



The Transportation Center: *Research that Moves You*

RESEARCH
THAT MOVES YOU

Hani Mahmassani

Presentation to the BAC
October 19, 2017



Northwestern University
Transportation Center

BAC
2017
FALL

Business Advisory Council
FALL MEETING

THURSDAY, OCT. 19, 2017 [8:00 AM]

NORTHWESTERN UNIVERSITY TRANSPORTATION CENTER
600 FOSTER STREET, EVANSTON, ILLINOIS 60208

Strategic Vision: A Refresher

- Pre-eminent think-tank and laboratory in the world for *cutting-edge research that matters* on a global scale.
- Provide the *premier educational program* in transportation systems.
- Essential academic partner for *novel, high-impact collaborative* research.
- Advance state of practice industry applications through a mix of engaged *application-driven research* and *fundamental advances*.



Progress Highlights:

BAC Membership (since last meeting)

- **5** new companies (**9** new members)

Funded Research Activity

- Active: **12** projects **\$ 2.6 M**, **4+** faculty
- Submitted: **5** proposals **\$ 650 K**, **3+** faculty



Students

- **13** incoming TRN (CEE) graduate students (**4** PhD track)
- **4** supported via dissertation year fellowships
- **15** Transportation & Logistics Minors (**6** seniors)
- **\$500k** (FY17) in support (travel, tuition, stipend, DYF's)

BAC: Update on Membership

- Continued momentum in terms of recruitment, retention of companies, events, and engagement
- Active research outreach with several BAC companies
- Continue to seek more opportunities to engage individual companies and/or consortia in research support and collaboration
- Active and highly effective membership committee; continuing process of identifying and vetting new prospects



BAC: New Membership Leadership

General Motors / Maven

Sustaining

AM General

EagleRail

Jeppesen

Association

American Short Line and
Regional Railroad Association



MAVEN



AM General[®]



