

The Supernetwork Sentinel

Fall 2018

Welcome to the Fall 2018 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 presentations at exciting conferences and achievements of the Center Associates. As always, we include a list of our recent Center publications.

Anna Nagurney
 John F. Smith Memorial Professor
 Director – Virtual Center for Supernetworks



Dinner at the UMass Club in Boston on July 26, 2018



<http://supernet.isenberg.umass.edu> Early Career Researcher Workshop at Lancaster University in England

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Books by Center Associates on display at Springer booth at OR60

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Center Director is Plenary Speaker at OR60 and at the ECR Workshop in England

The Center Director was the opening plenary speaker at the [OR60 Conference at Lancaster University](#), which took place September 11-13, 2018. The diamond anniversary Operational Research (OR) Conference was very special. She was invited by OR ambassador extraordinaire - Graham Rand and [The OR Society](#) to deliver the plenary talk. The title of this plenary talk of hers was: **Operational Research: The TransFORMative Discipline for the 21st Century**.



The Center Director with OR60 Conference Chair Graham Rand and Doctoral Student Assistants



The Center Director giving her plenary talk at OR60 in England

The OR60 Conference was exceptional with talks by academics, doctoral students, and practitioners and with excellent meals and social events. The Center Director thanks all concerned for the warmth and hospitality extended to her.

In addition, just prior to OR60, Professor Anna Nagurney was a plenary speaker at the inaugural Early Career Researcher (ECR) Workshop, also at Lancaster University, September 9-10, 2018. Early career researchers came from the United Kingdom, Nigeria, Thailand, and even Saudi Arabia to the workshop. The title of her workshop plenary talk was: **Network Journeys: For the Love of Operational Research**. Professor Anna Nagurney was invited to speak and take part in this workshop by Distinguished University Professor Kevin Glazebrook of Lancaster University.



Professor Glazebrook opening up the ECR Workshop



The Center Director speaking at the ECR Workshop

The slides for both her plenary talks can be downloaded from the Supernet Center website: <https://supernet.isenberg.umass.edu/visuals.html>

Center Associates Prominent at EURO Conference in Spain

Center Associates were prominent in presenting their research at the [EURO Conference in Valencia, Spain, July 8-11, 2018](#). In particular, Center Associates Professor Tina Wakolbinger of

the Vienna University of Economics and Business in Austria, Professor Patrizia Daniele of the University of Catania in Italy, Professor Dmytro Matsypura of the University of Sydney in Australia, and Professor Jose M. Cruz of the School of Business at the University of Connecticut took part in the conference and had their research conducted with collaborators, including Center Associate Professor Sara Saberi of the Foisie School of Business at WPI and the Center Director, presented.



Dinner at EURO Valencia with Professor Patrizia Daniele in the foreground and Professors Dmytro Matsypura, Jose M. Cruz, and Tina Wakolbinger also in attendance, with friends

In particular, Professor Patrizia Daniele, presented the paper, **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, in *Dynamics of Disasters: Algorithmic Approaches and Applications*, I.S. Kotsireas, P.M. Pardalos, and A. Nagurney, Editors, Springer International Publishing Switzerland (2018), pp 109-133. Timo Gossler, a doctoral student of Professor Tina Wakolbinger's, presented the paper, **How to Increase the Impact of Disaster Relief: A Study of Transportation Rates, Framework Agreements and Product Distribution**, which is joint work with Professors Wakolbinger and Daniele and the Center Director. Professor Jose M. Cruz, in turn, presented the paper, **Competitive Multiperiod Supply Chain Network Model with Freight Carriers and Green Technology Investment Option**, S. Saberi, J.M. Cruz, J. Sarkis, and A. Nagurney, *European Journal of Operational Research* (2018), **266(3)**, 934-949. These, and other recent presentations, [can be downloaded from the Supernetwork Center website](#). In addition, Professor Dmytro Matsypura presented the paper, **Exact IP-Based Approaches for the Longest Induced Path Problem**, which is joint work with A. Veremyev, O. Prokopyev, and E. Pasiliao.



