

# The Supernetwork Sentinel

## Fall 2019

Welcome to the Fall 2019 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 conference activities and major awards and honors received. As always, we include a list of our recent Center publications.



**Women in OR Panel at EURO Dublin**

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## Center Associates at EURO Dublin

Center Associate Professor Patrizia Daniele of the University of Catania in Italy served as a Member of the Program Committee of EURO 2019 in Dublin, Ireland, which took place June 23-26, 2019. Several Center Associates, in addition to Professor Patrizia Daniele; notably, Professor Sara Saberi of WPI and Professor Dmytro Matsypura of the University of Sydney in Australia, spoke at this conference.



**(l-r) Professors Daniele and Matsypura with the Center Director**

The Center Director also gave a tutorial on: **Game Theory and Variational Inequalities: From Transportation and Supply Chains to Financial Networks and the Internet**. She was a panelist on two panels: *Women in OR* and *Making an Impact*, and presented a paper on global trade and tariffs and quotas co-authored with Doctoral Student Center Associate Deniz Besik and Center Associate Professor Ladimer S. Nagurney of the University of Hartford.



**The Center Director being introduced by Professor Matthias Ehrgott before her tutorial**

EURO Dublin also served as the venue for the meeting of the Editorial Board of the journal *International Transactions in Operational Research (ITOR)*. This journal is edited by Professor Celso Ribeiro of Brazil.



**ITOR Board Meeting**



**Center Associates with colleagues after speaking in invited session at EURO Dublin**

We are delighted that Professor Anna Nagurney's tutorial as well as the Women in OR panel as well as other special presentations [have now been made available on the EURO website in video format](#). Many thanks to the organizers of the conference as well as to EURO, the Association of European Operational Research Societies.

Also, while in Dublin, the Center Director had the pleasure of presenting a talk on **Game Theory Network Models for Disaster Relief** at IBM and thanks IBM for the great hospitality!

## The Dynamics of Disasters Conference in Kalamata, Greece

After the EURO conference, the Center Director and Professor Ladimer S. Nagurney journeyed to Kalamata, Greece with a stopover in London and then Vienna.

Along with outstanding colleagues, Professors Panos M. Pardalos of the University of Florida and Ilias S. Kotsireas of Wilfrid Laurier University in Canada, the Center Director had organized another [Dynamics of Disasters conference](#) in Kalamata, Greece, July 1-5, 2019.

The importance of multidisciplinary perspectives in all phases of disaster management from preparedness and mitigation to response was vividly illustrated at this conference by speakers from many different countries.

Kalamata is located on the Mediterranean Sea and it is not an easy location to get to, but the beauty of the venue, as well as the fascinating scientific exchanges and discussions on a theme of great importance, made the travel worthwhile for everyone. The conference took place at the Elite Resort hotel in Kalamata. The local organizer was Sofia Papadaki, to whom thanks are extended.



**The conferees at the conference**

The two previous such conferences that the Center Director had also co-organized with Pardalos and Kotsireas resulted in two edited volumes published by Springer. Many of the chapters are enjoying multiple downloads and the Center Director has used several in the course: Humanitarian Logistics and Healthcare that she teaches at the Isenberg School of Management at UMass Amherst.

The delegates at this Dynamics of Disasters conference came from the USA, Canada, Greece, Italy, Poland, Germany, Korea, Japan, Russia, and Nepal, resulting in a very international experience and also an intense one since there was only a single track of talks.

Professor Stephan Pickl of Germany, who is Chair of Operations Research at the Universität der Bundeswehr München, delivered an excellent lecture on a Smart Optimization Framework SARA, emphasizing the hyperconnectivity of critical infrastructure networks and stochastic elements. He is a renowned disaster management expert and involved in policy making as well in Germany.

Dr. Matsuno of Japan presented an excellent talk on the use of gaming on smart phones to inform and educate about disasters in Tokyo, including floods. There was also an excellent presentation

on a course on emergency management developed by Dr. Assael, a chemical engineer from Greece, with input from students, and presentations on elegant network models for evacuation by Dr. Urmila Pyakurel of Nepal and colleagues and by her student Hari Nandan Nath. The use of DEA in regions for Russia for coping with disasters was presented by Sergiy Demin on work done with Dr. Fouad Aleskerov, and a description of the Global Resilience Institute at Northeastern University in Massachusetts was described by Dr. Steven Flynn. A talk on disaster management at mass gatherings with a focus on the Athens Marathon was delivered by Dr. Angeliki Bistariki.

Professor Theodore Trafalis of the University of Oklahoma delivered an outstanding tutorial on machine learning for imbalanced data with applications to severe weather prediction, including tornadoes.

It was a pleasure to listen to the very innovative and important research being conducted by colleagues in Italy, including that of Dr. Ugo Fiore and Salvatore Scognamiglio and colleagues, on the prevention of geological disasters, with even the use of a large-scale dataset on China.

