



The Supernetwork Sentinel

Fall 2022

Welcome to the Fall 2022 edition of **The Supernetwork Sentinel**, the newsletter of the Virtual Center for Supernetworks at the Isenberg School of Management, UMass Amherst. We are now publishing this newsletter in Fall and Spring editions. This structure conforms better with the academic year. 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 share with our readers and supporters the major achievements of the Center Director and Center Associates during this very challenging time in history. As always, we include a list of our recent Center publications.



Dinner at the INFORMS Conference

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The ODS Conference in Florence

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Inside

The ODS 2022 Conference in Florence, Italy is a Big Success

The KSE Event at the Harvard Club in NYC

The INFORMS Conference in Indianapolis

Virtual Welcome Event for Virtual Scholars in Ukraine – UMass Amherst – KSE Partnership

Center Director Delivers IFORS Distinguished Lecture in Buenos Aires

Kudos and News

The ODS 2022 Conference in Florence, Italy is a Big Success

The Center Director would like to thank the organizers of the outstanding Optimization and Decision Science Conference that took place August 30-September 2, 2022 in the stunning city of Firenze (Florence), Italy.

It was a conference of great scientific value, with wonderful social activities, at the University of Firenze, which brought together researchers from many different countries for face to face exchanges. For many of us, it was the first international face to face conference since the beginning of the COVID-19 pandemic.

Professor Anna Nagurney extends her deepest appreciation to the Conference Co-Chairs: Professors Fabio Schoen and Paola Capanera, for their warmth and hospitality. [The conference website can be found here.](#) Thanks to [the Local Organizing Committee and to the Program Committee](#) for their outstanding work!

It was a great honor to give the opening keynote talk at the Museum of Innocents, followed by a cocktail hour and tour of the museum. The title of Professor Nagurney's keynote was: *Labor and Supply Chain Networks: It's All About People.* [The slide deck can be downloaded here.](#)



The Center Director Delivering Her Keynote

The energy and enthusiasm of the conferees were heartwarming to behold. New friendships were made and established relationships further cemented. [The sessions were excellent and the University of Firenze a great venue.](#)

It was fabulous that all 5 co-authors of our paper on UAVs, 5G, and Disaster Management showed up: Daniele Sciacca, Center Associate Professor Patrizia Daniele of the University of Catania, Center Associate Professor Ladimer S.

Nagurney of the University of Hartford, and Dr. Gabriela Colajanni (see photo below).



Co-authors Gather for Group Photo

All the conferees had a fabulous time scientifically and socially. The great discipline of Operations Research, because of the creativity and dedication of its researchers, educators, and practitioners, is making laudable positive impact globally. Working together we can achieve so much good.

The KSE Event at the Harvard Club in NYC



On September 17, 2022, an extraordinary event took place at the Harvard Club in support of Ukraine that was organized by the [Kyiv School of Economics \(KSE\)](#) with assistance provided by [Razom for Ukraine](#) and [United24](#).

The event included a conference in the afternoon on the theme: "The Independence War in Ukraine: Global Implications" followed by a charity dinner with the subtheme of: "The Present and Future of the Country."

The full program, which contains information on the conference sessions, with overarching themes of global security, resilience in war, energy security, as well as food security, can be found on [the event page](#). The conference program was outstanding (it was tough to choose between the parallel sessions) with academics, executives, Ukrainian government ministers, an ambassador, thought leaders, representatives

from the World Bank, and even the Head of the Office of the President of Ukraine taking part. Given the research that we have been doing for quite a few years on agricultural supply chains, the Center Director was thrilled to hear from the panel on World Food Security, which was moderated by Dr. Oleg Nivievskyi, an agricultural economist, who is Vice President for Economics Education at KSE.



The World Security Panel with Dr. Oleg Nivievskyi on the right

High food prices were emphasized, along with the costs of logistics in Ukraine and the costs of fertilizer and fuel, plus how there is so much uncertainty now. Getting agricultural products out of Ukraine is essential to food security and just having the port of Odesa open (with the recent brokered agreement by the UN with support from Turkey) not enough. The port of Mikolayiv also is sorely needed. In addition, the need for weapons to defeat Russia was emphasized along with sanctions. The extremely challenged farmers paid \$40/ton to ship grain before the war and now the cost has risen to \$200/ton.