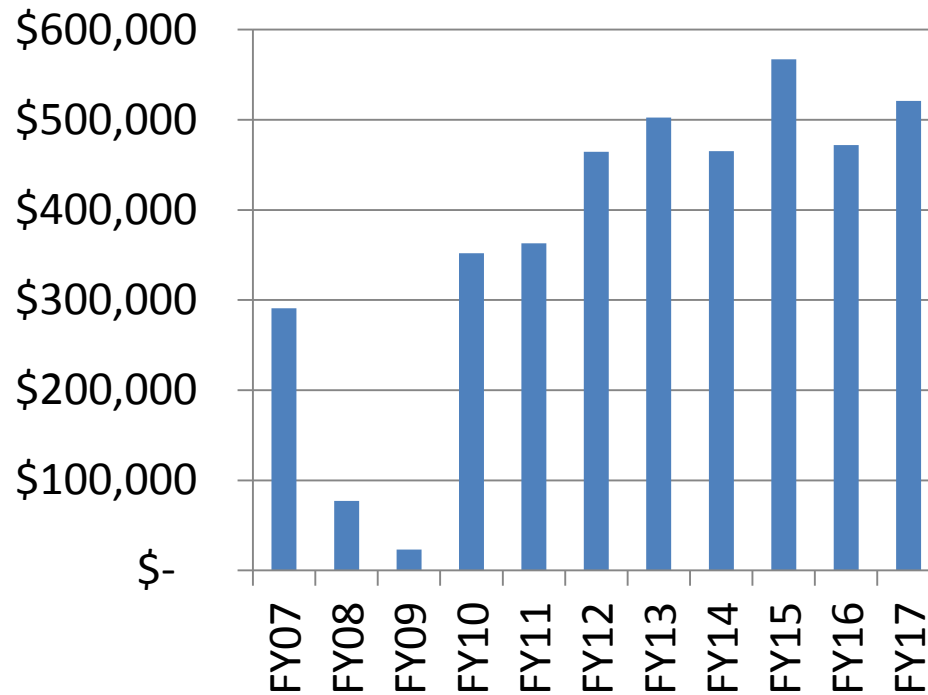
EAGLERAIL
CONTAINER LOGISTICS



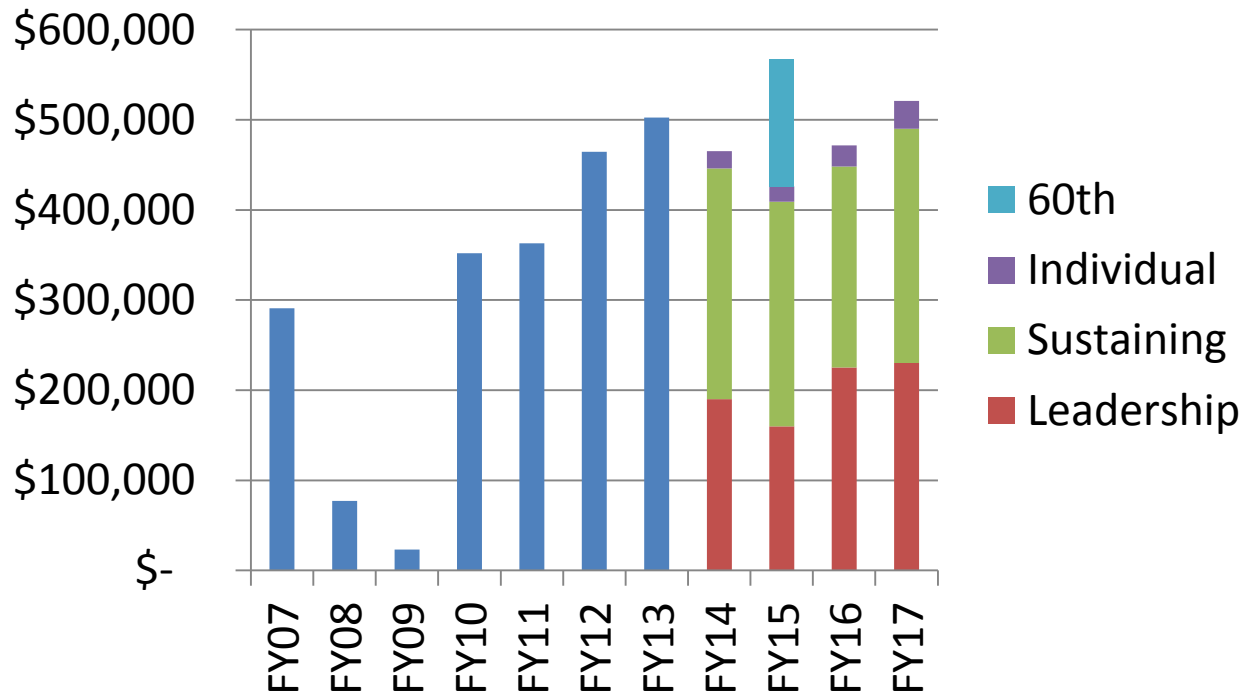
JEPPESEN[®]
A BOEING COMPANY



BAC Contributions: FY07 – FY17



BAC Contributions: FY07 – FY17

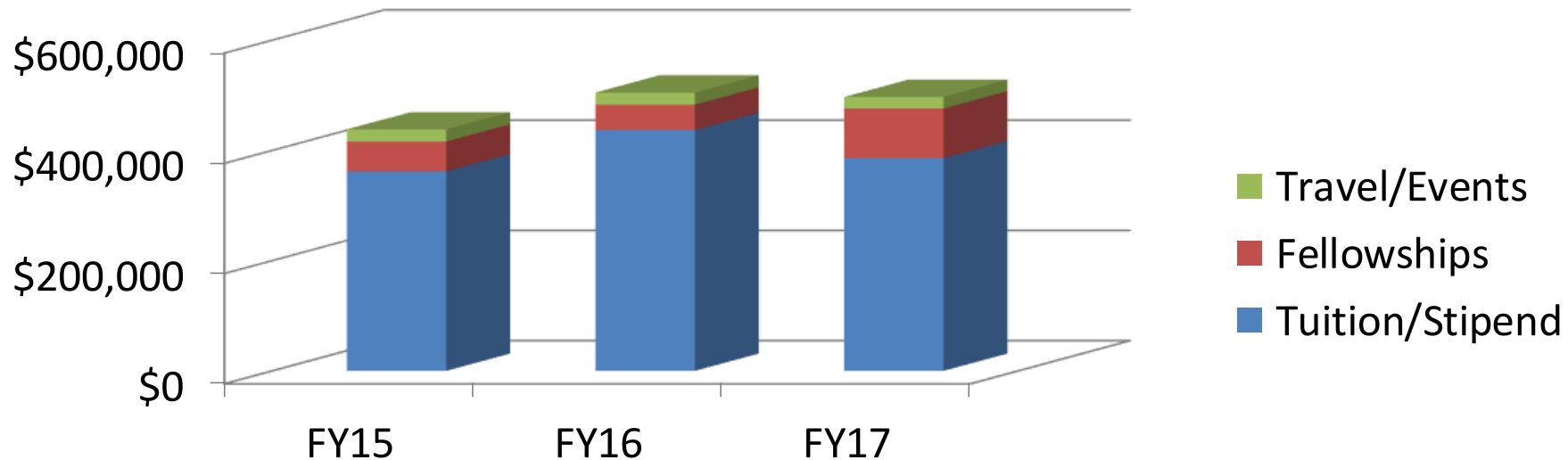


Students: Our Core Mission (I)

- TC adds *value to student experience* through industry exposure, seminars by authorities in the field, travel funds for conferences, fellowship stipends— essential differentiator for recruiting top talent
- Many opportunities for *undergraduates* interested in transportation; increasing engagement in research, *internship* placement with *BAC companies*
- *Industry support is critical* to our mission and to making a Northwestern Education in Transportation the unique experience it is.

Students: Our Core Mission (II)

Direct Student Funding Through NUTC



Students: Dissertation Year Fellows



Michael Hyland

Civil and Environmental Engineering

*Real-time Operation of Shared-use Autonomous Vehicle Fleets:
Modeling, Optimization, Simulation, and Analysis*



Fiorella Mete

Civil and Environmental Engineering

*Assessment of Bridge performance Through Data Science
Techniques*



John Miller

Civil and Environmental Engineering

*Integrating Dynamic Probabilistic Profitable Tours into the Truck
Assignment Problem for User Equilibrium and System Optimal
Solutions*



Saeed Rahimi-Aghdam

Civil and Environmental Engineering

Long Term Deformation of Concrete Infrastructures

Students: Transportation & Logistics Seniors



Benjamin Connelly
Industrial Engineering & Management Science



Daniel Diaz
Industrial Engineering & Management Science



Bryce Halloran
Economics



Benjamin Kullavanijaya
Economics



Ben Powell
Social Policy



Keaton Tatoes
