

# The Supernetwork Sentinel

## Winter 2020

Welcome to the Winter 2020 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 activities at the Center and accomplishments of Center Associates. As always, we include a list of our recent Center publications.

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**UMass Amherst INFORMS Student Chapter end-of-the-semester party**



**Dr. Stavros Siokos speaks in the UMass Amherst INFORMS Speaker Series**



**The Center Director with colleagues in Mexico City after her keynote talk**

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## Center Director Delivers Keynote in Mexico

The Center Director had the honor and pleasure of delivering the opening keynote at the [VIII Annual Conference of the Mexican Society of Operations Research \(OR\)](#). The conference took place October 16-18, 2019 in México City at the Instituto Tecnológico Autónomo de México (ITAM). The title of her keynote was: **Operations Research: The TransfORMative Discipline for the 21st Century**. Professor Anna Nagurney had been invited last March to deliver the opening keynote by Dr. Moncayo Martínez and Dr. Erick Centeno-Moreno of Texas A&M University.



Professor Anna Nagurney before her keynote talk

In her [keynote, which she has made publicly available](#), she included several photographs of luminaries in our profession, including one of Professor George Dantzig of Stanford, who has passed away, and with whom she so enjoyed conversing with during many conferences over the years. She hoped to energize and inspire the audience with her talk. Professor Anna Nagurney focused on advances in Operations Research in the form of networks and game theory for applications such as: congested urban transportation networks and the Braess paradox, perishable product supply chains from food to healthcare, cybersecurity, and disaster relief. The work on disaster relief was co-authored with a former student of hers, Emilio Alvarez Flores, an Isenberg School of Management and UMass Amherst Commonwealth Honors College alumnus, who is originally from Mexico. He now works for Cisco and they communicate regularly. She also discussed some very recent research on global trade networks and the impacts of tariffs and quotas, with a case study on avocados from Mexico. The latter research was conducted with Doctoral Student Center Associate Deniz Besik.

Deniz and the Center Director have, with co-authors, published a series of papers on the very

timely topic of tariffs, quotas, and trade wars in such journals as the *Journal of Global Optimization* (the issue is to be featured at the Springer booth at the INFORMS 2019 conference in Seattle), *Transportation Research E*, and the *European Journal of Operational Research*.

Professor Anna Nagurney mentioned in her keynote that she became interested in trade policy instruments when she was approached by a group of agricultural economists, researching the dairy industry, from Cornell University two decades ago, who wanted to collaborate on ad valorem tariffs focusing on Mexico. And, together, they published a series of papers. Hence, looking back, Mexico has permeated a nice amount of her research, spearheading both advances in methodologies as well as applications.



The Center Director with colleagues at the conference in Mexico City

## Center Associates Present at INFORMS in Seattle

Although the Center Director could not attend the INFORMS Conference because of her keynote, Center Associates presented many papers at this conference and also earned accolades.



In the above photo (l-r) are the following Center Associates at this conference: the females in the front row: Professor Min Yu of the University of Portland, Professor Ke Ke of Central Washington University, Professor Pritha Dutta of Pace University, PhD student Deniz Besik, and

Professor Sara Saberi of WPI. And, in the back row (l-r) are the males: PhD student Mojtaba Salarpour, Professor Jose Cruz of UConn, and Professor Patrick Qiang of Penn State. Professor Shivani Shukla of the University of San Francisco presented on our cybersecurity research but is not in the photo. Professor Dmytro Matsypura of the University of Sydney also did not make it to the photo (but more on his award follows).



**Center Associate Professor Dmytro Matsypura receives the ENRE best paper award at INFORMS in Seattle**

We were delighted that Professor Dmytro Matsypura received the INFORMS ENRE (Energy, Natural Resources and the Environment) Best Publication Award in Environment and Sustainability at the conference for his paper on wildfire fuel management, co-authored with Professor Oleg Prokopyev of the University of Pittsburgh and with Matsypura's student, Aizat Zahar, and published in the *European Journal of Operational Research*. [The paper can be accessed here.](#)

### **Center Director at INFORMS Security Conference in California**

Professor Anna Nagurney took part in [the INFORMS' inaugural Conference on Security](#) and it was outstanding. The official dates of the conference were February 9-11, 2020.

