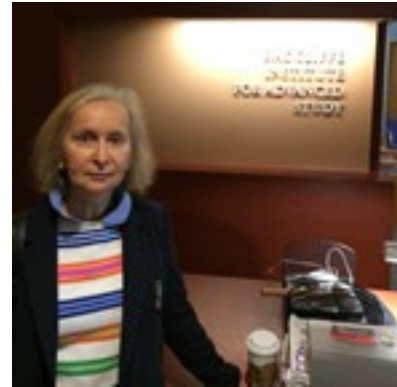


The Supernetwork Sentinel

Fall 2017

Welcome to the Fall 2017 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 report on the recent Dynamics of Disasters conference, the IFORS conference, the Summer Fellowship at Harvard, and accolades. As always, we also include a list of our recent Center publications.

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The Center Director beginning her Summer Fellowship at Harvard University



Dynamics of Disasters conference in Greece



EURO Hope Conference in Vienna, Austria

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Dynamics of Disasters Conference a Big Success

The [3rd International Conference on Dynamics of Disasters](#) took place in Kalamata, Greece, July 5-9, 2017. The conference was co-organized by the Center Director, Professor Anna Nagurney, Professor Ilias S. Kotsireas of the University of Waterloo in Canada, Professor Panos M. Pardalos of the University of Florida, and Professor Fuad T. Aleskerov of the Higher School of Economics in Moscow, Russia. Serving on the Program Committee were Supernetwork Center Associates Professor Patrizia Daniele of the University of Catania in Italy and Professor Tina Wakolbinger of the Vienna University of Economics and Business (WU) in Austria.

Center Associate Professor Dmytro Matsypura from the University of Sydney Business School in Australia presented a paper on his recent research on wildfire fuel management models and prescribed burning. Center Associate Professor Patrizia Daniele and the Center Director had a joint paper with Emilio Alvarez-Flores and Valeria Caruso on game theory and disaster relief. Also Professor Wakolbinger had a joint paper with her doctoral student, Timo Gossler of WU, on the impact of freight forwarders in humanitarian logistics.



Professor Dmytro Matsypura presenting

Center Associate Professor Ladimer S. Nagurney of CETA at the University of Hartford presented a paper on disaster communications.

The conference provided a wonderful venue for many discussions as well as pleasant social gatherings. Speakers and participants came from North America, South America, Europe, and Asia.

Given that the number of disasters is growing as well as the number of people affected by them, including the devastating hurricanes Harvey and Irma, and the recent earthquake in Mexico, the conference was very timely.



(l-r) Timo Gossler, Gabriela Alfaro, Professors Anna Nagurney and Patrizia Daniele, and Emilio Alvarez Flores



Group photo taken at the Dynamics of Disasters conference

A conference proceedings, to be published by Springer, is now being prepared.

Professors Kotsireas, Nagurney, and Pardalos also co-organized the 2nd International Conference on Dynamics of Disasters, which also took place in Kalamata, Greece in 2015 and [the proceedings volume was published by Springer in 2016.](#)

Center Director a Summer Fellow at Harvard University

The Center Director, Professor Anna Nagurney, spent several months as a Summer Fellow at the Radcliffe Institute for Advanced Study at Harvard University in Cambridge, Massachusetts in 2017. She had been a Science Fellow there in 2005-2006 and also Center Associate Professor Patrizia Daniele had joined her there for several months then as a Visiting Scholar.

This summer Professor Anna Nagurney researched, while at Harvard, game theory

models for blood supply chains as well as game theory models for disaster relief.

On June 21, 2017, she delivered a seminar on her research at Radcliffe.



The Center Director speaking at the Radcliffe Institute

She very much enjoyed interacting with the other Fellows at the Radcliffe Institute and had the opportunity to host former and present doctoral students as well as guests during her time at Harvard.



Doctoral Student Center Associates Deniz Besik and Pritha Dutta visiting the Radcliffe Institute



(l-r) Center Associate Professor Shivani Shukla with the Center Director and Radcliffe Fellow Professor Andrea Nahmod of UMass Amherst



Center Director with Professor David Parkes of Harvard University

While at Harvard, the Center Director was also interviewed for [the Matt Townsend Show](#). She was contacted by one of the producers of the show in response to the article, published in *The Conversation* on April 19, 2017, [Calculating Where America Should Invest in Its Transportation and Communication Networks](#). The article was picked up by the Associated Press and published on numerous news sites, including phys.org. Dr. Matt Townsend is an expert interviewer and the radio interview focused on investing in critical infrastructure. In her interview she emphasized the research done on fragile networks with Center Associate Professor Patrick Qiang of the Pennsylvania State University Great Valley.