(l-r) Professors Dmytro Matsypura, Tina Wakolbinger, and Jose M. Cruz at EURO Valencia

Center Associates Visit Center Director at the Radcliffe Institute for Advanced Study at Harvard University

For the second summer in a row, Professor Anna Nagurney was a Summer Fellow at the Radcliffe Institute for Advanced Study at Harvard University, where she completed the co-editing of the book, **Dynamics of Disasters: Algorithmic Approaches and Applications**, with her Co-Editors, Professor Ilias S. Kotsireas of Wilfrid Laurier University and Professor Panos M. Pardalos of the University of Florida. The book is a collection of refereed chapters, with several contributions by Center Associates. [More information on the book is available on the Springer website](#). In addition, she conducted research on perishable product supply chains from blood to food.

While at Radcliffe, she was visited by Center Associate Professor June Dong of the School of Business at SUNY Oswego.



Professor June Dong with the Center Director

Also, she hosted the visit of Professor Amir H. Masoumi of the O'Malley School of Business at Manhattan College and Professor Dong "Michelle" Li, who has moved from the College of Business at Arkansas State University to Babson College in Massachusetts.



Professors Masoumi and Li with the Center Director at Radcliffe

While at Radcliffe, Doctoral Student Center Associates Deniz Besik and Pritha Dutta, joined the Center Director and Professors Masoumi and Li, as well as Center Associate Professor Ladimer S. Nagurney of the University of Hartford in Connecticut, along with several UMass Amherst students and alums, for dinner at the UMass Club in Boston.



Group photo at the UMass Club in Boston

Upcoming INFORMS Conference in Phoenix

This year's Annual INFORMS Meeting is taking place in Phoenix, Arizona, November 4-7, 2018 and about 6,000 conferees are expected. The [Center Director is among the plenary/keynote speakers](#) and is deeply honored to have been selected to deliver the Omega Rho Distinguished Lecture at this conference. The title of her plenary talk is: **Networks to Save the World: OR in Action.**

In addition to numerous presentations to be delivered by Center Associates, we are delighted to announce that [the UMass Amherst INFORMS Student Chapter](#) will be receiving the Cum Laude Award from INFORMS at the conference. Special congratulations to Doctoral Student Center Associate Deniz Besik, who served as the Chapter's President last year, and to Doctoral Student Center Associate Mojtaba Salarpour, who served as the Chapter's Communication Director.

At this conference, the Center Director will be giving out the 2018 INFORMS Computing Society (ICS) Student Best Paper Prize, the Committee of which she chaired this year. She also served on the INFORMS Service Award Committee and will enjoy congratulating those award recipients.

Below is a sample, which is not exhaustive, of the presentations of Center Associates at this INFORMS Conference. We will certainly be busy!

Center Associate Professor Jose M. Cruz of the School of Business at the University of Connecticut organized the session: **Sustainability and the Triple Bottom Line: Social, Environmental (or Ecological) and Financial**, at which Center Associates Professor Dong "Michelle" Li, Professor Shivani Shukla of the University of San Francisco, and Doctoral Student Center Associates Deniz Besik and Pritha Dutta will be presenting their research, the latter two on work conducted with the Center Director.

Also, in an invited session on **Game Theory and Networks**, organized by colleagues at MIT, Professor Shivani Shukla will be present the paper, **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.

In addition, in the invited session, **Transportation Problems with Public Impact**, organized by colleagues at Georgia Tech, Doctoral Student Center Associate Deniz Besik will present a paper co-authored with the Center Director and Professor Min Yu of the University of Portland, **Dynamics of Quality as a Strategic Variable in Complex Food Supply Chain Network Competition: The Case of Fresh Produce**, published in *Chaos* 28: (2018), 043124.

Professor Dmytro Matsypura of the University of Sydney in Australia will present the paper, **Exact IP-Based Approaches for the Longest Induced Path Problem**, which is joint work with A. Veremyev, O. Prokopyev, and E. Pasiliio.

