

The Supernetwork Sentinel

Winter 2013

Welcome to the Winter 2013 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 book, major awards received, and other accomplishments of the Center Associates as well as exciting conference presentations that we have given. As always, we also include a list of our recent Center publications.

Anna Nagurney
 John F. Smith Memorial Professor
 Director – Virtual Center for Supernetworks
<http://supernet.isenberg.umass.edu>



Professor David E. Boyce with Professor Anna Nagurney and her 2012 Walter Isard Award plaque in Ottawa, Canada



Professor Anna Nagurney with PhD Alum Speaker and Center Associate Professor Jose M. Cruz and UMass Amherst Student Chapter Officers prior to his talk at the Isenberg School of Management

Inside

New Year – New Book

Major Awards Received

Future Urban Transport Conference in Sweden

Exciting Conference Presentations

Recent Center Publications

Hosting of PhD Alum Speakers

AAAS Dynamics of Disasters Symposium in Boston

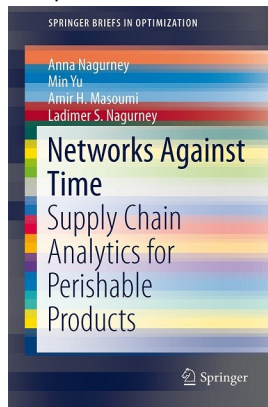
Kudos and News

Recent Center Publications

New Year – New Book

We are delighted to announce that the new book, *Networks Against Time: Supply Chain Analytics for Perishable Products*, co-authored by the Center Director Professor Anna Nagurney, Center Associate Professor Min Yu of the University of Portland, Amir H. Masoumi, Doctoral Student Center Associate, and Center Associate Professor Ladimer S. Nagurney of the University of Hartford, will be published by Springer Science+Business Media LLC in NYC.

The scheduled publication date is January 2013.



According to the Springer description: The book provides a wide range of critical supply chain problems which are modeled as generalized networks. Guidelines are given to determine the arc multipliers that capture perishability of the product whether food, radioisotopes, or even highly perishable blood in healthcare over space and time. Through case studies the authors portray the application of the models and algorithms to real-world sectors which illustrate the power of the framework in practice. The models and algorithms are fully described along with the input and output data in the case studies. This level of transparency is useful pedagogically as well as for future research and for applications in practice.

We expect that researchers and practitioners in mathematics, in operations research and management science, operations management, as well as in economics and computer science will find this book useful to gain a broader appreciation of the richness of network supply chain structures, processes, and applications. This book can also be used by advanced undergraduate students and graduate students in the disciplines noted above to familiarize themselves with methodologies and supply chain network models and applications.

The book discusses a wide range of relevant applications from blood supply chains to medical nuclear supply chains, food supply chains, pharmaceutical supply chains, and even fast fashion. It is based on extensive research that we have conducted over several years.

[More information about the book is available on the Springer website.](#)

Major Awards Received

At the INFORMS Annual Meeting in Phoenix, Arizona, which took place October 14-17, 2012, the UMass Amherst INFORMS Student Chapter received the Magna Cum Laude Award for its activities. This is the sixth national award that the chapter has received in six consecutive years (as long as such awards have been given). Professor Anna Nagurney has served as the Faculty Advisor of the chapter since 2004 and many former Doctoral Student Center Associates, as well as present ones, have served as Chapter Officers.



Several chapter officers and members with the award plaque and INFORMS dignitaries in Phoenix (Dr. Min Yu is second from the left; Dong Li, past President is in the center, and standing next to her is the present President, Joanne Oh, with Amir H. Masoumi standing the third from the right.)

Center Associate Professor Ladimer S. Nagurney was honored by the Radio Club of America on November 16, 2012 at an [awards banquet at the New York Athletic Club in New York City](#). At the banquet, which was the Radio Club of America's 103rd one, he was inducted as a Fellow. The Radio Club of America is the oldest association of professionals in the radio and wireless telecommunications industries. Professor Nagurney was one of only six elevated to Fellow status this year and was recognized for his outstanding achievements.