Economics

Students: Awards / Honors

Michael Hyland

Dwight David Eisenhower Transportation Fellowship

Ying Chen, Zihan Hong, Michael Hyland, and Helen Karla Ramalho de Farias Pinto

Received Runner Up in Best Student Paper
Competition for “A Hybrid Cluster-Regression
Approach to Forecast Ridership at Bikeshare
Stations: Case Study of Chicago’s Divvy System” at
The 58th Annual Transportation Research Forum

Faculty: NUTC Welcomes Visiting Professors



Yoram Shiftan

Technion, Civil and Environmental Engineering

Travel behavior, freight activity models, transport economics and project evaluation



Nikolas Geroliminis

École polytechnique fédérale de Lausanne,
Urban Transport Systems Laboratory

Network modeling and management; location of emergency response vehicles; smart congested cities.

Faculty: NUTC Welcomes Visiting Professors



Alejandro Molnar

Vanderbilt University, Economics

Industrial Organization, International Trade

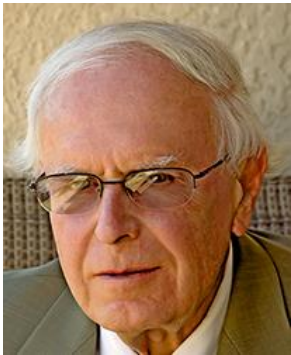


KeHu Tan

Beijing Jiaotong University, School of Economics
(visiting Strategy Dept. @Kellogg)

*Transportation economics, regulatory theory and policy,
industrial development*

Faculty: Awards / Honors



Zdenek Bazant

**American Society of Mechanical Engineers
(ASME) Medal**

Highest Award presented by ASME, recognizing contributions to mechanics of materials, safety



Joseph Schofer

UCLA Institute of Transportation Studies

The 10th Annual Martin Wachs Distinguished Lecture in Transportation

When Forecasting Fails: Making Infrastructure Decisions in an Uncertain World

<https://www.youtube.com/watch?v=Ts6IEG8QGCM>

Important New Synergistic Initiatives @ NU



DATA SCIENCE INITIATIVE

(under aegis of NICO)

NUTC is one of several partner centers.