Center Associate Professor Patrick Qiang of Pennsylvania State University Great Valley will

present the co-authored paper, **A Mathematical Programming Model With Equilibrium Constraints For Competitive Closed Loop Supply Chain Network Design.**

Center Associate Professor Sara Saberi of WPI will present the paper, **How Blockchain Can Disrupt the Supply Chain.**

In addition, Center Associate Professor Amir H. Masoumi of the O'Malley School of Business at Manhattan College will present a joint paper, co-authored with Center Associate Professor Min Yu of the Pamplin School of Business at the University of Portland, and Jan Hoffman of Manhattan College, **Blood Bank Margers from a Supply Chain Perspective: A Case Study.**

Also, Center Associate Professor Tina Wakolbinger is a co-author of the paper, **Integrated Information Systems for Humanitarian Organizations: The Embedded Case Study of Doctors Without Borders**, that will be presented by Ioanna Falagara Sigala. This is joint work with Professor Bill Kettinger.

Kudos and News

Congratulations to Center Associate Professor Dong "Michelle" Li. She has begun her tenure track Assistant Professorship position at Babson College in Wellesley, Massachusetts. Babson is considered the top entrepreneurship educational institution in the US and we wish her well. Congratulations to her also on the publication of the paper, **Consumer Learning of Product Quality with Time Delay: Insights from Spatial Price Equilibrium Models with Differentiated Products**, Dong Li, Anna Nagurney, and Min Yu, *Omega* (2018), **18**, 150-168, and on the acceptance of the paper, **The Sustainable Supply Chain Network Competition with Environmental Tax Policies**, Min Yu, Jose M. Cruz, Dong "Michelle" Li, in press in *The International Journal of Production Economics*. Wonderful to see sustained collaborations among the Supernetwork Center Associates!

Also, kudos to Center Associate Professor Jose M. Cruz on his grant from the School of Business at the University of Connecticut: **Multiperiod Sustainable Chain Network Analysis with Short and Long Terms Investment Options**, Dean's Fund Grant, \$15,000, May 2018 – January 2019. Congratulations to him on the publication of this paper, **Sustainability and Competition for Limited Critical Resources**, H. Lee, M. Nunez, and J. Cruz, *European Journal of Operational Research* (2018), **264** (3), 1130-114.

Congratulations to Center Associate Professor Sara Saberi of the Foisie School of Business at WPI on the publication of her article, [Sustainable, Multiperiod Supply Chain Network Model with Freight Carrier Through Reduction in Pollution Stock](#), *Transportation Research E* (2018), **118**, 421-444. Also, congratulations to her on the extension of her grant with Professor Joe Sarkis of WPI from APICS!

Congratulations to Center Associate Professor Patrizia Daniele on her election to the board of the Italian Operations Research Society (AIRO). Kudos also to her on her important role in several conferences. She was the Co-Director of the International Workshop, ["Variational Analysis and Applications" \(VARANA 2018\)](#), Erice, Italy, August 28 – September 5, 2018, together with H. Attouch, G. Buttazzo, A. Maugeri, and was the Chair of the Program Committee of the International Conference on [Optimization and Decision Science \(ODS2018\)](#), Taormina, Italy, September 10-13, 2018.

Congratulations to Center Associate Tina Wakolbinger for serving on the Scientific Committee of [the EURO HOPE Mini-Conference](#) held in Leuven, Belgium, September 13-14, 2018. Also, kudos to her on the following publications: **A Review of Management Theories in the Context of Quality, Environmental and Social Responsibility Voluntary Standards**, F. Tuzcek, P. Castka, and T. Wakolbinger, *Journal of Cleaner Production* (2018), **176**, 399 – 416. and **Funds Allocation in NPOs: The Role of Administrative Cost Ratios**, C. Burkart, T. Wakolbinger, and F. Toyasaki, *Central European Journal of Operations Research* (2018), **26(3)**, 307-330.

Congratulations to Center Associate Professor Zugang "Leo" Liu of Pennsylvania State University Hazleton on the acceptance of his paper, joint with Professor Jia Wang of Rowan University, **Supply Chain Network Equilibrium with Strategic Financial Hedging Using Futures**, in the *European Journal of Operational Research*.

Congratulations to Center Associate Dr. Stavros Siokos on his receipt of [the CEO Today Award!](#) He is the managing partner of the London-based Astarte Capital Partners, the firm he co-founded in 2015.

Center Associate Professor Shivani Shukla of the University of San Francisco took part in the [Automated Vehicles Symposium 2018 in San Francisco, July 11, 2018.](#)

Congratulations to Center Associate Professor Patrick Qiang of Pennsylvania State University Malvern. He is on the Organizing Committee of the **2018 INFORMS Conference on Service**

Science (<https://easychair.org/cfp/INFORMS-CSS2018>), November 3, 2018, in Phoenix, Arizona.