The audience was very engaged and new friendships made and networks established.

Another wonderful, unexpected delight was to hear Dr. Angeliki Bistariki speak. She is a nurse and a PhD and, in her presentation on mass gatherings and the Athens Marathon, she had a video from our local news station in western Massachusetts - WWLP, moderated by Barry Krieger on how MEMA prepares for the Boston Marathon!

It was also terrific to hear the talk by Dr. Georgios Tsaples and colleagues on system dynamics modeling of the consequences of extreme weather conditions on traffic in the city of Thessaloniki, Greece. There were even insights as to modal choice and use (or not) of public transportation following.

Stamatis Papangelou reported on his research on land property data logging on a blockchain ledger, which is very innovative and enables the assessment of land property for the risk of natural disasters.

The structure of the conference included time for coffee breaks, nice meals, some touring, and a banquet with a view of the Mediterranean Sea.

The organizers of this conference have signed a contract with Springer to produce another edited volume on Dynamics of Disasters.

## Center Director Receives the Constantin Caratheodory Prize in France

Shortly after the EURO Conference and the Dynamics of Disaster conference it was time for [the World Congress on Global Optimization \(WCGO\)](#), which took place in Metz, France.

Professor Anna Nagurney was tremendously honored and humbled to be the recipient of the 2019 Constantin Caratheodory Prize, along with Professor Anatoly Zhigljavsky of Cardiff University in Wales. More information about the prize and the previous recipients of this prize can be found on [the International Society of Global Optimization website](#). She said in her acceptance speech, that she is standing on the shoulders of giants and is very grateful to the Chair of the Prize Committee, Distinguished University Professor Panos M. Pardalos of the University of Florida (and former recipient of this and many other prizes), and to all the committee members for this truly distinctive honor. Professor Yaroslav Sergeyev was a member of the prize committee and is also President of the International Society of Global Optimization.

[A nice article on the prize was published by UMass Amherst](#). Professor Anna Nagurney very much appreciates the congratulatory messages that she has been receiving.



**The Caratheodory Prize recipients with Professors Sergeyev and Pardalos**

The plenary talk that she gave at WCGO was in the Constantin Caratheodory Prize session. She posted her [plenary talk because it is on a very timely topic](#) and on research conducted with Doctoral Student Center Associate Deniz Besik, and other collaborators.



**Professor Anna Nagurney delivering her plenary talk at WCGO**

The WCGO was an intellectual (and social) feast with [plenary talks given by renowned researchers](#), beginning on the first day with a breathtaking plenary by Pardalos on networks and brain research with applications to epilepsy and Parkinson's, to a very dynamic, fascinating last day plenary by Professor Sergiy Butenko of Texas A&M University. Butenko, who is the Editor of the *Journal of Global Optimization*, spoke on his unifying framework for network analysis and cliques with applications ranging from social networks to material science! To have the opportunity to listen to these and such plenary speakers as Professor Ben-Tal of Israel, Professor Immanuel Bomze of Austria (who is also the President of EURO and he had also been at EURO Dublin), Professor Fukushima of Japan, and Professor Zhigljavsky of the UK, was fabulous.



**The WCGO conferees in Metz, France**

## Center Director Delivers Keynote in Colombia

The Center Director had the pleasure of being a keynote speaker [at the CIO 2019 logistics conference](#) and also delivering a guest lecture. Both of these took place at the Naval Academy located on an island in Cartagena, Colombia. She had been a keynote speaker at the same conference, but four years earlier, in Bogota, so



it was a special honor to be invited back to Colombia.

The other keynote speakers at CIIO 2019 were: Professors Jahre of Norway, Schwede of Germany, and Conway of the US. The keynoters were put up in the Naval Academy officers quarters. The views were majestic and there was excellent security. There were nameplates on their room doors; they had an officer assigned to assist them; met with an Admiral; were taken on a tour of the Navy Museum in the Old Town, and were treated to a lavish dinner, this past Friday, at the Naval Club.

The Center Director's talk at the Naval Academy was: "Networks to Save the World: Operations Research in Action" and [it can be downloaded here.](#)



**Professor Anna Nagurney with the Admiral**

The hospitality extended to the keynote speakers was extraordinary and they had numerous conversations with naval officers that were truly inspiring. The officers' intelligence, dedication, work ethic, physical fitness, and stamina are remarkable. The Center Director marveled at the intensity of the experiences and the honor of being there as special guests.



**Some of the conferees with keynoters**

Below are a few additional photos from the talks and very memorable experiences. Not only were there officers and cadets at the conference but also Deans of the hosting universities, numerous

students that were bused in from major cities, including Bogota, and even the Minister of Trade and Commerce came for the Friday afternoon late session. The conference ended with a fabulous panel and discussion, which Professor Anna Nagurney very much enjoyed being part of.

