

# The Supernetwork Sentinel

## Winter-Summer 2021

Welcome to the Winter-Summer 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. This edition is a combined one due to the pandemic. 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.

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 John F. Smith Memorial Professor  
 Director – Virtual Center for Supernetworks  
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## Renewal of Center

On June 17, 2021, the Center Director received the excellent news from the UMass Amherst Provost John McCarthy and the Vice Chancellor for Research and Engagement Michael Malone that the Virtual Center for Supernetworks has been recommended for continuance for another 5 years. We thank the Evaluation Committee of Centers & Institutes at the University of Massachusetts Amherst for its positive comments and this positive recommendation.

Some of the comments in the Committee's report included the following: *The Center through its various activities has contributed scholarly work on the vitality and fragility of supply chains, for food, medicine, and vaccine, and its expertise was sought by different media outlets over the last year during the Covid-19 pandemic. The Center is significantly referenced in the media, which gives it a lot visibility and contributes to the reputation of Isenberg and our campus. Through its doctoral students and Associates, as well as the members of its INFORMS Student Chapter, the Center contributes to our diversity at UMass Amherst. In addition to people born in the USA, it has involved over the years contributors who have come from different countries including "Cape Verde, China, India, Ukraine, Greece, Austria, Italy, Turkey, Iran."*

In Fall 2021, we will mark 20 years of the establishment of the Center, which is quite the achievement and which was made possible because of the outstanding collaborations, creativity, energy, and enthusiasm of the Center Associates and the support of many over the years for our research and allied professional activities.

## Director Delivers the Harold Larnder Prize Lecture at CORS

At the [CORS 2021 Conference](#), which was virtual because of the pandemic, The Center Director Anna Nagurney was honored with the official receipt of the Harold Larnder Prize in a lovely award ceremony. Many thanks to the co-organizers of the conference, Professors Fatma Gzara and Timothy Chan, for the very special introduction and also thanks to the CORS President, Professor Michael Pavlin!

Professor Anna Nagurney is only the second female recipient of this prize and now the only living one, since, sadly, [Dr. Ailsa Land passed away on May 16, 2021, at the age of 93](#). Quite remarkably, we honored her receipt of the Beale Medal (first female recipient of that award) with a panel on February 25, 2021, and both she and

her husband were able to be virtually present. We [provide a link to the video of the panel at which I had the honor of speaking and some additional information in a previous blogpost](#). The title of Nagurney's talk was "Novel Supply Chain Network Models Inspired by the COVID-19 Pandemic: From Optimization to Game Theory," at the conference. She has [made her slide deck available for viewing and downloading](#).

[A recording of her Harold Larnder Prize keynote can be viewed here.](#)

The Prize Certificate arrived from Canada just in time for the virtual award ceremony!



## The Center Director with the Harold Larnder Prize Certificate.

The first time that the award was given was back in 1986. [The full list of recipients is here.](#)

## Center Associates Earn Major Grants

Congratulations to Center Associate Professor Sara Saberi of WPI. She is a Co-PI on a major five-year NSF grant. The project is focused on analyzing issues faced by manufacturers that offered to shift their production during the COVID-19 pandemic and the development of tools and exercises to improve emergency manufacturing responses in the future. The

project is being called **Rapid Execution for Scaling Production of Needed Designs** network, or RESPOND, and is a collaboration among multiple universities and small business.

[More information on this very timely project can be found on the NSF website.](#)

Also, congratulations to Center Associate Professor Shivani Shukla at the University of San Francisco. She is a Co-PI on a large grant from the California Strategic Growth Council. The grant is for four years and, [according to the press release](#), seeks to “develop and implement neighborhood-level climate sustainability plans and projects that will reduce greenhouse gas emissions, foster public health and environmental benefits, and catalyze economic opportunity and shared prosperity within the neighborhood of East Oakland.”

## Exciting Conference Activity

Because of the Covid-19 pandemic, conferences have become exclusively virtual. Center Associates presented at multiple conferences in the Fall of 2020 and Winter and Spring 2021 and will be especially busy speaking at conferences in the Summer of 2021!

The INFORMS Annual meeting, November 7-13, 2020, required that speakers record their presentations and upload them to the conference website. Professor Anna Nagurney presented an invited talk in a special session noting the 50<sup>th</sup> anniversary of the journal *Networks*, which is based, partly, on her invited paper that was published in the journal in early 2021.



**The Networks 50<sup>th</sup> Anniversary Session at INFORMS**

Doctoral Student Center Associate Mojtaba Salarpour presented the paper, **A Stochastic Disaster Relief Game Theory Network Model**, co-authored with the Center Director and with Center Associates Professor June Dong of SUNY Oswego and Professor Ladimer S.

Nagurney of the University of Hartford. The paper was published in the journal *Operations Research Forum* in January 2020. Center Associate Professor Pritha Dutta of Pace University in NYC presented the paper, **Competition for Medical Supplies Under Stochastic Demand in the Covid-19 Pandemic: A Generalized Nash Equilibrium Framework**. The paper was published in a Springer volume edited by Professors Rassias and Pardalos in 2021. The paper was co-authored with the Center Director and with Mojtaba Salarpour and Professor June Dong. This paper was also presented by Mojtaba Salarpour at the POMS 31st Annual Conference, April 30 - May 5, 2021. Congratulations to Mojtaba for being selected and for taking part in the Doctoral Colloquium at the POMS Conference!

