. For example, financial organizations have rigorous and effective techniques for modeling and managing market, credit, operational and reputational risks. Similar methods are needed for cybersecurity. In addition, techniques are needed for optimizing investments in cybersecurity technologies.

The vision of this project is to eventually have: 1) rigorous models for cybersecurity risk, 2) models for costs and benefits of various cybersecurity technologies, and 3) techniques for integrating these models into higher level models that account for other risks and risk management expenditures.

The Co-PIs on this grant are: Wayne Burleson, Christopher Misra, Anna Nagurney, Mila Getmansky Sherman, and Senay Solak

Support for this project is provided by the Advanced Cyber Security Center.

Last March, a workshop was held at the University of Massachusetts Amherst to kick off this project, which brings together an interdisciplinary team of experts in electrical and computer engineering, security, finance, and operations research / management science. Professor Anna Nagurney's presentation, "Networks, Performance Assessment, and Vulnerability Analysis," which she delivered at this workshop can be downloaded at: http://supernet.isenberg.umass.edu/visuals/Risk_Management_and_Optimization_Workshop_Nagurney.pdf

Center Director Begins her Visiting Professorship in Sweden

Professor Anna Nagurney has been appointed a Visiting Professor of Operations Management at

the University of Gothenburg in Sweden. Her first visit to the university took place March 11-24, 2012.

During her stay there, on March 12, she gave a guest lecture on financial networks in a graduate class, delivered a logistics seminar titled, "Grand Challenges and Opportunities in Supply Chain Network Analysis to Design," on March 14, and, on March 16, gave a finance seminar, "Financial Networks and Disruption Management."



Professor Michael Patriksson with colleagues at Professor Nagurney's lecture at Chalmers

In addition, on March 20, she gave an invited talk in the Math Department at the Chalmers University of Technology in Gothenburg on "Perishable Product Supply Chains in Health Care: Models, Analysis, and Computations." She was introduced to the faculty and students at Gothenburg University on March 12, through her seminar "International Collaborations."



The School of Business, Economics and Law in Gothenburg

As part of her visiting professor contract, she will be working with the logistics and transport group, the environmental economics group, and the Centre for Finance. She will also be cooperating in the networks Northern Lead and the Strategic Transport Initiative.

The Visiting Professor Programme has been made possible through contributions from the business community in west Sweden. The

sponsors of the Visiting Professor Programme are AB Volvo, Stena AB, Sten A Olssons stiftelse för forskning och kultur, SKF AB, Elanders AB, and Carl Bennet AB.

Nagurney will be spending part of her 2012-2013 sabbatical at the University of Gothenburg. While on sabbatical there, Nagurney will also be participating in seminars with the business community and will be supporting cooperative activities with top management of the corporate sponsors. She will also help in the advising of doctoral students.

During her visit to Gothenburg in March, she also met her Isenberg School colleagues, Professors Linda Smircich and Marta Calas, there. A writeup on their visit appeared in the UMass Amherst publication, *In the Loop*; <http://www.umass.edu/loop/people/article/s/149767.php>

Her presentations in Sweden, as well as presentations of Center Associates at other venues, can be accessed on the Supernetworks Center website: <http://supernet.isenberg.umass.edu/visuals.htm>

Research and Teaching Accolades

Center Associate Professor Jose M. Cruz of the School of Business at the University of Connecticut Storrs was awarded a promotion to Associate Professor and tenure. In addition, he was appointed an Ackerman Scholar for two years. According to his school's website: The Ackerman Scholar award recognizes significant and continuing all round academic productivity among the faculty of the School. It is awarded to faculty who are not already supported by Chair or Professorship appointments. The award is supported by the Ackerman Fund, the School and the departments. The purpose of the Ackerman Fund is to "grant a monetary reward to faculty members who have excelled in classroom teaching, curriculum development, research, outreach to business and state agencies."

Congratulations to Dr. Cruz on these wonderful achievements and recognitions!

Professor Patrick Qiang of the Graduate School of Professional Studies at Pennsylvania State University Malvern received his campus' Early Career Award for his research, a notable achievement.

On May 2, 2012, in the lovely atrium of the Isenberg School of Management at UMass Amherst, the annual reception at which

research awards are given out took place. At this event, Professor Anna Nagurney received the 2011-2012 Research Excellence Award, which came with a plaque and a monetary award.