Supernetwork Center Associates at IFORS Conference

[The 21st Conference of the International Federation of Operations Research Societies \(IFORS\) took place in beautiful Quebec City, July 17-21, 2017.](#) The Center Director presented the paper: **A Game Theory Model for Freight Service Provision Security Investments for HighValue Cargo**, co-authored with Center Associates Professors Shivania Shukla, Ladimer S. Nagurney, and Sara Saberi of the Foise School of Business at Worcester Polytechnic Institute (WPI). She also presented the paper: **Mergers and Acquisitions in Blood Banking Systems: A Supply Chain Network Approach**, joint with Center Associate Professor Amir H. Masoumi of the School of Business at Manhattan College in NYC, and Center Associate Professor Min Yu of the Pamplin School of Business at the University of Portland in Oregon.

Center Associate Professor Tina Wakolbinger presented the paper: **A Framework for Outsourcing Humanitarian Logistics Activities**, joint with her doctoral student, Timo Gossler. She was also a co-author of the paper: **Scenario-based Multi-stage Disaster Preparedness Measurement Model for High Hazard Potential Regions.**



Presenters and co-authors after IFORS session

It was wonderful to see the book: **Competing on Supply Chain Quality: A Network Economics Perspective**, co-authored by the Center Director and Center Associate Professor Dong "Michelle" Li of the College of Business at Arkansas State University displayed at the Springer booth at the conference!



The Center Director with Springer editors at IFORS

Semiplenary on Blood Supply Chains Given in Berlin, Germany

On September 8, 2017, Professor Anna Nagurney delivered a semiplenary talk: **Blood Supply Chains: Challenges for the Industry and How Operations Research Can Help**, at [the International Conference on Operations Research in Berlin, Germany](#).

The conference had 910 participants from 46 different countries. She was invited to give the semiplenary talk by Professor Jan Ehmke. This was her second trip to Berlin to give an invited talk within two years, and she gave a plenary talk in March 2015 at the Physics of Socio-Economic Systems Division Conference, where

she spoke on **Design of Sustainable Supply Chains for Sustainable Cities**.



The Center Director delivering her semiplenary talk

Being presented with a gift after her talk



(l-r) Professor Stefan Zimmer, the Center Director, and Professor Jan Ehmke

Professor Anna Nagurney thoroughly enjoyed the Operations Research conference in Berlin and thanks the organizers for a fabulous time scientifically as well as socially. The caliber of the presentations was outstanding as was the hospitality.

Articles on FirstNet and Hurricane Harvey in *The Conversation*

Center Associate Professor Ladimer S. Nagurney and the Center Director published the article: **[FirstNet for Emergency Communications: 6 Questions Answered](#)** on August 16, 2017 in *The Conversation*. The article describes one of the largest private-public partnerships in the US, FirstNet, with the lead private partner being AT&T. The goal is to considerably enhance mobile communications nationally for first responders in emergencies. The article was also

reprinted in the *San Francisco Chronicle* and disseminated via the *Homeland Security News Wire*.

And, on August 28, 2017, *The Conversation* published the article: [Response to Natural Disasters Like Harvey Could Be Helped with Game Theory](#), by Professor Anna Nagurney. The article discusses how game theory can assist in more effective delivery of relief items, taking into consideration that humanitarian organizations also compete for financial funds based on their visibility in the media in terms of their response in disasters. The article was reprinted in *The Chicago Tribune* and generated even international interest. On August 30, 2017, Professor Anna Nagurney was interviewed by Angela Kokott for her radio show *Calgary Today*. [That interview, as well as the one for the Matt Townsend Show, can be accessed here.](#) In the *Calgary Today* interview, Professor Nagurney also noted the Dynamics of Disasters conference and Professors Ilias S. Kotsireas and Panos M. Pardalos!

Upcoming INFORMS Conference

Despite Hurricane Harvey, which hit Texas in late August 2017, the next [annual INFORMS conference will be taking place there, October 22-25, 2017.](#)

As is the tradition among our Supernetwork Center Associates, this annual conference serves as the venue for us to get together from locations far and wide. It will be a very busy conference but also very exciting.

