



# The Virtual Center for Supernetworks



*Supernetworks for Optimal Decision-Making and Improving the Global Quality of Life*

## The Supernetwork Sentinel

Fall 2021

Welcome to the Fall 2021 edition of **The Supernetwork Sentinel**, the newsletter of the Virtual Center for Supernetworks at the Isenberg School of Management, UMass Amherst. This newsletter 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 major achievements of the Center Director and Center Associates during this challenging time in history. As always, we include a list of our recent Center publications.

Anna Nagurney  
Eugene M. Isenberg Chair in Integrative Studies  
Director – Virtual Center for Supernetworks  
<http://supernet.isenberg.umass.edu>

### Center Associates



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## Dynamics of Disasters Conference a Big Success

The 2021 Dynamics of Disasters (DOD) conference, which was originally scheduled to take place in Athen, Greece, due to the pandemic took place in a virtual format, July 15-18. It was a big success.

The plenary speakers were outstanding and we were delighted to have Center Associate Dr. Stavros Siokos of Astarte Capital, as one of the plenary speakers. His talk title was on deforestation and climate disasters.



### Plenary Speakers

There were speakers from Europe, Asia, and North America and the talks and discussions were excellent. Many new partnerships were forged which will continue to advance our best practices and knowledge surrounding all phases of disaster management.



### Conference Conferees

[The website for the conference can be accessed here.](#)

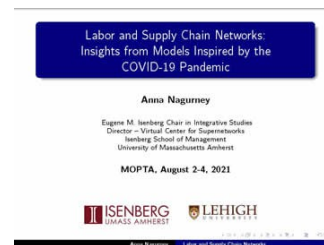
The presentations at the DOD conference included research done with Center Associates Professors Deniz Besik of the University of Richmond and Pritha Dutta of Pace University on food supply chains and disruptions in the pandemic; on convalescent plasma, [based on a paper with Professor Pritha Dutta, recently published in \*Operations Research Forum\*](#), and on refugee migration networks - work done with

Center Associates Professors Patrizia Daniele of the University of Catania and Ladimer S. Nagurney of the University of Hartford and based on [a paper published in the \*Journal of Global Optimization\*](#). Doctoral Student Center Associate Mojtaba Salarpour presented a paper with the Center Director published in the *International Journal of Production Economics*, which was also presented at EURO 2021. Professor Patrizia Daniele presented a very interesting paper on 5G networks in disaster relief with her PhD students, Daniele Sciacca and Gabriella Colajanni. Plus, Center Associate Professor Tina Wakolbinger of the Vienna University of Economics and Business in Austria had a paper with her doctoral student, Lydia Novszel, on a meta-analysis of supply chain disruption research.

<http://caopt.com/DOD2021/schedule.pdf>

## Center Director Keynotes Several Conferences

The Center Director keynoted several conferences recently. She delivered the keynote (virtually): **Labor and Supply Chain Networks: Insights from Models Inspired by the COVID-19 Pandemic** at the [Modeling and Optimization \(MOPTA\) Conference, held at Lehigh University, August 2-4, 2021](#). She thanks her host, Professor Karmel Shehadeh, for the wonderful hospitality.



She also delivered a keynote of the same title at the International Conference on Network Games, Control Optimisation (NETGCOOP), which took place September 22-24, 2021.

And, on September 22, 2021, she was honored to be a panelist at the Conclave: Technological Interventions for Operations and Supply Chains During COVID-19, Jaipuria Institute of Management, Noida, India. She spoke on: **Operations, Supply Chains, and COVID-19: From Research to Policy.**

Joining her as panelists were the experts in the announcement below.

www.jaipuria.ac.in

JAIPURIA  
INSTITUTE OF MANAGEMENT  
LUCKNOW NOIDA JAIPUR BHOPAL

Jaipuria Institute of Management, Noida organizes conclave on

**Technological Interventions for Operations and Supply Chains during Covid-19**

Sep 22, 2021 07:00 PM to 8:30 PM (IST)

**Panelists**

**Dr. Joseph Sarkis**  
Professor, Foise Business School  
Worcester Polytechnic Institute, USA  
(Expert in Sustainable Supply Chain Management)

**Dr. Anna Nagurney**  
Professor, Isenberg School of Management  
University of Massachusetts Amherst, USA  
(Expert in Supply Chain Networks and Disruptions Management)

**Dr. ManMohan S Sodhi**  
Professor, Bayes Business School City  
University of London, UK  
(Expert in Supply Chain Risks)

**Dr. Eva K Lee**  
Expert of OR applications in  
Medicine and Healthcare

**Dr. Ankur Chauhan**  
Assistant Professor, Operations and SCM  
Jaipuria Institute of Management,  
Noida, India

**Moderator**

Register Now: <https://bit.ly/jaipurianoida22sep> Meeting ID: 945 2399 2953  
Passcode: 122474

## Expertise of Center Associates Yields Extensive Media Coverage

The research conducted by the Center Director and the Center Associates has received a great deal of media attention in the pandemic. For some of the coverage by the print media, [please click here](#). For interviews by TV and radio stations, [please click here](#).