Congratulations to Professor Ladimer S. Nagurney. He was interviewed for the article, **FirstNet Helps Ensure Emergency Medical Communications During a Really Big Disaster – and Every Day, which was published in *HealthcareITNews*.**

The Center Director was interviewed by Kevin Delsh for the article, **[Why Verizon's 5G Home May Have Killed the Need for Net Neutrality Rules](#)**, in *TechTalks*.

Congratulations to Doctoral Student Center Associate Pritha Dutta on the acceptance for publication of her second journal article on blood supply chains, **Supply Chain Network Competition Among Blood Service Organizations: A Generalized Nash Equilibrium Framework**, A. Nagurney and P. Dutta, *Annals of Operations Research* (2018), in press. Also, congratulations to her on her acceptance to the INFORMS Doctoral Colloquium just prior to the INFORMS Annual Meeting in Phoenix, Arizona, November 4-7, 2018.

Congratulations to Doctoral Student Center Associate Mojtaba Salarpour on his successful passing of the core exam in Management Science at the Isenberg School of Management! Mojtaba has been elected Treasurer of the UMass Amherst INFORMS Student Chapter for 2018-2019.

Recent Center Publications

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

Supply Chain Network Competition Among Blood Service Organizations: A Generalized Nash Equilibrium Framework, A. Nagurney and P. Dutta, *Annals of Operations Research* (2018), in press.

Competition for Blood Donations, A. Nagurney and P. Dutta, *Omega* (2018), in press.

Dynamics of Quality as a Strategic Variable in Complex Food Supply Chain Network Competition: The Case of Fresh Produce, A. Nagurney, D. Besik, and M. Yu, *Chaos* 28: (2018), 043124.

A Competitive Multiperiod Supply Chain Network Model with Freight Carriers and Green Technology Investment Option, S. Saberi, J.M. Cruz, J. Sarkis, and A. Nagurney, *European Journal of Operational Research* (2018), **266(3)**, 934-949.

Cybersecurity Investments with Nonlinear Budget Constraints and Conservation Laws: Variational Equilibrium, Marginal Expected Utilities, and Lagrange Multipliers, G. Colajanni, P. Daniele, S. Giuffre, and A. Nagurney, *International Transactions in Operational Research* (2018), **25(5)**, 1443-1463.

Consumer Learning of Product Quality with Time Delay: Insights from Spatial Price Equilibrium Models with Differentiated Products, D. Li, A. Nagurney, and M. Yu, *Omega* (2018), **18**, 150-168.

Preface to Volume: *Dynamics of Disasters: Algorithmic Approaches and Applications*, in *Dynamics of Disasters: Algorithmic Approaches and Applications*, I.S. Kotsireas, P.M. Pardalos, and A. Nagurney, Editors, Springer International Publishing Switzerland (2018), pp v-viii.

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, in *Dynamics of Disasters: Algorithmic Approaches and Applications*, I.S. Kotsireas, P.M. Pardalos, and A. Nagurney, Editors, Springer International Publishing Switzerland (2018), pp 109-133.

A Multitiered Supply Chain Network Equilibrium Model for Disaster Relief with Capacitated Freight Service Provision, A. Nagurney, in *Dynamics of Disasters: Algorithmic Approaches and Applications*, I.S. Kotsireas, P.M. Pardalos, and A. Nagurney, Editors, Springer International Publishing Switzerland (2018), pp 85-108.

Advances in Disaster Communications: Broadband Systems for First Responders, L.S. Nagurney, in *Dynamics of Disasters: Algorithmic Approaches and Applications*, I.S. Kotsireas, P.M. Pardalos, and A. Nagurney, Editors, Springer International Publishing Switzerland (2018), pp 135-156.

Hospital Competition in Prices and Quality: A Variational Inequality Framework, A. Nagurney and K. Li, *Operations Research for Health Care* (2017), **15**, 91-101.

Quality in Competitive Fresh Produce Supply Chains with Application to Farmers' Markets, A. Nagurney and D. Besik, *Socio-Economic Planning Sciences* (2017), **60**, 62-76.

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. Soylyu, *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.

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

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