Professor Ladimer S. Nagurney receiving his Fellow award plaque in NYC

Professor Anna Nagurney was greatly honored to be the 2012 recipient of the *Walter Isard Award* -- the top research honor of [the North American Regional Science Council \(NARSC\)](#). She received the accolade at NARSC's annual meeting, November 7-10, which took place in Ottawa. The Walter Isard Award recognizes regional scientists who have made significant theoretical and methodological contributions to the field of Regional Science throughout their careers. Professor Nagurney's innovative scholarship, the council observed, has focused on applied and theoretical aspects of decision making on network systems, particularly involving transportation and logistics, energy and the environment, and economics and finance. She as a Fellow of the Regional Science Association International, previously serving on its Council and is currently an elected NARSC Councilor-at-Large.



Professor Anna Nagurney receiving the award from Professor Bill Anderson, President of NARSC (photo courtesy of Professor David E. Boyce)

Future Urban Transport Conference in Sweden

Professor Anna Nagurney is spending part of her sabbatical year at the School of Business, Economics and Law at the University of Gothenburg in Sweden, where she holds a

Visiting Professorship of Operations Management.

On October 17, 2012 she took part in the Future Urban Transport Conference in Gothenburg and spoke on the panel, **Forward Looking**. Joining her on the panel were: Dr. Michael Browne, moderator, Dr. Bengt Holmberg, Dr. Rosario Macario, Mr. Michael Replogle, and Mr. Anders Roth. The conference theme was [Urban Freight for Livable Cities](#).



(l-r): Dr. Michael Browne, Dr. Bengt Holmberg, Dr. Rosario Macario, Mr. Michael Replogle, Dr. Anna Nagurney, and Mr. Anders Roth

Exciting Conference Presentations

The past several months Center Associates have been very busy with conference presentations.

Student Center Associate Amir H. Masoumi traveled to the INFORMS Annual Meeting, which took place in Phoenix, Arizona, October 14-17, 2012. He delivered the presentation, [A Dynamic Oligopoly Model for Pharmaceutical Supply Chain Networks Under Brand Differentiation and Perishability](#), co-authored with Professors Anna Nagurney and Min Yu. The presentation was based on a paper of the same name, which appeared recently in *Transportation Research E*.

Student Center Associate Dong "Michelle" Li gave two presentations at the same conference, which was her first INFORMS conference. She spoke on [Securing the Sustainability of Global Medical Nuclear Supply Chains Through Economic Cost Recovery, Risk Management, and Optimization](#). This work is joint with Professor Anna Nagurney and Center Associate Professor Ladimer S. Nagurney. Her other presentation was: [A Dynamic Network Oligopoly Model with Transportation Costs, Product Differentiation, and Quality Competition](#), joint with the Center Director.

Professor Min Yu delivered the presentation in Phoenix, based on joint work with Center Associate Professors Patrick Qiang of Penn State Malvern and Anna Nagurney, entitled:

Multiproduct Humanitarian Healthcare Supply Chains: A Network Modeling and Computational Framework.



Center Associate Professor Patrick Qiang at the Wiley book exhibit at INFORMS Phoenix where the *Fragile Networks* book, co-authored with the Center Director, was displayed.

Center Associate Professor Jose M. Cruz of the University of Connecticut spoke on **A Dynamic Model to Study Sustainable Business Policies in a Closed Loop Supply Chain** and on **Mitigating Global Supply Chain Risks Through Corporate Social Responsibility**. He also presented the paper, co-authored with Center Associate Professor Zugang "Leo" Liu of Penn State Hazleton: **Supply Chain Networks with Corporate Financial Risks and Trade Credits Under Economic Uncertainty**.

Center Associate Professor Dmytro Matsypura traveled from the University of Sydney in Australia to the INFORMS conference. He spoke on **Incremental Network Design with Maximal Flow**, co-authored with T. Kalinowski and M. Savelsbergh. In addition, Dr. Matsypura spoke on **Integer Programs for Margining Option Portfolios by Option Spreads with More than Four Legs**. This is joint work with his former colleague, Professor Vadim Timkovsky.