There were opportunities to network and to chat in the elegant Harvard Club.

We congratulate the President of KSE, Tymofiy Mylovanov, and the Rector of KSE, Tymofii Brik, for the excellent organization of the conference and charity dinner, and for being incredible masters of ceremony of the event, as well as ambassadors for higher education in Ukraine and for the recovery and reconstruction of Ukraine.

The Chair of the International Academic Board, the Nobel laureate in Economics, Roger Myerson, gave a wonderful speech at the charity dinner. The Nobel laureate Paul Krugman also spoke and noted that borscht is a Ukrainian dish and that Ukrainians are fighting for the freedom of the free world.



KSE Rector Brik with the Center Director

The President of Razom for Ukraine, Dora Chomiak, also spoke. Razom for Ukraine has been assisting in humanitarian relief in Ukraine for many years.

The INFORMS Conference in Indianapolis

The INFORMS Annual Meeting took place October 16-19, 2022 in Indianapolis, Indiana. This is the first face to face meeting of this conference since the declaration of the pandemic and it was an extraordinary conference!

There were also events taking place prior. The Director was deeply honored to have been invited to speak at the Minority Issues Forum (MIF) Workshop for Undergraduate Underrepresented Minorities on October 15. There were students taking part even from Puerto Rico. One of the goals of this workshop was to introduce Operations Research to undergraduates and to share with them some of the impactful applications.

[Professor Anna Nagurney's presentation at this workshop, along with many other conference and seminar talks can be found on the Supernetwork Center website.](#)



The MIF Workshop with Organizers Professors Encarnacion and Proano

Professor Anna Nagurney served as the Chair of the inaugural Stella Dafermos Mid-Career Award Committee. As the Chair of the Award Selection Committee, it was an honor to serve and to recognize the recipient of this award as well as to recognize the great legacy of Nagurney's PhD dissertation advisor at Brown University, Stella Dafermos, who passed away at age 49 in April 1990. Anna was Stella's first PhD student. She was the only female professor, at that time, with appointments in the Division of Applied Mathematics and in the Division of Engineering.



The Advocacy Panel at INFORMS in Indianapolis

Professor Nagurney is very grateful to Professors Richard Hartl, Hani S. Mahmassani, Amedeo Odoni, and Grazia Speranza for serving on this committee. The award recipient was Professor Niels Agatz!



Professor Niels Agatz Receiving His Award

Center Associates presented many papers at this conference and enjoyed multiple social events. The Center Director enjoyed speaking on the INFORMS Advocacy panel. The conference attracted over 6,000 delegates from around the globe.



Several Center Associates and Other Speakers After a Session

Virtual Welcome Event for Virtual Scholars in Ukraine – UMass Amherst – KSE Partnership

On November 30, Professor Anna Nagurney hosted a Virtual Welcome event for the 8 Virtual Scholars in Ukraine who are now working with faculty in the Isenberg School of Management as part of the extraordinary partnership established between UMass Amherst and the Kyiv School of Economics. We are indebted to the UMass Amherst Vice Chancellor of Global Affairs Kalpen Trivedi and the Isenberg Dean Anne P. Massey for support of this partnership. The Isenberg School published an article on this event: <https://www.isenberg.umass.edu/news/supporting-ukraine-through-academic-partnership>

The Center Director will be working with three of the Virtual Scholars: Professors Elena Besedina, Pavlo Martyshev, and Pavlo Prolopovych. Special thanks to the Isenberg School Selection Committee: Associate Dean George Milne and Professors Nikunj Kapadia and Bogdan Prokopovych! The projects that are being researched and collaborated on are very exciting.



UMass Amherst - KSE Partnership
Screenshot of Virtual Scholars and Faculty Hosts

Center Director Delivers IFORS Distinguished Lecture in Buenos Aires

Professor Anna Nagurney had the great honor of delivering the IFORS Distinguished Lecture (IDL) at the CLAIO 2022 Conference, which took place in beautiful Buenos Aires, Argentina from December 12-15.



The Center Director Delivering the IFORS Distinguished Lecture

The venue for the conference was the stunning Infinity Building at the University of Buenos Aires with lovely atriums. It was amazing the number of different countries that the conferees came from.