In addition, Center Associate Professor Deniz Besik of the University of Richmond delivered the talk, **Global Supply Chain Networks and Tariff Rate Quotas: Equilibrium Analysis with Application to Agricultural Products** at the INFORMS Conference. The talk is based on the paper co-authored with the Center Director and Professor Ladimer S. Nagurney and which was published in the *Journal of Global Optimization* in 2019. In addition, Center Associate Professor Dmytro Matsypura of the University of Sydney in Australia had his PhD student, Jessica Leung, deliver a presentation on their joint work at the INFORMS conference!

Both Professor Pritha Dutta and Mojtaba Salarpour also presented at the DSI conference, November 21-23, 2020, in a virtual, but synchronous format.

In the late Spring and Summer of 2021, Center Associates will be presenting at many conferences virtually, including at EURO 2021 in Athens, the Dynamics of Disasters Conference, and INFORMS Healthcare, among other conferences. The EURO Conference is hybrid but the other two are virtual.

The Center Director will be a keynote speaker at the ACM Workshop on Critical Infrastructure Network Security in June 2021.

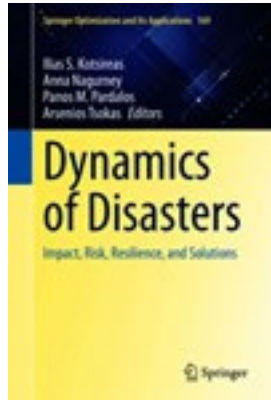


**Keynote Speakers at the ACM Workshop**

[For many of the conference talk presentations, including several video recordings, please visit the Supernetwork center website.](#)

## New DOD Book Published and Conference Organized

We are thrilled that the latest Dynamics of Disasters volume was published by Springer in 2021.



The Center Director co-edited the book with Professors Ilias S. Kotsireas and Panos M. Pardalos, and Arsenios Tsokas. [The full table of contents is available here.](#) The Center Director and Center Associates Professor Tina Wakolbinger of the Vienna University of Economics and Business in Austria and Professor Patrizia Daniele of the University of Catania in Italy have chapters in this volume, all of which have been refereed.

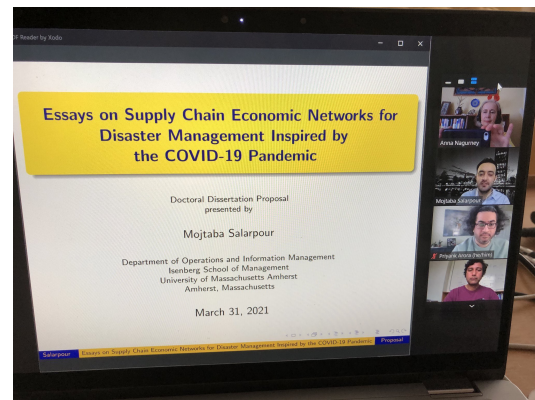
In addition, we are pleased to announce that the 5<sup>th</sup> International Conference on Dynamics of Disasters, which will be virtual, will take place July 16-18, 2021. One of the plenary speakers is Center Associate Dr. Stavros Siokos, who is a Co-Founder of Astarte Capital Partners, in London, UK. [More information on the conference can be found here.](#) Center Associates Professors Wakolbinger and Daniele and Center Associate Professor Ladimer S. Nagurney of the University of Hartford will also be taking part in this conference as will Mojtaba Salarpour. The Center Director is co-organizing this conference. Additional plenary speakers are: Professors Maria Besiou and Oleg Prokopyev and Dr. George Karagiannis.

Fifth International Conference on Dynamics of Disasters			
Plenary Speakers			
<p><b>Doing More with Less: The Impact of Preparedness and Coordination on Humanitarian Aid</b></p> <p>Prof. Maria Besiou KTH Logistics University, Germany</p> 	<p><b>Critical Elements Detection in Networks: An Optimization Perspective</b></p> <p>Prof. Oleg Prokopyev University of Pittsburgh, PA, USA</p> 	<p><b>Deforestation and Climate Disasters</b></p> <p>Dr. Stavros Siokos Astarte Capital Partners LLP, London, UK</p> 	<p><b>Science and Technology in Disaster Management: Past, Present and Future</b></p> <p>Dr. George Karagiannis General Secretariat for Civil Protection, Greece</p> 

### Dynamics of Disasters Plenary Speakers

## Kudos and News

Congratulations to Doctoral Student Center Associate Mojtaba Salarpour for successfully defending his dissertation proposal on March 31, 2021. The title of his proposal is: **ESSAYS ON SUPPLY CHAIN ECONOMIC NETWORKS FOR DISASTER MANAGEMENT INSPIRED BY THE COVID-19 PANDEMIC.**



### Mojtaba Salarpour defending his dissertation proposal

Congratulations also to Mojtaba on the publication of his paper, **A Multicountry, Multicommodity Stochastic Game Theory Network Model of Competition for Medical Supplies Inspired by the Covid-19 Pandemic**, co-authored with Professor Anna Nagurney, in the *International Journal of Production Economics* (2021), **235**, 108074.