CENTER FOR OPTIMIZATION AND STATISTICAL LEARNING



Research: Private Sector

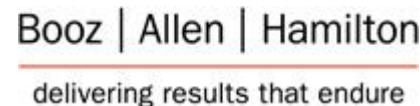
Industry Research

- **Hub Group**
- **Fleetmatics**
- **UI Labs/CityDigital**



Industry Teaming

- **Booz Allen Hamilton**
- **Leidos, Inc.**
- **Resource Systems Group, Inc.**
- **SETS, Inc. (MENA)**
- **Various small businesses**



Research: Public Sector

Public Agencies / Federal Research

- **Argonne National Laboratory (DOE)**
- **Chicago Department of Transportation**
- **Chicagoland Metropolitan Agency for Planning**
- **Federal Highway Administration**
- **METRA**



Research: Journal of Transportation

Transportation System Analysis for Better Policy-Making

Guest Editors: Marco Nie and Amanda Stathopoulous

Scope: *Special Issue Call for Papers*

- *Sharing, automation and electrification – three trends driving research efforts in the field of transportation in recent years.*
- *Focus - next generation of analytical tools tailored to these emerging conditions*
- *Inform public policies pertinent to design, operations and management of the future transportation systems.*



Research: Proposal to USDOT

Transforming Freight Flow Data Collection

NU Principal Investigators: Hani Mahmassani and Joe Schofer

Partner: Resource Systems Group (RSG) (lead)

Sponsor: USDOT Bureau of Transportation Statistics BTS

Scope: BTS seeks new methods to collect and estimate freight flow data. Needed to capture the *many changes in the transportation sector with respect to logistics and supply chain, such as the growing number of the third-party logistics providers, distribution centers, and electronic shopping.*





Research: Autonomous and Connected Vehicle Systems

1. **Demand:** for both freight and person travel
2. **Supply:**
 1. Emergence of new shared autonomous mobility services and business models—fleet assignment and routing.
 2. Freight and logistics impacts
3. **Operational aspects:**
 1. Mixed traffic flow, truck operations, safety, reserved lanes, infrastructure capacity, flow stability, productivity
 2. Sensor performance and wireless telecom interactions
4. **Regional Network Operations and Planning:** integrating CAVs in planning tools and models—forecasting impacts on infrastructure performance.





Research:
Autonomous and Connected Vehicle Systems

1. Two ongoing FHWA projects

Twinned with European Community project
with similar scope



2. New international collaboration on CAV impacts

1. Led by Technical University of Munich (Global Fund Initiatives)
2. In partnership with NUTC and UC-Santa Barbara.



Research: Machine Learning / Analytics

Principal Investigator: Ying Chen, NUTC Research Assistant Professor

Example Topics:

- (1) *Driver Scoring and Safety Applications* – using vehicle/truck trajectory data
- (2) *Sentiment Analysis* – mining crowdsourced data/social media to identify relationship between successful shipments and expressed sentiments
- (3) *Traffic video processing* - tool to count vehicles, pedestrians, bikes in multi-directional traffic flow and identify abnormal behaviors/conditions

New course now established on *Data Analytics and Machine Learning for Transportation and Infrastructure Systems*. Essential contribution to graduate students' methodological toolkit.

Outreach Activities



isttt
international
symposium
transportation
& traffic theory

ISTTT22
The 22nd International Symposium on Transportation and Traffic Theory

Research: Outreach Activities

- **The 22nd International Symposium on Transportation and Traffic Theory**
 - Co-Chairs: Hani Mahmassani, Marco Nie, Karen Smilowitz
 - ISTTT22 covered all scientific aspects of transportation and traffic, spanning all modes of transport—public and private—including *freight*, *air*, and *maritime* modes.
 - Preconference Workshop - *Getting There From Here: Traffic Modeling, Data Streams, & Prediction For Connected / Automated Vehicle Systems Planning & Operations*
- **INFORMS Transportation Science & Logistics (TSL) Society First Triennial Conference**
 - Karen Smilowitz. President, INFORMS TSL and Co-Organizer
 - Maciek Nowack and Michael Hewitt (NUTC faculty affiliates @Loyola)--organizers

Selected Outreach Activities (I)

Northwestern University Transportation Center **CCITT**
Center for the Commercialization of Innovative Transportation Technology

