

The Supernetwork Sentinel

Summer 2019

Welcome to the Summer 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 the 50th Anniversary of the Isenberg PhD program, major honors received, as well as upcoming events. As always, we include a list of our recent Center publications.

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Center Associates Dr. Padma Ramanujam, Professors Jose Cruz and Patrick Qiang, with Professors Shenghan Xu and Davit Khachatryan at the Management Science PhD Alumni Panel at the 50th Anniversary of Isenberg's PhD Program on April 5, 2019



Dr. Pritha Dutta with friends and family after receiving her PhD on May 10, 2019



Center Associates with friends at POMS in DC

Inside

50th Anniversary of Isenberg's PhD Program

Center Associates at POMS in DC

Outstanding UMass Amherst INFORMS Speakers

Major Accolades

Kudos and News

Recent Center Publications

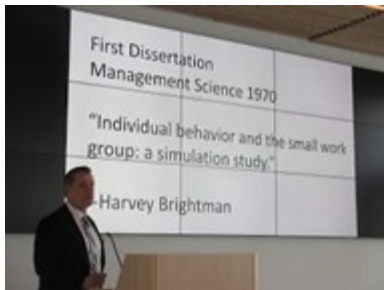
50th Anniversary of Isenberg's PhD Program

On April 5, 2019, we marked an extraordinary milestone - the 50th anniversary of the PhD Program at the Isenberg School of Management, with alums, family members, present doctoral students, faculty, and guests convening for a special celebration.

This event was months in the planning and was the first gala event to take place in our \$62 million Business Innovation Hub (BIH) at the Isenberg School. Thanks to the PhD Director, Dr. George Milne, and to Mike Korza and Sophia Love for a day that brought 220 of us from as far as such countries as Austria and Canada, and states of California, Oregon, and Idaho back for the celebration.

[The full program can be viewed here.](#)

The day began with registration and many greetings and hugs and at the lunch. Dr. Milne and Interim Dean Tom Moliterno had opening remarks.



Dr. Milne making his opening remarks

The day was one of community, recognizing what has made our doctoral program unique, and celebrating the past, present, and future. It was also about reconnecting face to face and sharing experiences and even wisdom. For some, it was the first time back to their alma mater since they received their PhD (and now they are tenured Professors).



Group photo with several Supernetwork Center Associates and friends

After the lunch, we broke out into different tracks and the Center Director, who is back to being the Management Science PhD Area Coordinator, thoroughly enjoyed giving her presentation, which was then followed by a panel of Management Science PhD alums that she had organized. Attendance was fabulous at both and there were photo ops as well. Her [full presentation can be downloaded here](#). It involved a lot of research and was very enjoyable to prepare and deliver.



The Center Director gives her presentation.

The Management Science PhD panel included panelists from both industry and academia and [you can read more about these stellar alums here](#). The panelists were: Center Associate Professor Jose M. Cruz of the University of Connecticut, Professor Davit Khachatryan of Babson College, Center Associate Professor Patrick Qiang of Penn State, Center Associate Dr. Padma Ramanujam of SAS, and Professor Shenghan Xu of the University of Idaho.



The discussions continued after the panel



Group photo with many Management Science PhD alums and the PhD Director and friends

At the banquet dinner, we had the pleasure of listening to Center Associate Professor Tina Wakolbinger of the Vienna University of Economics and Business in Austria and to Dr. Dennis Hanno, President of Wheaton College, deliver their keynote speeches.



Professor Wakolbinger delivering her keynote talk



Banquet keynote speakers with former Isenberg Dean, Dr. Tom O'Brien

Also, other Center Associates that returned to campus for this special celebration included Center Associates Professor June Dong of SUNY Oswego and Professor Dong "Michelle" Li of Babson College and Center Associate Professor Amir H. Masoumi of Manhattan College. Doctoral Student Center Associates Deniz Besik, Pritha Dutta, and Mojtaba Salarpour also took part in the anniversary event.