She would like to congratulate the [organizers of the INFORMS Security Conference](#): Mr. Harrison Schramm, Captain Brian Morgan, and Dr. Paul Nicholson, on its success! The format was excellent -50 minute presentations (8 or so parallel sessions), with lunch and coffee provided, and ample time for discussion. Everyone was very gracious and friendly. One "marker of the success" of this conference was the number of INFORMS Fellows in attendance, including: Gerry Brown, Stephen Robinson, Vicki Bier, Michael Fu, Sheldon Jacobson, and the Center Director. She delivered the presentation, *Game Theory Network Models for Disaster Relief*. Special

thanks to Nathaniel Bastian for being an outstanding stream chair of the stream: *Interdisciplinary Applications - Frontiers*. He had all of the presentations ready for projecting on his laptop.



**Professor Anna Nagurney with several conferees in Monterey**



**Networking at the INFORMS Security conference**

### **Excellent UMass Amherst INFORMS Presentations**

This Fall semester we had the pleasure of hosting multiple speakers in our UMass Amherst INFORMS Speaker Series. We were delighted that Professor Andrew Trapp came to UMass Amherst from WPI to speak on his work on refugees and optimizing placement. Also, Professor Thomas Sharkey of RPI spoke on his NSF-funded research on emergency response in the Arctic.



**Professor Andrew Trapp after his presentation at the Isenberg School**

Plus, we had the honor of hosting Dr. Golbon Zakeri, who presented her energy and stochastic programming research. Dr. Art House (the connection was made by former Isenberg Dean Dr. Tom O'Brien) also spoke, under the auspices of the UMass Amherst Cybersecurity Institute, on cybersecurity. Dr. House has served as the Chief Cybersecurity Risk Officer for the state of Connecticut and has done a lot of global speaking and consulting in this critical application domain.



**Professor Sharkey giving his presentation**

We were thrilled that Center Associate, Dr. Stavros Siokos, the Managing Partner and Founder of Astarte Capital Partners in London, was back at the Isenberg School to speak on impact investing for environmental and societal benefits.

And, in late January 2020, we had the pleasure of hosting Dr. Rasmus Dahlberg of Denmark, who has conducted research on disaster management in the Arctic.



**Professor Dahlberg after his talk at Isenberg**

Many thanks to the UMass Amherst INFORMS Student Chapter for its assistance with the organization of this Speaker Series.

Please visit the chapter's [Youtube channel where interviews with many of our speakers can be found.](#)

Thanks also to Doctoral Student Center Associate Mojtaba Salarpour, for his great work as the Chapter's President in 2019-2020. Thanks also to the Chapter Officers.

## Kudos and News

Kudos to Center Associate Professor Jose M. Cruz of the School of Business at the University of Connecticut for his appointment as an Associate Dean of Graduate Programs! Professor Cruz is the recipient of multiple research, teaching, and service awards from his school.

Congratulations to Center Associate Professor Patrizia Daniele of the University of Catania in Italy! Two of her papers, co-authored with Professor Anna Nagurney, with one also co-authored with her PhD student, Giorgia Cappello, have been accepted for publication. The papers are: **International Human Migration Networks Under Regulations**, A. Nagurney and P. Daniele (2020), in press in the *European Journal of Operational Research* and **Human Migration Networks and Policy Interventions: Bringing Population Distributions in Line with System Optimization**, A. Nagurney, P. Daniele, and G. Cappello (2020), in press in the *International Transactions in Operational Research*.

Congratulations to Center Associate Professor Tina Wakolbinger of the Vienna University of Economics and Business on the publication of her paper, **Digitizing the Field: Designing ERP Systems for Triple-A Humanitarian Supply Chains**, published in the *Journal of Humanitarian Logistics and Supply Chain Management* **10(2)**.

Congratulations to Center Associate Professor Dmytro Matsypura of the University of Sydney in Australia for his co-authored paper, **Assortment Optimisation Problem: A Distribution-Free Approach**, in press in *Omega*.

Congrats to Doctoral Student Center Associate Deniz Besik! Deniz has accepted a tenure track offer from the Robins School of Business at the University of Richmond in Virginia and will be joining its faculty in Fall 2020. Congratulations also to Deniz for taking part in the INFORMS Doctoral Colloquium in Seattle, Washington prior to the INFORMS Conference, plus for being awarded a Bayer Women in OR scholarship to take part in the conference.

Congratulations to Doctoral Student Center Associate Mojtaba Salarpour. His paper, **A Stochastic Disaster Relief Game Theory Network Model**, co-authored with the Center Director, Center Associate Professor June Dong of SUNY Oswego, and Center Associate Professor Ladimer S. Nagurney of the University of Hartford, appears in the new journal, *SN Operations Research Forum* (2020), **1(10)**. The article is available for free download.