Below is a graphic of some of the press interviews that Professor Anna Nagurney has taken part in during the pandemic.



Professor Pritha Dutta [was interviewed by FOX News on small businesses and supply chain disruptions in the pandemic.](#)

Professor Deniz Besik was featured on the University of Richmond homepage for her statement to the U.S. Committee on Agriculture about food supply chains during the COVID-19 pandemic. In her elegantly and very informative statement she noted that, "Hunger and food insecurity are crucial societal problems that need to be addressed all over the world. Food is essential to our well-being, and we need food to survive. This past year has helped us to identify weaknesses within our food system or food supply chains. COVID-19 crisis elevated the already existing inequalities regarding healthcare and food insecurity status of vulnerable communities, including low-income people, children, older adults, and immigrants living in the United States."

Center Associate Professor Sara Saberi of WPI was a featured faculty member on the School of Business website, where her important research and accomplishments were noted; <https://www.wpi.edu/news/announcements/business-school-faculty-spotlight-series-sara-saberi>

## Center Associates to Present at INFORMS Conference

The 2021 INFORMS Annual Meeting will take place in Anaheim, CA, October 24-27, 2021 in a hybrid format.

Center Associate Professor Deniz Besik will be presenting in person as will Doctoral Student Center Associate Mojtaba Salarpour. The title of Professor Besik's presentation, which is co-authored with Professors Anna Nagurney and Pritha Dutta is, **An Integrated Multitiered Supply Chain Network Model of Competing Agricultural Firms and Processing Firms**. Mojtaba Salarpour will present the paper, **Modeling of Covid-19 Trade Measures on Essential Products: A Multiproduct, Multicountry Spatial Price Equilibrium Framework**. This paper is joint work with the Center Director and Center Associate Professor June Dong of the School of Business at SUNY Oswego.

In addition, Professor Anna Nagurney will present virtually the tutorial, **Game Theory and the COVID-19 Pandemic**. The tutorial is based on a 48 page paper that will be published by INFORMS. She thanks Professor Doug Shier of Clemson University, who is the Editor of the

tutorial series, and Professor John Carlsson of USC for inviting her to present he is the Editor of the specific 2021 volumes.

The Center Director will also have a virtual presentation of a paper with Professor Patrizia Daniele and Professor Ladimer S. Nagurney entitled, **Refugee Migration Networks and Regulations: A Multiclass, Multipath Variational Inequality Framework**.

In addition, Center Associate Professor Sara Saberi will be presenting at the conference in person.

## UMass Amherst INFORMS Student Chapter to be Recognized 15<sup>th</sup> Year in a Row

We are delighted that we have been informed by INFORMS that the UMass Amherst INFORMS Student Chapter will be receiving its 15<sup>th</sup> annual award from INFORMS at the Annual Meeting in Anaheim, CA. This is quite the achievement. The chapter has been recognized every year since chapter awards have been given, starting in 2007. The Chapter was founded by now Professor Tina Wakolbinger, who was a PhD student at the Isenberg School. Professor Anna Nagurney has served as the Chapter's Faculty Advisor since the chapter's inception.

Special thanks to Mojtaba Salarpour who served as the Chapter President for two consecutive years: 2019-2020 and 2020-2021.

Below is a photo of the first meeting of the new academic year of the Student Chapter in the Supernetworks Lab in the Isenberg School of Management.



**Student Chapter Members at the Supernetworks Lab**

## Kudos and News

The Center has achieved an amazing milestone – 20 years of its existence since it was established in the Fall of 2001. The plan is to hold a symposium to mark this important anniversary. More news to follow.

On September 21, 2021, the Center Director had the article, **Global Shortage of Shipping Containers Highlights the Importance in Getting Goods to Amazon Warehouses, Shelves and Your Door in Time for Christmas**, published in *The Conversation*. In one month, after also being republished by *Fast Company*, the article had been read by over 315,000, and remains the most read article published in *The Conversation* written by any UMass Amherst professor, since the site was established in March 2011. [The article can be accessed here.](#)

Despite the pandemic, Center Associates have been remarkably productive in terms of research publications. We list several recent ones in the next section of this newsletter.

Congratulations to Center Associate Professor Shivani Shukla of the University of San Francisco for publishing the paper with Professor William Riggs, **Exploring the Benefits of Minimobility in the Urban Context: The Case of Central Stockholm**, in the *Journal of Transport and Land Use* in 2021.