Her keynote talk was entitled: "Tariffs and Quotas in Global Trade: What Networks, Game Theory, and Variational Inequalities Reveal" and [it is also posted on the Supernetwork Center website.](#)



**Center Director with several keynoters and officers**



**Professor Anna Nagurney delivering her keynote in Colombia**

## **Exciting UMass Amherst INFORMS Upcoming Talks**

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

Plus, we will have the honor of hosting Dr. Golbon Zakeri, who will be speaking on her energy and stochastic programming research and Dr. Art House (the connection was made by former Isenberg Dean Dr. Tom O'Brien) will

speak, also 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.

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

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

## Kudos and News

Congratulations to Center Associate Professor Jose M. Cruz of the University of Connecticut on his appointment as Associate Dean of Graduate Programs at the School of Business! Dr. Cruz, earlier this year, received the AAUP Service Excellence Award, presented to only 10 faculty members at UConn annually. He has also received the School of Business' Ackerman Scholarship Award twice, the Outstanding Graduate Teaching Award, the Outstanding Undergraduate Teaching Award, and the Distinguished Service Award.

Kudos to Center Associate Professor Dmytro Matsypura of the University of Sydney. He has been informed that he will receive the INFORMS ENRE (energy, natural resources and the environment) Best Publication Award in Environment and Sustainability for his paper on wildfires, **Wildfire Fuel Management: Network-based Models and Optimization of Prescribed Burning**, co-authored with Professor Oleg Prokopyev of the University of Pittsburgh, and Dr. Matsypura's student, Aizat Zahar, and published in EJOR in 2018. Dr. Matsypura will present the paper and will receive the award certificate at the INFORMS conference in Seattle in October 2019.

Congrats to Doctoral Student Center Associate Deniz Besik and Center Associate Professor Ladimer S. Nagurney! Their paper, published in October 2019, and co-authored with the Center Director, **Global Supply Chain Networks and Tariff Rate Quotas: Equilibrium Analysis with Application to Agricultural Products**, has been selected by the publisher, Springer, and the editor, to be a free, online access article in the *Journal of Global Optimization*. Also, Deniz has had another paper published, which was co-authored with Center Associate Professor Dong "Michelle" Li of Babson College, and the Center

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

Kudos to Center Associate Professor Pritha Dutta, who is now, after completion of her PhD at UMass Amherst, an Assistant Professor at Pace University in NYC. Her latest paper on blood supply chains, co-authored with Professor Anna Nagurney, **Multitiered Blood Supply Chain Network Competition: Linking Blood Service Organizations, Hospitals, and Payers**, is in press in *Operations Research for Health Care*.

Bravo 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, is to appear in the *IBM Journal of Research and Development* in a special issue on Disaster Management. Also, Professor Qiang is serving on the Program Committee for ICSS2020: 2020 INFORMS Conference on Service Science, Beijing, China, July 6-8, 2020.

Congrats to Center Associate Professor Tina Wakolbinger of the Vienna University of Economics and Business for serving on the Program Committee of EURO HOpe 2019: The 4th EURO HOpe mini-conference, Centre for Integrated Emergency Management, University of Agder Kristiansand, Norway, September 5-6, 2019.

The Center Director co-authored with Professor David Boyce, the tribute, **In Memoriam: Martin Beckmann (1924-2017)**, in *Transportation Science*, and this article is also available for free download from the journal website. Professor Martin Beckmann was on Professor Anna Nagurney's PhD dissertation committee at Brown University and was the last surviving author of the classic book, *Studies in the Economics of Transportation*, published by Yale University Press in 1956.

The Center Director's invited article, **Networks in Economics and Finance in Networks and Beyond: A Half Century Retrospective**, appears online in *Networks*; and will be published in the Special 50th Anniversary Issue of *Networks*.

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.

Congrats to Center Associates Professors Ding Zhang and June Dong of SUNY Oswego. Their co-authored paper, **A Supply Chain Network Economic Model with Time-based Competition**, is scheduled to appear in a 2020 issue of the *European Journal of Operational Research*.

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

Congratulations to Doctoral Student Center Associate Deniz Besik for being accepted into the INFORMS Doctoral Colloquium in Seattle, Washington prior to the INFORMS Conference. Also, congrats to Deniz for being awarded a Bayer Women in OR scholarship to take part in the conference.

Congratulations to Doctoral Student Center Associate Mojtaba Salarpour for being elected President of the UMass Amherst INFORMS Student Chapter for 2019-2020.

## Recent Center Publications

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

**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, in press in *Operations Research for Health Care* (2019).

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

**Quantifying Supply Chain Network Synergy for Humanitarian Organizations**, A. Nagurney and Q. Qiang, in press in *IBM Journal of Research and Development* (2019).

**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.

**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.

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