Center Associate Professor Tina Wakolbinger of the Vienna University of Economics and Business had her paper, **An Analysis of Competition and Coalition Fundraising Strategies for Disaster Relief Operations**, which is joint work with Professor Fuminori Toyasaki of York University in Canada, presented by him at the INFORMS Phoenix conference.

The Phoenix INFORMS conference served as a wonderful mini-reunion for many of the Center Associates.



(l-r) Doctoral Student Center Associates Amir H. Masoumi and Dong Li, with Dr. Fuminori Toyasaki of York University and Center Associate Professor Min Yu of the University of Portland at the INFORMS Phoenix Meeting

The Center Director took part in the 59th Annual North American Meetings of the Regional Science Association International in [Ottawa, Canada](#). At this conference, she presented [A Dynamic Network Oligopoly Model with Product Differentiation and Quality Competition](#), co-authored with Doctoral Student Center Associate Dong Li.



Professor Anna Nagurney with other speakers in her session at the Regional Science Conference in Ottawa

Center Associate Professor Zugang "Leo" Liu also spoke at the Decision Sciences Institute (DSI) 2012 Annual Meeting in San Francisco, California, November 17-20. His presentation was based on the paper, co-authored with Professor Anna Nagurney, and forthcoming in the *Annals of Operations Research*, [Supply Chain Networks and Global Outsourcing and Quick-Response Production under Demand and Cost Uncertainty](#). He had also presented this research at the INFORMS Phoenix Meeting.

Hosting of PhD Alum Speakers

This semester, we had the pleasure of hosting two UMass Amherst PhD Alums. On November 2, 2012, we hosted the talk of Dr. James Benneyan

of Northeastern University and, on December 7, 2012, the presentation by Center Associate Dr. Jose M. Cruz of the University of Connecticut. The UMass Amherst INFORMS Student Chapter helped the Center Director in the organization and marketing of the talks. Below are the posters that were prepared.



After Dr. Benneyan's presentation we also celebrated the UMass Amherst INFORMS Student Chapter's receipt of the magna cum laude award from INFORMS at the Annual Meeting in Phoenix.



(l-r) Dr. Benneyan, several chapter officers and members, Professor Anna Nagurney

Dr. Jose Cruz joined us after his talk for the student chapter's end of the semester party.

Dr. Cruz's presentation: **The Myths and Facts of How to Get a Tenure Track Academic Job and How to Get Tenure** can be downloaded [here](#).



The students presenting Dr. Cruz with a gift

AAAS Dynamics of Disasters Symposium in Boston

The Center Director organized a symposium for the [AAAS 2013 Annual Meeting](#), which will take place February 14-18, 2013 in Boston, Massachusetts. The symposium, entitled, *Dynamics of Disasters: Harnessing the Science of Networks To Save Lives*, will take place on Sunday, February 17 at the Hynes Convention Center.

Professor Anna Nagurney thanks the AAAS and AMS for supporting the proposal that described this symposium.

The discussants are: Dr. Jose Holguin-Veras, Rensselaer Polytechnic Institute, and Center Associate, Dr. Tina Wakolbinger, Vienna University of Economics and Business.

The speakers are:

Dr. David McLaughlin, University of Massachusetts Amherst, who will be speaking on [Chasing Storms Across Disciplines](#),

Dr. Laura McLay, Virginia Commonwealth University, who will speak about [The Emergency Medical and Fire Calls During Severe Weather Events](#), and

Dr. Panos M. Pardalos, University of Florida, whose presentation is on [Assessing the Vulnerability of Evacuation Plans via Critical Element Detection](#).

The motivation for organizing such a timely symposium was as follows: The number of disasters is growing as well as the number of people affected by disasters, with accompanying societal and economic losses as vividly demonstrated by Superstorm Sandy and Hurricanes Katrina and Irene. The understanding of the dynamics of natural or man-made disasters is, hence, a problem of great importance globally.