Professor Anna Nagurney with colleagues Professor Nikunj Kapadia and Mila Getmansky Sherman who were also recognized for their research

Professor Anna Nagurney was recognized for her research also by the University of Massachusetts Amherst as a *Spotlight Scholar*. She is the first faculty member from the Isenberg School to receive this distinction and only the tenth in the university overall. The article on the UMass Amherst website: **The Business of Supernetworks – Isenberg School Professor Studies the Flows of a Complex, Connected World**, which discusses the research conducted at the Supernetworks Center can be accessed at:

<http://www.umass.edu/umhome/spotlightscholar/nagurney.php>



Professor Nagurney with several Operations Management students who have since graduated

The article highlights the research at the Supernetworks Center including the work on humanitarian logistics. In the Spring 2012

semester, Professor Nagurney taught a new course, *Humanitarian Logistics and Healthcare*, at the Isenberg School of Management and Doctoral Student Center Associates: Dong "Michelle" Li, Amir H. Masoumi, and Min Yu were in attendance in the course. Invited speakers included: Mr. Tom O'Regan of Emergency Preparedness at UMass Amherst, Rick Lee of the Red Cross, and Lt. Col. James Sahady of the National Guard. Center Associate Professor Ladimer S. Nagurney of the University of Hartford was also a guest speaker and spoke on Disaster Communications. Amir Masoumi also delivered an invited guest lecture on his research on blood supply chains.



(l-r) Michelle Li, Lt. Col. Sahady, Amir Masoumi, and Min Yu

The class lecture notes prepared by the Center Director, along with several invited presentations, can be found at: <http://supernet.isenberg.umass.edu/courses/SC-H-MGMT597LG-Spring2012.html>

Center Associate Min Yu successfully defended her doctoral dissertation, **Analysis, Design, and Management of Supply Chain Networks with Applications to Time-Sensitive Products**, on April 6, 2012. She received her PhD with a concentration in Management Science on May 11, 2012, at the Mullins Center (photo below). Dr. Yu will be an Assistant Professor at the Pamplin School of Business at the University of Portland in Oregon in the Fall and will be a Pamplin Fellow.



TV Coverage

Professor Anna Nagurney's [Connecting Point interview with host Carrie Saldo is now online.](#)

Thanks to PBS affiliate WGBY 57 for giving her the opportunity to discuss the [Braess Paradox, and How It Is Impacting Our World.](#)



Carrie Saldo interviewing Nagurney her show, which aired April 11, 2012 on WGBY

In the segment, she also speaks about the [Virtual Center for Supernetworks](#), the [Isenberg School of Management](#), and her course [Humanitarian Logistics and Healthcare](#).

It is fascinating to see how networks and paradoxes are now captivating the media and the public.

Thanks also to the producers of the PBS production, *America Revealed*, for the great interview with Professor Anna Nagurney by Yul Kwon as [part of the Transportation segment.](#)

Kudos and News

Center Associate Professor Zugang "Leo" Liu of Pennsylvania State University at Hazleton has been appointed to the editorial board of the journal, *International Journal of Applied Management Science*.

Center Associate Professor Tina Wakolbinger of the Vienna University of Economics and Business has had her paper, **A Measure of Regional Influence with the Analytic Network Process**, co-authored with R. Banai, published in *Socio-Economic Planning Sciences* (2011), **45(4)**, 165-173.

Congratulations to Center Associate Professor Patrick Qiang. His paper, **A Bi-Criteria Measure to Assess Supply Chain Network Performance for Critical Needs Under**

Capacity and Demand Disruptions, with Anna Nagurney, appears in *Transportation Research A* (2012), Special issue on Network Vulnerability in Large-Scale Transport Networks, **46(5)**, 801-812.

Congratulations also to Amir H. Masoumi and Min Yu for the publication of two of their papers, both with the Center Director:

A Supply Chain Generalized Network Oligopoly Model for Pharmaceuticals Under Brand Differentiation and Perishability, A. H. Masoumi, M. Yu, and A. Nagurney *Transportation Research E* (2012), **48**, 762-780,

Supply Chain Network Operations Management of a Blood Banking System with Cost and Risk Minimization, A. Nagurney, A. Masoumi, and M. Yu, *Computational Management Science* (2012), **9(2)**, 205-231.

The POMS (Production and Operations Management Society) Annual Conference took place in Chicago, Illinois, April 20-23, 2012. The theme of [this year's conference](#) was *Socially Responsible Operations*.

[The Virtual Center for Supernetworks Center Associates](#) were well-represented at this conference.