[In the session on Networks and Supply Chains](#), organized by the Center Director, Center Associate Professor Patrick Qiang will speak on his latest closed-loop supply chain research; Doctoral Student Center Associate Deniz Besik will present on supply chain competition and outsourcing, joint with with the Center Director and Center Associate Professor Min Yu. Also, Center Associate Professor Amir H. Masoumi will present on mergers and acquisitions in blood banking systems (work with Professor Min Yu and the Center Director), and Center Associate Dong "Michelle" Li will present on consumer learning of product quality with time delay (with the Center Director and Professor Yu).

In addition, Center Associate Professor Shivani Shukla and the Center Director have been invited to present on their work on cybersecurity in a session organized by Dr. Les Servi of MITRE. The Center Director will also present on her disaster relief and game theory research (with Center Associate Professor Patrizia Daniele and co-authors) [in an invited session.](#)

Doctoral Student Center Associate Pritha Dutta will present the paper: **Competition for Blood Donation: A Nash Equilibrium Network Framework** in [a session on Game Theory](#).

The session: [Sustainable and Responsible Supply Chain Management](#) organized by Center Associate Professor Jose Cruz of the School of Business at the University of Connecticut will have presentations by him, by Professor Min Yu and also by Professor Sara Saberi.

Professor Dmytro Matsypura will travel from the University of Sydney in Australia to present his co-authored research in a session on **Network Optimization**.

Center Associate Professor Tina Wakolbinger will also have a paper, which will be presented by her former doctoral student, Dr. Thomas Nowak, on closed-loop supply chains.

[The full INFORMS Houston program can be searched here.](#)

Kudos and News

Center Associate Professor Sara Saberi of the Foisie School of Business at Worcester Polytechnic Institute (WPI) presented a paper at the MSOM conference on June 20, 2017 held at the Kenan-Flagler Business School at the University of North Carolina in Chapel Hill. The title of the paper: **A Competitive Multiperiod Supply Chain Network Model with Freight Carriers and Green Technology Investment Option**. The paper was co-authored with the Center Director, Professor Joe Sarkis of WPI, and Center Associate Professor Jose Cruz of the School of Business at the University of Connecticut.



Professor Sara Saberi presenting at MSOM

A big congratulations to Professors Saberi and Sarkis on their grant from APICS: [Blockchain Technology's Contributions to Supply Chain Business and Sustainability Value](#).

Congratulations to Center Associate Professor Shivani Shukla who has begun her tenure track Assistant Professorship at the School of Management at the University of San Francisco in California!

Congratulations to Center Associate Professor Tina Wakolbinger on the success of the [EURO HOpe conference, which she organized and which took place at the Vienna University of Economics and Business \(WU\) in Austria, June 29-30, 2017](#). Please visit the website where many of the presentations have also been posted. This conference focused on humanitarian operations.



Some of the conferees at the EURO HOpe conference dinner

While in Vienna, Professor Wakolbinger also hosted the Center Director and Professor Ladimer S. Nagurney and they enjoyed seeing several of her colleagues at WU.



(l-r) Professors Ladimer S. Nagurney, Tina Wakolbinger, Manfred Fischer, Anna Nagurney, and Dr. Petra Staufer-Steinnocher

Congratulations to Center Associate Professor Min Yu [who was featured on the Pamplin School](#)

[of Business Blog](#) on her paper, **Mergers and Acquisitions in Blood Banking Systems: A Supply Chain Network**, joint with Center Associate Professor Amir H. Masoumi of the School of Business at Manhattan College and the Center Director, which was published in the *International Journal of Production Economics* (2017), **193**, 406-421. Also, congratulations to Professor Yu and to Doctoral Student Center Associate Deniz Besik on the publication of their paper, joint with the Center Director: **Supply Chain Network Capacity Competition and Outsourcing: A Variational Equilibrium Framework**, *Journal of Global Optimization* (2017), **69(1)**, 231-254.

Congratulations to Center Associate Professor Dmytro Matsypura on the acceptance of his paper: **Wildfire Fuel Management: Network-based Models and Optimization of Prescribed Burning**, joint with Professor Oleg Prokopyev and Aizat Zahar, in the *European Journal of Operational Research*. In addition, his co-authored paper: **Optimal Selection of Expert Forecasts with Integer Programming**, is in press in the journal *Omega*.

Congratulations to Center Associate Professor Patrizia Daniele, who, as of October 1, 2017, will be a Full Professor!