However, due to the inherent nature of disasters, there are complex challenges: the critical infrastructure, including the transportation, logistical and communication

systems, may have been severely negatively impacted and their functionality compromised; there is a short time window in which to respond with the critical needs products, which must be delivered in order to prevent loss of life and human suffering, and there may be great uncertainty due to the disruptions, among other complications.

Moreover, there may be different organizations competing for resources and the complex interactions may result in inadequate financing, inappropriate coordination and response, congestion, inadequate delivery of supplies, including of relief personnel, etc. This symposium focuses on the dynamics of disasters, through the prism of mathematical modeling and the science of networks, to address such issues as prediction, communications, response and recovery, and the resiliency of evacuation networks. This symposium is intended to be accessible to a general scientific audience and will communicate the effectiveness of a multidisciplinary approach for the investigation of critical real-world phenomena.

Kudos and News

Congratulations to Center Associate Professor Dmytro Matsypura of the University of Sydney. He has been promoted to a Senior Lecturer there. He obtained tenure at the University of Sydney several years ago.

Congratulations to Center Associates Professors Patrick Qiang, Ke "Grace" Ke, Trisha Anderson, and June Dong. Their paper, **The Closed Loop Supply Chain Network with Competition, Distribution Channel Investment, and Uncertainties**, appears in the journal *Omega* (2012), **41(2)**, 186-194. Also, congrats to Professors Liu, Cruz, and Anderson, on the publication of their paper, **Consumer Environmental Awareness and Competition in Two-Stage Supply Chains**, *European Journal of Operational Research*, **218(3)**, 602-613.

Center Associate Professor Tina Wakolbinger had her paper, **Alternative Supply Chain Production-Sales Policies for New product Diffusion: An Agent-Based Modeling and Simulation Approach**, co-authored with Professors M. Amini, M. Racer, and M. G. Nejad, published in the *European Journal of Operational Research* (2012), 301-311.

Center Associate Professor Patrizia Daniele of the University of Catania in Italy, along with Dr. A. Barbagallo, and Professor A. Maugeri, has had the paper, **Variational Formulation for a General Dynamic Financial Problem:**

Balance Law and Liability Formula, published in *Nonlinear Analysis: Theory, Methods & Applications* (2012), **75**, 1104-1123

Congrats to Center Associate Min Yu. Her paper, **Competitive Food Supply Chain Networks with Application to Fresh Produce**, co-authored with Professor Anna Nagurney, appears in the *European Journal of Operational Research* (2013), **224(2)**, 273-282.

Center Associate Professor Jose M. Cruz continues to serve as the Interim Director of the Business Analytics and Project Management Master's program at the School of Business at the University of Connecticut.

Congrats to Center Associate Professor Ladimer S. Nagurney and to Doctoral Student Center Associate Dong "Michelle" Li. Their paper, with Professor Anna Nagurney, **Securing the Sustainability of Global Medical Nuclear Supply Chains Through Economic Cost Recovery, Risk Management, and Optimization**, has been accepted for publication in the *International Journal of Sustainable Transportation*.

Congratulations to Doctoral Student Center Associate Amir H. Masoumi who took part in the 2012 INFORMS Future Academicians Colloquium, at the INFORMS National Meeting in Phoenix in October.



Professor Anna Nagurney with students and Dr. Beusch (far right) with the students in the PhD course in Gothenburg, Sweden

In October 2012, Professor Anna Nagurney contributed to the PhD course: Theoretical Perspectives in Contemporary Business Administration Research at the School of Business, Economics and Law at the University of Gothenburg. She taught a segment on **Operations Management and Supply Chain Network Theory**. [The course lecture can be downloaded here.](#) She was hosted by Dr. Peter Beusch.

Congratulations to Center Associate Dr. Stavros Siokos, the CEO of Sciens. He was a featured speaker at the InvestHedge Forum 2012, which

took place at the British Museum in London, England, on October 2, 2012. [More information on this forum can be found here.](#)

Center Associate Professor Lan Zhao continues to serve as the Chair of the Department of Mathematics, Computer & Information Science at SUNY Old Westbury.