Professor Nagurney thanks Professor Javier Marengo for all the courtesies extended and for all the logistics and arrangements. Thanks also to Manuela Blaum. [The conference website can be accessed here.](#)

Her IFORS Distinguished Lecture was entitled: "Human Migration Networks: How Operations Research Can Assist with Refugees and Supply Chain Network Labor Shortages," It was dedicated to essential workers, who did so much for us during the pandemic, and to those fighting for their freedom including those in Ukraine.

[The list of previous IFORS Distinguished Lecturers is available here.](#) The Nobel Laureate in Economics John Nash is on the list!

It was an especially exciting time to be in Buenos Aires since it was the last week of the World Cup matches.



Professor Anna Nagurney with CLAIO 2022 Conferees

Kudos and News

Congratulations to Center Associate Professor Dmytro Matsypura of the University of Sydney in Australia. As of January 2023, he will be heading the Division of Business Analytics with 27 faculty! He has also been awarded a major grant and will be working with Professor Oleg Prokopyev of the University of Pittsburgh.

Our expertise on various supply chains including agricultural ones and impacts of global events from the COVID-19 pandemic to Russia's war on Ukraine continues to be sought. [Please visit the Center website to read about some of our interviews with the media.](#)

Congratulations to Center Associate Professor Michelle Li of Babson College! She was the recipient of the Early Career Scholar Award! <https://entrepreneurship.babson.edu/faculty-awards-2022/>

We are delighted to announce that the book, "Labor and Supply Chain Networks," authored by Professor Anna Nagurney will be published in January 2023 by Springer!

The Center Associates have been very active in publishing and in presenting at conferences. Upcoming conferences include the POMS Conference in Orlando, Florida, and the IFORS Conference in Santiago, Chile! We are delighted that Center Associate Professor Sara Saberi of WPI is on the Scientific Program Committee of the POMS conference in Paris, France. The Center Director will deliver a keynote talk at the IFORS Conference in Chile.

Center Associate Professor Patrick Qiang of Penn State Malvern will present his research at the POMS-HK Conference in Hong Kong in January 2023.

We congratulate Center Associate Professor Mojtaba Salarpour on his completion of his first semester as an Assistant Professor at Texas A&M Commerce.

Recent Center Publications

Please see our center articles at:

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

A Bandwidth Auction Mechanism to Enable Affordable Internet Access, L.A. Marentes, S. Cabrales, T. Wolf, A. Nagurney, Y. Donoso, *Netnomics* (2022), **22**, 283–316.

An Integrated Multitiered Supply Chain Network Model of Competing Agricultural Firms and Processing Firms: The Case of Fresh Produce and Quality, D. Besik, A. Nagurney, and P. Dutta, *European Journal of Operational Research*, in press.

Supply Chain Networks, Wages, and Labor Productivity: Insights from Lagrange Analysis and Computations, A. Nagurney, *Journal of Global Optimization* (2022), **83**, 615–638.

Resilience of Supply Chain Networks to Labor Disruptions, A. Nagurney and A. Ermagun, *Resilience Findings* (2022), June 16.

Modeling of Covid-19 Trade Measures on Essential Products: A Multiproduct, Multicountry Spatial Price Equilibrium Framework, A. Nagurney, M. Salarpour, and J. Dong, *International Transactions in Operational Research* (2022), **29(1)**, 226–258.

Attracting International Migrant Labor: Investment Optimization to Alleviate Supply Chain Labor Shortages, A. Nagurney, *Operations Research Perspectives* (2022), **9**, 100233.

Defense Critical Supply Chain Networks and Risk Management with the Inclusion of Labor: Dynamics and Quantification of Performance and the Ranking of Nodes and Links, A. Nagurney (2022), accepted in: *Handbook for Management of Threats, Security and Defense, Resilience and Optimal Strategies*, K. Balomenos, A. Fytopoulos, and P.M. Pardalos, Editors, Springer Nature.

Optimization of Investments in Labor Productivity in Supply Chain Networks, A. Nagurney, *International Transactions in Operational Research* (2022), **29(4)**, 2116–2144.

Spatial Price Equilibrium Networks with Flow-Dependent Arc Multipliers, A. Nagurney and D. Besik, *Optimization Letters* (2022), **26**, 2483–2500.

A Multiperiod Supply Chain Network Optimization Model with Investments in Labor Productivity in an Era of COVID-19 and Climate Change, A. Nagurney, *Operations Research Forum* (2021), **2**, 68.

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.

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