Center Associate Professor Patrick Qiang of Penn State University Malvern has had his paper, **A Closed-Loop Supply Chain Equilibrium Model with Random and Price-Sensitive Demand and Return**, co-authored with Y. Hamdouch and K. Ghoudi, published in *Networks and Spatial Economics* (2017), **17**, 459-503. In addition, he published the co-authored paper: **A Mathematical Programming Model with Equilibrium Constraints for Competitive Closed-Loop Supply Chain Network Design**, in the *Asia-Pacific Journal of Operations Research* (2017).

Center Associate Professor Ding Zhang of the School of Business at SUNY Oswego had the paper: **The Influence of Reference Effect on Pricing Strategies in Revenue Management Settings**, co-authored with H. Yang and C. Zhang, published in the *International Transactions in Operational Research* (2017), **24(4)**, 907-924.

Center Associate Dr. Stavros Siokos, Managing Partner of Astarte Capital Partners in London, England, was interviewed in the [Finance Monthly](#). In the interview, Dr. Siokos speaks about his education and professional career in international finance and his outlook on the future.

Center Associate Dr. Padma Ramanujam continues as a pricing analyst for SAS, based in Raleigh-Durham, North Carolina.

Congratulations to Doctoral Student Associates Pritha Dutta and Deniz Besik. Pritha was the President of the [UMass Amherst INFORMS Student Chapter](#) last year and Deniz was elected President for this academic year. The student chapter will be receiving the Magna Cum Laude Award from INFORMS at the annual meeting to be held in Houston, Texas, October 22-25, 2017. This is the 12th consecutive year that the student chapter has been honored with an award.

Congratulations to Doctoral Student Center Associate Deniz Besik who successfully passed her comprehensive exam in Management Science on June 12, 2017.



Deniz Besik with her exam committee

We welcome Mojtaba Salarpour as a new Doctoral Student Center Associate. Mojtaba matriculated into the PhD program at the Isenberg School of Management in the Fall of 2017. His research interests lie in humanitarian logistics and disaster relief.

Recent Center Publications

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

Quality in Competitive Fresh Produce Supply Chains with Application to Farmers' Markets, A. Nagurney and D. Besik (2017), in press in *Socio-Economic Planning Sciences*.

A Multitiered Supply Chain Network Equilibrium Model for Disaster Relief with Capacitated Freight Service Provision, A. Nagurney, presented at the 3rd International Conference on Dynamics of Disasters, Kalamata, Greece, July 5-9, 2017.

A Variational Equilibrium Network Framework for Humanitarian Organizations in Disaster Relief: Effective Product Delivery Under Competition for Financial Funds, A. Nagurney, P. Daniele, E. Alvarez Flores, and V. Caruso, presented at the 3rd International Conference on Dynamics of Disasters, Kalamata, Greece, July 5-9, 2017.

Mergers and Acquisitions in Blood Banking Systems: A Supply Chain Network Approach, A.H. Masoumi, M. Yu, and A. Nagurney, *International Journal of Production Economics* (2017), **193**, 406-421.

Supply Chain Network Capacity Competition and Outsourcing: A Variational Equilibrium Framework, A. Nagurney, M. Yu, and D. Besik, *Journal of Global Optimization* (2017), **69(1)**, 231-254.

Multifirm Models of Cybersecurity Investment Competition vs. Cooperation and Network Vulnerability, A. Nagurney and S. Shukla, *European Journal of Operational Research* (2017), **260(2)**, 588-600.

Cybersecurity Investments with Nonlinear Budget Constraints: Analysis of the Marginal Expected Utilities, P. Daniele, A. Maugeri, and A. Nagurney, in *Operations Research, Engineering, and Cyber Security: Trends in Applied Mathematics and Technology*, N.J. Daras and Th.-M. Rassias. Eds., Springer (2017), 117-134.

A Supply Chain Network Game Theory Model of Cybersecurity Investments with Nonlinear Budget Constraints, A. Nagurney, P. Daniele, and S. Shukla, *Annals of Operations Research* (2017), **248(1)**, 405-427.

Supply Chain Performance Assessment and Supplier and Component Importance Identification in a General Competitive Multitiered Supply Chain Network Model, D. Li and A. Nagurney (2017), *Journal of Global Optimization*, **67(1)**, 223-250.

A Generalized Nash Equilibrium Network Model for Post-Disaster Humanitarian Relief, A. Nagurney, E. Alvarez Flores, and C. Soylu, *Transportation Research E* (2016), **95**, 1-18.

Physical Proof of the Occurrence of the Braess Paradox in Electrical Circuits, L.S. Nagurney and A. Nagurney, *EPL (Europhysics Letters)* (2016), **28004**.