Professor Anna Nagurney and Doctoral Student Center Associates Sara Saberi and Dong "Michelle" Li are continuing to conduct research funded by the National Science Foundation (NSF) on the project, **Network Innovation Through Choice**. Professor Anna Nagurney is a Co-PI on this project. She was also a Co-PI on the project, **Cybersecurity Risk Analysis and Security Investment Optimization**, which was completed in December 2012, and which was funded by the ASCS. Other collaborators on the ASCS project included Professors Wayne Burleson, Senay Solak, and Mila Sherman, along with Chris Misra. A presentation on their project was given by Dr. Wayne Burleson on November 15, 2012 in Boston, Massachusetts and [can be viewed here.](#)

Center Associates Professor Patrizia Daniele and Tina Wakolbinger have been collaborating and, along with Professor Fuminori Toyasaki, have completed the paper, **A Variational Inequality Formulation of Equilibrium Models for End-of-Life Products with Nonlinear Constraints**

Professor Anna Nagurney has been appointed to the editorial board of the journal *Transportation Research E*. She is also serving on the [Organizing Committee for the 10th Computational Management Science Conference](#), which will take place in Montreal, Canada, May 1-3, 2013.

Doctoral Student Center Associate Shivani Shukla is serving as the Communications Director for the UMass Amherst INFORMS Student Chapter and Dong "Michelle" Li is serving as the chapter's treasurer.

Recent Center Publications

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

Competitive Food Supply Chain Networks with Application to Fresh Produce, M. Yu and A. Nagurney, *European Journal of Operational Research* (2013), **224(2)**, 273-282.

Supply Chains and Transportation Networks, A. Nagurney, *Handbook of Regional Science* (2013), M. Fischer and P. Nijkamp, Editors, Springer, Berlin, Germany, in press.

Securing the Sustainability of Global Medical Nuclear Supply Chains Through Economic Cost Recovery, Risk Management, and Optimization, A. Nagurney, L. S. Nagurney, and D. Li (2012), to appear in the *International Journal of Sustainable Transportation*.

Medical Nuclear Supply Chain Design: A Tractable Network Model and Computational Approach, A. Nagurney and L. S. Nagurney, *International Journal of Production Economics* (2012), **140(2)**, 865-874.

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

The Closed-loop Supply Chain Network with Competition, Distribution Channel Investment, and Uncertainties, Q. Qiang, K. Ke, T. Anderson, and J. Dong, *Omega* (2012), **41(2)**, 186-194.

Choice as a Principle in Network Architecture, T. Wolf, J. Griffioen, K. Calvert, R. Dutta, G. Rouskas, I. Baldine, and A. Nagurney, in the *Proceedings of ACM SIGCOMM 2012*, Helsinki, Finland, August 13-17, 2012.

Multiperiod Competitive Supply Chain Networks with Inventorying and a Transportation Network Equilibrium Reformulation, Z. Liu and A. Nagurney, *Optimization and Engineering* (2012), **13(2)**, 471-503.

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.

A Game Theoretical Approach to the Vertical Coexistence of Small and Big Fish, C. Mullon and A. Nagurney (2012), *Ecological Modelling*, **240**, 41-48.

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.

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.

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



The UMass Amherst INFORMS Student Chapter end of the semester party on December 7, 2012 at the Isenberg School of Management

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

We wish everyone a Happy New 2013 Year!

Center Director

Dr. Anna Nagurney
John F. Smith Memorial Professor

Center Associates

Dr. Trisha Anderson
Dr. Jose M. Cruz
Dr. Patrizia Daniele
Dr. June Dong
Dr. Ke "Grace" Ke
Dr. Zupang "Leo" Liu
Dr. Dmytro Matsypura
Dr. Ladimer S. Nagurney
Dr. Qiang "Patrick" Qiang
Dr. Padma Ramanujam
Dr. Stavros Siokos
Dr. Tina Wakolbinger
Dr. Min Yu
Dr. Ding Zhang
Dr. Lan Zhao

Doctoral Students

Dong "Michelle" Li
Amir H. Masoumi
Sara Saberi
Shivani Shukla

Center Website:

<http://supernet.isenberg.umass.edu>

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