Below is a list of the papers that members of our team presented:

[Supply Chain Network Design of a Sustainable Blood Banking System](#) (A. Nagurney and A. H. Masoumi);

[A Supply Chain Network Oligopoly Model for Pharmaceuticals Under Brand Differentiation and Perishability](#) (A. H. Masoumi, M. Yu, and A. Nagurney);

The Influence of Technical, Market and Legislative Factors of E-waste Flows (F. Toyasaki, T. Wakolbinger, A. Nagurney, and T. Nowak); This paper was also presented as a poster in March at the International Closed-Loop Conference in Zaragoza, Spain, at which Dr. Wakolbinger and Mr. Nowak took part.

[Multiproduct Humanitarian Healthcare Supply Chains: A Network Modeling and Computational Framework](#) (A. Nagurney, M. Yu, and Q. Qiang), and

Global Supply Chain Network Competition under Exchange Rate Uncertainty (Z. Liu).



(l-r) Dr. Zugang Liu, Amir H. Masoumi, Dr. Tina Wakolbinger, and Dr. Fuminori Toyasaki of York University at POMS in Chicago

Also, Amir H. Masoumi, took part in the POMS Doctoral Student Colloquium and Dr. Zugang Liu took part in the Emerging Scholars Program. Amir also attended the mini-conference on Humanitarian Operations and Crisis Management, prior to the POMS Conference.

Center Associate Professor Patrizia Daniele of the University of Catania in Italy was a plenary speaker on **General Financial, Economic and Electric Models: Methodologies and Suggestions for the Recovery** at the First French-Italian Workshop on Energy Markets and Models in Brescia, March 19-20, 2012. More information is available at: <http://fiwem1.eco.unibs.it/?q=node/8>

In addition, she took part in the Workshop on Variational Analysis and Applications in Erice, Italy, May 14-22, 2012.



Professor Daniele with other workshop participants at a meal in Erice

She has also organized a session for the 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, July 1-5, 2012, in which several Center Associates are invited speakers.

Congratulations to Center Associates Professors Patrick Qiang, Ke Ke (of Central Washington University), Trisha Anderson (of Texas Wesleyan University) and June Dong (of SUNY Oswego) for

their paper, **The Closed-loop Supply Chain Network with Competition, Distribution Channel Investment, and Uncertainties**, which is accepted for publication in *Omega*, and is available online:

<http://www.sciencedirect.com/science/article/pii/S0305048312000333>

Congratulations to Professor June Dong on her receipt of a Summer Scholars Program Grant from SUNY Oswego. Her project is: *Schools Redistricting and Other Quantitative Methods Applications in Oswego Governmental Organizations*.

Center Associate Professor Ding Zhang of SUNY Oswego has been the host of Dr. Sun Susheng, a Visiting Scholar from Wuhan University of Science and Technology in China, this past year and has been researching theories and methods of regional logistical management.

Center Associate Dr. Stavros Siokos continues to serve as President of Sciens Fund of Funds Management in London, England. His paper, **Fund of Hedge Fund Portfolio Construction Process in the New Era of Risk**, co-authored with A. Allen, has been accepted for publication in the *International Journal of Portfolio Analysis and Management*.

Congratulations to Center Associate Professor Ladimer S. Nagurney. His paper, **Dynamics and Equilibria of Ecological Predator-Prey Networks as Nature's Supply Chains**, with Anna Nagurney, was published in *Transportation Research E* (2012), **48**, 89-99.

Center Associate Professor Dmytro Matsypura of the University of Sydney in Australia has been very busy presenting his research on option spread. His work with Vadim Timkovsky was presented at ICORES 2012 – the 1st International Conference on Operations Research and Enterprise Systems in Vilamoura, Portugal, February 4-6, 2012. In addition, he gave an invited seminar on **Margining Option Portfolios by Network Flows** at CARMA at the University of Newcastle, Australia, on January 24, 2012.

Dr. Matsypura is a co-organizer, with Dr. Sergiy Butenko, of the Yalta Optimization Conference, that will take place in Ukraine June 17-18. More information on this conference is at: <http://www.yaltaconference.info/index.php>

We welcome Sara Saberi as a new Doctoral Student Center Associate. She will be working on the NSF grant that Professor Anna Nagurney is a Co-PI on: *Network Innovation Through Choice*.