Center Associates at POMS in DC

The POMS conference took place in Washington DC, May 2-6, 2019. Doctoral Student Center Associate Deniz Besik had the honor of being selected to take part in the POMS Doctoral Colloquium. She also presented some of her latest work, joint with the Center Director and Center Associate Professor Ladimer S. Nagurney of the University of Hartford on tariff rate quotas and agricultural products. Pritha Dutta, now officially a PhD, presented on research, also conducted with the Center Director, on competition for blood donations, a paper, which was recently published in the journal *Omega*. In addition, the Center Director presented a paper

on game theory and disaster relief, co-authored with Doctoral Student Center Associate Mojtaba Salarpour, and Center Associate Professor Patrizia Daniele of the University of Catania in Italy. The paper was recently published in the *International Journal of Production Economics*. Also taking part in POMS and delivering papers were Center Associates Professor Sara Saberi of WPI and Amir H. Masoumi of Manhattan College.



Group photo after Deniz Besik's presentation at POMS



The Center Director with Pritha Dutta after her talk at POMS



The disaster relief session with speakers and audience at POMS

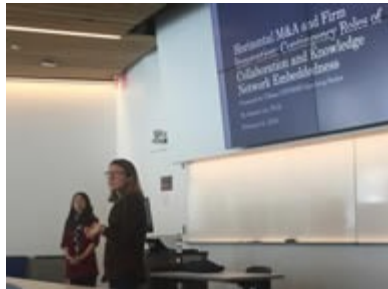
Outstanding UMass Amherst INFORMS Speakers

This has been a tremendous Spring 2019 with notable speakers in our UMass Amherst INFORMS Speaker Series.

We had the pleasure of hosting Professor Aurora Liu of the Isenberg School, Professor Peter Haas,

formerly of IBM, and now a Professor at the College of Computer and Information Sciences at UMass Amherst, Dr. Jurij Paraszczak of IBM, and Dr. Thiago Serra of Mitsubishi Labs. Professor Haas is both an INFORMS Fellow and an ACM Fellow.

Professor Aurora Liu recently joined the faculty of the Management Department of the Isenberg School of Management. Her talk on February 1 was entitled, "Horizontal M&A and Firm Innovation: Contingency Roles of Collaboration and Knowledge Network Embeddedness."



UMass Amherst INFORMS Student Chapter President Katerina Deliali introducing Professor Liu

Professor Peter Haas spoke on "Temporally-Biased Sampling Schemes for Online Model Management" on February 22, 2019.



Professor Haas and audience after his lecture

On March 8, 2019, Dr. Jurij Paraszczak, formerly the head of IBM's Smart Cities Analytics Program, delivered the talk, "Smarter Cities and their Analysis," Dr. Paraszczak discussed the analysis of cities, from building simple models that relate physics to everyday activities, to statistical models, and, ultimately, predictive ones. He spoke of the hierarchy of: analytics, data, models, and insights. [The Isenberg School posted a nice writeup on his lecture on its website.](#)



Dr. Jurij Paraszczak giving his lecture

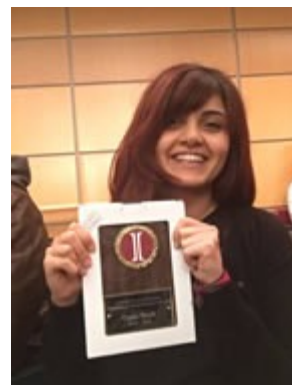
And, on March 2, 2019, we had the pleasure of hosting Dr. Thiago Serra of Mitsubishi Electric Research Labs in Cambridge, MA. Dr. Serra is a recent CMU PhD grad and will be an Assistant Professor at Bucknell University in Pennsylvania this coming Fall. The title of his presentation was, "Bounding and Counting Linear Regions of Deep Neural Networks." Dr. Serra is a recipient of the Judith B. Liebman Award from INFORMS.