Introduction to the Volume: Dynamics of Disasters: Key Concepts, Models, Algorithms, and Insights, I.S. Kotsireas, A. Nagurney, and P.M. Pardalos, Springer International Publishing Switzerland (2016) i-xi.

Freight Service Provision for Disaster Relief: A Competitive Network Model with Computations, A. Nagurney, in *Dynamics of Disasters: Key Concepts, Models, Algorithms, and Insights*, I.S. Kotsireas, A. Nagurney, and P.M. Pardalos, Editors, Springer International Publishing Switzerland (2016), 207-229.

A Layered Protocol Architecture for Scalable Innovation and Identification of Network Economic Synergies in the Internet of Things, T. Wolf and A. Nagurney, , *Proceedings of the 2016 IEEE First International Conference on Internet-of-Things Design and Implementation (IoTDI)*, pp 141 – 151.

A Mean-Variance Disaster Relief Supply Chain Network Model for Risk Reduction with Stochastic Link Costs, Time Targets, and Demand Uncertainty, A. Nagurney and L.S. Nagurney, in *Dynamics of Disasters: Key Concepts, Models, Algorithms, and Insights*, I.S. Kotsireas, A. Nagurney, and P.M. Pardalos, Editors, Springer International Publishing Switzerland (2016), 231-255.

Towards Pricing Mechanisms for delay Tolerant Services, L. Marentes, T. Wolf, A. Nagurney, and Y. Donoso, *International Journal of Computers Communications & Control* (2016), **11(1)**, 77-89.

A General Multitiered Supply Chain Network Model of Quality Competition with Suppliers, D. Li and A. Nagurney, *International Journal of Production Economics* (2015), **170**, 336-356.

A Game Theory Model of Cybersecurity Investments with Information Asymmetry, A. Nagurney and L.S. Nagurney, *Netnomics* (2015), **16(1-2)**, 127-148.

A Supply Chain Game Theory Framework for Cybersecurity Investments Under Network Vulnerability, A. Nagurney, L.S. Nagurney, and S. Shukla, in *Computation, Cryptography, and Network Security*, N.J. Daras and M.T. Rassias, Editors, Springer International Publishing (2015), 381-298.

Supply Chain Network Competition in Price and Quality with Multiple Manufacturers and freight Service Providers, A. Nagurney, S. Saberi, S. Shukla, and J. Floden, *Transportation Research E* (2015), **77**, 248-267.

A Multiproduct Network Economic Model in Financial Services, A. Nagurney, *Service Science* (2015), **7(1)**, 70-81.

Design of Sustainable Supply Chains for Sustainable Cities, A. Nagurney, *Environment & Planning B* (2015), **42(1)**, 40-57.

A Supply Chain Network Game Theory Model with Product Differentiation, Outsourcing of Production and Distribution, and Quality and Price Competition, A. Nagurney and D. Li, *Annals of Operations Research* (2015), **228(1)**, 479-503.

An Integrated Disaster Relief Supply Chain Network Model with Time Targets and Demand Uncertainty, A. Nagurney, A.H. Masoumi, and M. Yu, in *Regional Science Matters: Studies Dedicated to Walter Isard*, edited by P. Nijkamp, A. Rose, and K. Kourtit, Springer International Publishing Switzerland (2015), 287-318.

Fashion Supply Chain Network Competition with Ecolabelling, A. Nagurney, M. Yu, and J. Floden, in *Sustainable Fashion Supply Chain Management: From Sourcing to Retailing*, T.-M. Choi and T.C.E. Cheng, Editors, Springer (2015), 61-84.

A Game Theory Model for a Differentiated Service-Oriented Internet with Duration-Based Contracts, A. Nagurney, S. Saberi, T. Wolf, and L.S. Nagurney, in *Proceedings of ICS 2015: Operations Research and Computing: Algorithms and Software for Analytics*, B. Borchers, J. P. Brooks, and L. McLay, Editors, INFORMS (2015), 15-29.

Securing the Sustainability of Global Medical Nuclear Supply Chains Through Economic Cost Recovery, Risk Assessment, and Optimization, Anna Nagurney, Ladimer S. Nagurney, and Dong Li, *International Journal of Sustainable Transportation* (2015), **9(6)**, 405-418.



The Center Director with INFORMS representatives at IFORS conference in Quebec City

The Center Director and Center Associates thanks you for your support!

The Center Director

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John F. Smith Memorial Professor

Center Associates

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Dr. Patrizia Daniele
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Dr. Qiang "Patrick" Qiang
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