Recent Center Publications

Please also see our center articles at: <http://supernet.isenberg.umass.edu/dart.html>

A Bi-Criteria Measure to Assess Supply Chain Network Performance for Critical Needs Under Capacity and Demand Disruptions, Q. Qiang and A. Nagurney, *Transportation Research A* (2012), Special issue on Network Vulnerability in Large-Scale Transport Networks, **46(5)**, 801-812.

A Supply Chain Generalized Network Oligopoly Model for Pharmaceuticals Under Brand Differentiation and Perishability, A. H. Masoumi, M. Yu, and A. Nagurney *Transportation Research E* (2012), **48**, 762-780.

Supply Chain Network Operations Management of a Blood Banking System with Cost and Risk Minimization, A. Nagurney, A. Masoumi, and M. Yu, *Computational Management Science* (2012), **9(2)**, 205-231.

Multiproduct Humanitarian Healthcare Supply Chains: A Network Modeling and Computational Approach, A. Nagurney, M. Yu, and Q. Qiang (2012), *Proceedings of the 23rd Annual POMS Conference*, Chicago, Illinois, April 20-23, 2012.

Sustainable Fashion Supply Chain Management Under Oligopolistic Competition and Brand Differentiation, A. Nagurney and M. Yu, *International Journal of Production Economics*, Special issue on Green Manufacturing and Distribution in the Fashion and Apparel Industries (2012), **135**, 532-540.

Fragile Networks: Identifying Vulnerabilities and Synergies in an Uncertain Age, A. Nagurney and Q. Qiang, *International Transactions in Operational Research* (2012), **19**, 123-160.

Dynamics and Equilibria of Ecological Predator-Prey Networks as Nature's Supply Chains, A. Nagurney and L. S. Nagurney *Transportation Research E* (2012), **48**, 89-99.

Risk Reduction and Cost Synergy in Mergers and Acquisitions via Supply Chain Network Integration, Z. Liu and A. Nagurney *Journal of Financial Decision Making* (2011), **7(2)**, 1-18.

Supernetworks: The Science of Complexity, A. Nagurney, *Journal of University of Shanghai for Science and Technology* (2011), **33**, 205-228.

Spatial Price Equilibrium and Food Webs: The Economics of Predator-Prey Networks, A. Nagurney and L. S. Nagurney, in the *Proceedings of the 2011 IEEE Conference on Supernetworks and System Management*, F. Y. Xu and J. Dong, Editors, IEEE Press, Beijing China, pp 1-6.

Supply Chain Network Design for Critical Needs with Outsourcing, A. Nagurney, M. Yu, and Q. Qiang, *Papers in Regional Science* (2011), **90**, 123-142.

Supply Chain Outsourcing Under Exchange Rate Risk and Competition, Z. Liu and A. Nagurney, *Omega* (2011), **39**, 539-549.

Fashion Supply Chain Management Through Cost and Time Minimization from a Network Perspective, A. Nagurney and M. Yu (2011), in *Fashion Supply Chain Management: Industry and Business Analysis* (2011), T.-M. Choi, Editor, IGI Global, Hershey, Pennsylvania, pp 1-20.

Modeling and Analysis of the Multiperiod Effects of Social Relationship on Supply Chain Networks, J. M. Cruz and Z. Liu, *European Journal of Operational Research* (2011), **214**, 39-52.

The Closed-loop Supply Chain Network with Competition, Distribution Channel Investment, and Uncertainties, Q. Qiang, K. Ke, T. Anderson, and J. Dong (2011), to appear in *Omega*.

Supply Chain Networks with Global Outsourcing and Quick-Response Production Under Demand and Cost Uncertainty, Z. Liu and A. Nagurney (2011), *Annals of Operations Research*, in press.

Multiperiod Competitive Supply Chain Networks with Inventorying and a Transportation Network Equilibrium Reformulation, Z. Liu and A. Nagurney (2010), *Optimization and Engineering*, in press.

Medical Nuclear Supply Chain Design: A Tractable Network Model and Computational Approach, A. Nagurney and L. S. Nagurney (2011), revised and resubmitted.

Design of Sustainable Supply Chains for Sustainable Cities, A. Nagurney (2011), submitted.

A Dynamic Network Oligopoly Model with Transportation Costs, Product Differentiation, and Quality Competition, A. Nagurney and D. Li (2012), submitted.

Competitive Food Supply Chain Networks with Application to Fresh Produce, M. Yu and A. Nagurney (2012), submitted.



Celebrating with Dr. Min Yu her receipt of her PhD

The Center Director and the Center Associates thank you for your support!

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