Also kudos to Professor June Dong for her publication with Center Associate Professor Ding Qiang of SUNY Oswego, and co-authors in the *European Journal of Operational Research*. The paper is, **A Supply Chain Network Economic Model with Time-Based Competition** (2020), **280(3)**, 889-908.

Congrats to Center Associate Professor Patrick Qiang of Pennsylvania State University Great Valley Campus. His paper, **Quantifying Supply Chain Network Synergy for Humanitarian Organizations**, with Professor Anna Nagurney, appears in the *IBM Journal of Research and Development* in a special issue on Disaster Management. Given the timeliness of the special issue, which is on Disaster Management, the full issue is available for free download online. Thanks to IBM!

Congratulations to Center Associates Professor Min Yu of the University of Portland, and Professors Jose M. Cruz and Dong "Michelle" Li, on the publication of their paper, **The Sustainable Supply Chain Network Competition with Environmental Tax Policies**, in the *International Journal of Production Economics* in 2019.

Center Associate Professor Min Yu of the University of Portland is on sabbatical in Spring 2020 as is Professor Anna Nagurney.

## Recent Center Publications

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

**A Stochastic Disaster Relief Game Theory Network Model**, A. Nagurney, M. Salarpour, J. Dong, and L.S. Nagurney, *SN Operations Research Forum* (2020), **1(10)**.

**Quantifying Supply Chain Network Synergy for Humanitarian Organizations**, A. Nagurney and Q. Qiang, *IBM Journal of Research and Development* (2020), **64(1/2)**, pp 12:1-12:16.

**International Human Migration Networks Under Regulations**, A. Nagurney and P. Daniele (2020), in press in the *European Journal of Operational Research*.

**Human Migration Networks and Policy Interventions: Bringing Population Distributions in Line with System Optimization**, A. Nagurney, P. Daniele, and G. Cappello (2020), in press in the *International Transactions in Operational Research*.

**Networks in Economics and Finance in Networks and Beyond: A Half Century Retrospective**, A. Nagurney, in press in *Networks* (2019).

**Multitiered Blood Supply Chain Network Competition: Linking Blood Service Organizations, Hospitals, and Payers**, P. Dutta and A. Nagurney, *Operations Research for Health Care* (2019), **23**, 100230.

**In Memoriam: Martin Beckmann (1924-2017)**, D. Boyce and A. Nagurney, *Transportation Science* (2019), **53(6)**, 1798-1799.

**Strict Quotas or Tariffs? Implications for Product Quality and Consumer Welfare in Differentiated Product Supply Chains**, A. Nagurney, D. Besik, and D. Li, *Transportation Research E* (2019), **29**, 136-161.

**Global Supply Chain Networks and Tariff Rate Quotas: Equilibrium Analysis with Applications to Agricultural Products**, A. Nagurney, D. Besik, and L.S. Nagurney, *Journal of Global Optimization* (2019), **75**, 439-460.

**An Integrated Financial and Logistical Game Theory Model for Humanitarian Organizations with Purchasing Costs, Multiple Freight Service Providers, and Budget, Capacity, and Demand Constraints**, A. Nagurney, M. Salarpour, and P. Daniele, *International Journal of Production Economics* (2019), **212**, 212-226.

**Supply Chain Network Competition Among Blood Service Organizations: A Generalized Nash Equilibrium Framework**, A. Nagurney and P. Dutta, *Annals of Operations Research* (2019), **275(2)**, 551-586.

**Competition for Blood Donations**, A. Nagurney and P. Dutta, *Omega* (2019), **212**, 103-114.

**Tariffs and Quotas in World Trade: A Unified Variational Inequality Framework**, A. Nagurney, D. Besik, and J. Dong, *European Journal of Operational Research* (2019), **275(1)**, 347-360.

**How to Increase the Impact of Disaster Relief: A Study of Transportation Rates, Framework Agreements and Product Distribution**, T. Gossler, T. Wakolbinger, A. Nagurney, and P. Daniele, *European Journal of Operational Research* (2019), **274(1)**, 126-141.

**A Game Theory Model for Freight Service Provision Security Investments for High-Value Cargo**, A. Nagurney, S. Shukla, L. S.

Nagurney, and S. Saberi, *Economics of Transportation* (2018), **16**, 21-28.

**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.

**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.

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