Congratulations to Center Associates Professors Min Yu of the University of Portland, Jose M. Cruz of UConn, Dong Li of Babson College, and Amir H. Masoumi of Manhattan College on the publication of their paper, **A Multiperiod Competitive Supply Chain Framework with Environmental Policies and Investments in Sustainable Operations**, in the *European Journal of Operational Research* in 2021!

Congratulations to Center Associates Professor Patrick Qiang of Penn State Great Valley and Professor Ke Ke of Central Washington University on the publication of their paper, **Closed-Loop Supply Chain Network with Interaction of Forward and Reverse Logistics**, with co-authors, in 2021, in the journal, *Sustainable Production and Consumption*.

Congratulations to Center Associate Professor Dmytro Matsypura of the University of Sydney in Australia! His first PhD student, Jessica Leung, is graduating soon and has secured a tenure track position at Monash University in Australia!

Congratulations to Professor Tina Wakolbinger, who has now graduated 7 PhD students, with another one finishing soon! She now has several PhD students working under her supervision. A special congratulations to her and to her former PhD student, [Dr. Timo Gossler, for being recognized by the Republic of Austria with the President's Honor in a special ceremony!](#)

## Recent Center Publications

Please see our center articles at:

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

**Game Theory and the COVID-19 Pandemic**, A. Nagurney, *INFORMS Tutorials in Operations Research* (2021).

**Supply Chain Game Theory Network Modeling under Labor Constraints: Applications to the Covid- 19 Pandemic**, A. Nagurney, *European Journal of Operational Research* (2021), **293(3)**, 880-891.

**Probabilistic Assessment of Transport Network Vulnerability with Equilibrium Flows**, Y. Jiang, Y. Wang, W.Y. Szeto, A.H.F. Chow, and A. Nagurney, *International Journal of Sustainable Transportation* (2021), **15(7)**, 512-523.

**A Multicountry, Multicommodity Stochastic Game Theory Network Model of Competition for Medical Supplies Inspired by the Covid-19 Pandemic**, M. Salarpour and A. Nagurney, *International Journal of Production Economics* (2021), **235**, 108074.

**A Multiclass, Multiproduct Covid-19 Convalescent Plasma Donor Equilibrium Model**, A. Nagurney and P. Dutta, *Operations Research Forum* (2021), **2**, 31.

**A System-Optimization Model for Multiclass Human Migration with Migration Costs and Regulations Inspired by the Covid-19 Pandemic**, G. Cappello, P. Daniele, and A. Nagurney, *Minimax Theory and Applications* (2021), **6(2)**, 281-294.

**Human Migration Networks and Policy Interventions: Bringing Population Distributions in Line with System-Optimization**, A. Nagurney, P. Daniele, and G. Cappello, *International Transactions in Operational Research* (2021), **28(1)**, 5-26.

**Competition for Medical Supplies Under Stochastic Demand in the Covid-19 Pandemic: A Generalized Nash Equilibrium Framework**, A. Nagurney, M. Salarpour, J. Dong, and P. Dutta (2021), in: *Nonlinear Analysis and Global Optimization*, T.M. Rassias and P.M. Pardalos, Editors, Springer Nature Switzerland AG, 331-356.

**Perishable Food Supply Chain Networks with Labor in the Covid-19 Pandemic**, A. Nagurney (2021), in: *Dynamics of Disasters – Impact, Risk, Resilience, and Solutions*, I.S. Kotsireas, A. Nagurney, P.M. Pardalos, and A. Tsokas, Editors, Springer International Publishing Switzerland, pp 173-193.

**Capacitated Human Migration Networks and Subsidization**, A. Nagurney, P. Daniele, and G. Cappello (2021), in: *Dynamics of Disasters – Impact, Risk, Resilience, and Solutions*, I.S. Kotsireas, A. Nagurney, P.M. Pardalos, and A. Tsokas, Editors, Springer International Publishing Switzerland, pp 195-217.

**International Human Migration Networks Under Regulations**, A. Nagurney and P. Daniele, *European Journal of Operational Research* (2021), **291(3)**, 894-905.

**Optimization of Supply Chain Networks with Inclusion of Labor: Applications to COVID-19 Pandemic Disruptions**, A. Nagurney, *International Journal of Production Economics* (2021), **235**, 108080.

**The Braess Paradox**, A. Nagurney and L.S. Nagurney, *International Encyclopedia of Transportation* (2021), Chapter 10760, R. Vickerman, Editor, Elsevier.

**A Stochastic Disaster Relief Game Theory Network Model**, A. Nagurney, M. Salarpour, J. Dong, and L.S. Nagurney, *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.

**Refugee Migration Networks and Regulations: A Multiclass, Multipath Variational Inequality Framework**, A. Nagurney, P. Daniele, and L.S. Nagurney, *Journal of Global Optimization* (2020), **78**, 627-649.

**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.

## The Center Director

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Eugene M. Isenberg Chair in Integrative Studies

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Mojtaba Salarpour

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