The Center Director introducing Dr. Serra

Major Accolades

Doctoral Student Center Associate Deniz Besik received the 2019 Outstanding Doctoral Student Researcher Award from the Isenberg School of Management on May 2, 2019.



Deniz Besik with her award plaque

The Center Director Professor Anna Nagurney was greatly honored to be elected a Fellow of the Network Science Society. The award ceremony took place at a banquet at the NetSci Conference in Burlington, Vermont. The dates of the conference: May 29-31, 2019. Professor Anna Nagurney was one of 7 Fellows elected in 2019. She was recognized "For sustained contributions to network science, including the formulation, analysis, and computation of solutions to engineered network systems, from congested urban transportation to supply chains, under varied decision-making behaviors."



The Center Director with Professor Yair Moreno, the President of the Network Science Society, and, with also Professor Adilson Moreno, Fellows Committee Chair, in photo below



In addition, the Center Director has been selected to receive the 2019 Constantine Caratheodory Prize at [the World Congress on Global Optimization \(WCGO\), which will take place in Metz, France, July 8-10, 2019](#). She will also deliver a plenary talk at this conference. This is also a tremendous honor and she is humbled.



The 2019 Network Science Fellows

Kudos and News

Congratulations to Pritha Dutta on the successful defense of her doctoral dissertation: **Blood Supply Chain Networks in Healthcare: Game Theory Models and Numerical Case Studies**, and on her receipt of the PhD! Dr. Dutta will be a tenure track Assistant Professor at Pace University in NYC. We are delighted that she will continue as a Center Associate.



Pritha Dutta with her dissertation committee after her successful defense on April 1, 2019



Pritha Dutta at the Isenberg PhD robing ceremony on May 9, 2019 with PhD Director Dr. George Milne and the Center Director

Center Associate Professor Patrizia Daniele of the University of Catania in Italy is serving as a Member of the Program Committee of EURO 2019 in Dublin, Ireland, which will take 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, will be speaking at this conference. The Center Director will give a tutorial on: **Game Theory and Variational Inequalities: From Transportation and Supply Chains to Financial Networks and the Internet**. She will also be a panelist on two panels: Women in OR and Making an Impact, and will present a paper on global trade and tariffs and quotas co-authored with Deniz Besik and Center Associate Professor Ladimer S. Nagurney.

Congratulations to Center Associate Professor Tina Wakolbinger who was selected researcher of the month for May 2019 by her university – the Vienna University of Economics and

Business. Also, congratulations to her on the publication of the co-authored paper, **Joint Fundraising Appeals: Allocation Rules and Conditions That Encourage Aid Agencies' Collaboration**, in the June 2019 issue of *Decision Sciences*.

Congratulations to Doctoral Student Center Associate Deniz Besik on successfully passing her doctoral dissertation proposal defense on May 23, 2019.



Deniz Besik with her dissertation committee

The Center Director had the pleasure of speaking at RPI on March 29, 2019, hosted by the Department of Industrial and Systems Engineering. Her talk was on *Game Theory Network Models for Disaster Relief*. She was delighted that the Chair of the Department, Professor Al Wallace, came to her presentation as did a former student of hers from the Isenberg School – Emily Agoglia. Coincidentally, Professor Wallace was the PhD Advisor of the incoming Isenberg Dean, Dr. Anne P. Massey!



(l-r) Emily Agoglia, Professors Wallace and Nagurney

The Center Director had the pleasure of being a plenary speaker at Optimization Days in Montreal, Canada, on May 15, 2019, as part of the Third Anniversary Celebration of the Montreal OR Student Chapter. She thanks the students for the fabulous hospitality extended to her and congratulates them on their anniversary!



The Center Director with members of the audience after her plenary talk in Montreal

The UMass Amherst INFORMS Student Chapter recognized its former officers who are receiving PhDs soon at the end of the semester party.