Congratulations also to Center Associate Professor June Dong of SUNY Oswego for acceptance of the paper, **Modeling of Covid-19 Trade Measures on Essential Products: A Multiproduct, Multicountry Spatial Price Equilibrium Framework**, with Mojtaba Salarpour and the Center Director, in the *International Transactions in Operational Research*.

We are delighted to announce that the paper, **Supply Chain Game Theory Network Modeling Under Labor Constraints: Applications to the Covid-19 Pandemic** by Professor Anna Nagurney, published in the *European Journal of Operational Research* (2021), **293(3)**, 880-891, is the recipient of an Editors' Choice Award for 2021!

In the pandemic, Professor Patrizia Daniele and the Center Director have collaborated on a series of papers on human migration networks. Their paper, **Human Migration Networks and Policy Interventions: Bringing Population Distributions in Line with System-Optimization**, with Professor Daniele's PhD student, Giorgia Cappello, was published in the

*International Transactions in Operational Research* (2021), **28(1)**, 5-26.

Congratulations to Professor Tina Wakolbinger for the publication, **Integrated Express Shipment Service Network Design with Customer Choice and Endogenous Delivery Time Restrictions**, co-authored with F. Martin and V.C. Hemmelmayr, and published in the *European Journal of Operational Research* (2021), **294(2)**, 590-603.

Congratulations to Professor Sara Saberi for the publication of her article, **Blockchain Technology and the Sustainable Supply Chain: Theoretically Exploring Adoption Barriers**, in the *International Journal of Production Economics* (2021), **231**, 107831, with M. Kouhizadeh and J. Sarkis. Kouhizadeh is Professor Saberi's first PhD student and she has accepted a tenure track Assistant Professorship at the University of Rhode Island!

Congratulations to Center Associates Professor Patrick Qiang of Penn State Great Valley and Professor Ke Ke of Central Washington University for the publication of their paper, **Closed-loop Supply Chain Network with Interaction of Forward and Reverse Logistics**, co-authored with R. Fu and Z. Huang, and published in *Sustainable Production and Consumption* (2021), **27**, 737-752.

Congratulations to Center Associate Professor Dmytro Matsypura of the University of Sydney in Australia for the publication of his article, **Assortment Optimisation Problem: A Distribution-free Approach**, in *Omega* (2020), **95**, 102083.

Center Associate Professor Deniz Besik of the Robins School of Business at the University of Richmond completed her first year as an Assistant Professor. She recently submitted a statement to the U.S. Committee on Agriculture regarding the food supply chain during the COVID-19 pandemic and was featured on her business school's homepage for this statement.

Center Associate Professor Pritha Dutta has had the paper, **A Multiclass, Multiproduct Covid-19 Convalescent Plasma Donor Equilibrium Model**, co-authored with the Center Director, accepted for publication in *Operations Research Forum*.

The Center Director on April 14, 2021 was appointed the Eugene M. Isenberg Chair in Integrative Studies by the UMass Amherst Board of Trustees and the UMass Amherst President Marty Meehan. Since 1998, she had been the John F. Smith Memorial Professor of Operations Management. The new Chaired Professorship is the most prestigious one that a faculty member can attain in the university. She is deeply

honored and grateful for this recognition and thanks the donors who made both of her endowed professorships possible.

Professor Anna Nagurney is also honored to have been appointed to the Scientific Advisory Board of the Relief-Ops project funded by EPSCR. She is working with Professors Stephan Onggo and Christine Currie on this project, which focuses on Designing a resilient relief supply network for natural disasters in West Java Indonesia. [More information on the project is available on its website.](#)



### Virtual meeting of some of the members of the Relief Ops Team on the EPSCR funded project

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](#).

[Many of our recent publications can be found on the Supernetwork Center website. Some are itemized below.](#)

## Recent Center Publications

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

**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.

**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.

**The Center Director**

Dr. Anna Nagurney  
Eugene M. Isenberg Chair in Integrative  
Studies

**Center Associates**

Dr. Trisha Anderson  
Dr. Deniz Besik  
Dr. Jose M. Cruz  
Dr. Patrizia Daniele  
Dr. Pritha Dutta  
Dr. June Dong  
Dr. Ke "Grace" Ke  
Dr. Dong "Michelle" Li  
Dr. Zugang "Leo" Liu  
Dr. Amir H. Masoumi  
Dr. Dmytro Matsypura  
Dr. Ladimer S. Nagurney  
Dr. Qiang "Patrick" Qiang  
Dr. Padma Ramanujam  
Dr. Sara Saberi  
Dr. Stavros Siokos  
Dr. Shivani Shukla  
Dr. Tina Wakolbinger  
Dr. Min Yu  
Dr. Ding Zhang

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