Special recognition awards presented at UMass INFORMS Student Chapter party

Congratulations to Center Associate Professor Sara Saberi on receipt of a grant to study blockchains in supply chains. [This project is joint with her colleague, Professor Joe Sarkis.](#)

Congratulations to Center Associate Professor Patrick Qiang on the publication of his co-authored paper, **Product and Service Design for Remanufacturing, Uncertainty, and the Environmental Impact in the Closed-Loop Supply Chain Network**, in the edited volume, *Advances in Service Science*, Springer, 2019. He is serving on the Program Committee of ICSS2019: 2019 INFORMS Conference on Service Science, Nanjing University of Aeronautics and Astronautics, Nanjing, China, June 27-29, 2019.

Congratulations to Center Associate Professor Dmytro Matsypura on his co-authored paper, **On Exact Solution Approaches for the Longest Induced Path Problem** in the *European Journal of Operational Research* (2019), **278** (2), 546-562.

Congratulations to Doctoral Student Center Associate Deniz Besik and Center Associate Professor June Dong of SUNY Oswego on the publication of their paper, **Tariffs and Quotas in World Trade: A Unified Variational Inequality Framework**, with Anna Nagurney, in the *European Journal of Operational Research*

(2019), **275(1)**, 347-360. Also, kudos to Deniz and the Center Associate Professor Ladimer S. Nagurney on the acceptance of their paper with the Center Director, **Global Supply Chain Networks and Tariff Rate Quotas: Equilibrium Analysis with Applications to Agricultural Products**, in the *Journal of Global Optimization*.

Kudos to Center Associate Professor Ding Zhang of SUNY Oswego on his co-authored paper, **Integrated Planning for Public Health Emergencies: A Modified Model for Controlling H1N1 Pandemic**, accepted in the *Journal of the Operational Research Society*.

Congratulations to Doctoral Student Center Associate Mojtaba Salarpour on the publication of his first paper, **An Integrated Financial and Logistical Game Theory Model for Humanitarian Organizations with Purchasing Costs, Multiple Freight Service Providers, and Budget, Capacity, and Demand Constraints**, co-authored with the Center Director and Center Associate Professor Patrizia Daniele in the *International Journal of Production Economics* (2019).

Center Associate Professor Min Yu of the University of Portland will be on sabbatical in spring 2020. The Center Director will also be on sabbatical then.

It will be a very busy summer with the already mentioned EURO conference in Dublin and the WCGO in Metz, France, and the [Dynamics of Disasters conference in Kalamata, Greece](#), which Professor Anna Nagurney has co-organized with Professors Ilias S. Kotsireas and Panos M. Pardalos. This is the third such conference that she has been involved in co-organizing with these colleagues. She also wants to recognize Professor Pardalos on his receipt of the prestigious 2019-2019 Humboldt Research award from Germany. He will be recognized with other award recipients in Berlin, Germany in late June 2019 by Chancellor Angela Merkel.

Recent Center Publications

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

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), in press.

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.

A Supply Chain Network Game Theory Model of Cybersecurity Investments with Nonlinear Budget Constraints, A. Nagurney, P. Daniele, and S. Shukla, *Annals of Operations Research* (2017), **248(1)**, 405-427.

Supply Chain Performance Assessment and Supplier and Component Importance Identification in a General Competitive Multitiered Supply Chain Network Model, D. Li and A. Nagurney (2017), *Journal of Global Optimization*, **67(1)**, 223-250.

A Generalized Nash Equilibrium Network Model for Post-Disaster Humanitarian Relief, A. Nagurney, E. Alvarez Flores, and C. Soylu, *Transportation Research E* (2016), **95**, 1-18.

The Center Director

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John F. Smith Memorial Professor

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Dr. Ladimer S. Nagurney
Dr. Qiang "Patrick" Qiang
Dr. Padma Ramanujam
Dr. Sara Saberi
Dr. Stavros Siokos
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Dr. Min Yu
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Dr. Lan Zhao

Doctoral Students

Deniz Besik
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If you would like to be put on our email list, contact: supernet@isenberg.umass.edu