Industry Technical Workshop
BRIDGING THE FUTURE
INNOVATION IN LARGE-SCALE
INFRASTRUCTURE DEVELOPMENT

WEDNESDAY, MAY 3, 2017 [1:00 PM]
JAMES ALLEN CENTER | MCCORMICK AUDITORIUM | 2169 CAMPUS DRIVE

Spring 2017

Northwestern University Transportation Center **CCITT**
Center for the Commercialization of Innovative Transportation Technology

Industry Technical Workshop
MAKING THE CUSTOMER HAPPY
INNOVATION & BEST PRACTICES

WEDNESDAY, OCT. 18TH @ 1:30PM
JAMES ALLEN CENTER | MCCORMICK AUDITORIUM | 2169 CAMPUS DRIVE, EVANSTON

Fall 2017

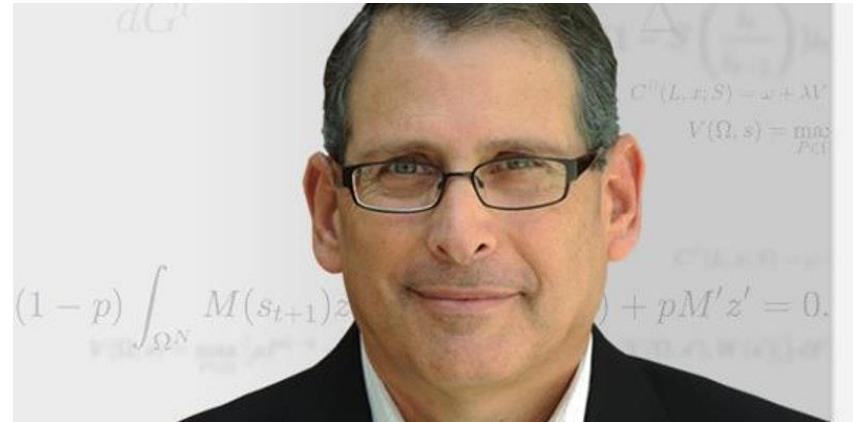
Selected Outreach Activities (II)

2017 LEON N. MOSES DISTINGUISHED TRANSPORTATION LECTURE

Martin Eichenbaum

Charles Moskos Professor of
Economics, Northwestern

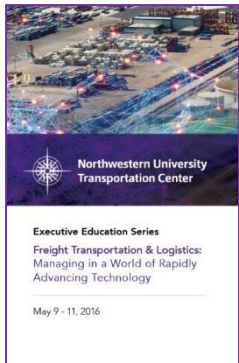
Co-Director, Center For International
Macroeconomics



"Outlook for the US Economy: Is this as good as it gets?"

Selected Outreach Activities (III)

Executive Education



Freight Transportation and Logistics

Managing in a World of Rapidly Advancing Technology

May 9 - 11, 2016

- Superb speaker list included: CSCMP, CN, Echo Global, Groupon, Ruan, SEKO Logistics, Schneider, and Nippon Cargo.

Freight Transportation and Logistics

→ *2018, To be announced*

E-Fulfillment Course

→ *2018, To be announced*

2018 William A. Patterson Lecture



Mr. Dennis A. Muilenburg

Chairman, President & CEO

The Boeing Company

May 2, 2018



Closing Thoughts

- *NUTC focused on the future*
 - Pushing the limits on logistics and supply chain operations
 - Automated and connected vehicle systems, trucks
 - Last mile supply chain logistics
 - Internet of Things and smart cities
 - Technology-enabled service delivery models
- ***BAC engagement and support is part of our DNA, critical to what we do, and how well we do it***

And one more thing... Diana Marek



- Celebrated 40 years at Northwestern this past year
- Retiring.... yes retiring... in January 2018, her 41st year at Northwestern
- Began her career at NUTC on February 14, 1977



- Friend to Students
- Friend to Alumni
- Friend to Faculty and Staff
- Friend to BAC members
- The core and spirit of NUTC



Thank you!

BAC: New Members, Ongoing Companies

Leadership

Frank Bush

*Consulting Practice Director, Think
Big Analytics, a Teradata Company*



Rick Elieson

President, Cargo, American Airlines



BAC: New Members, Ongoing Companies

Sustaining

Chris Kettering

*Chief Engineer, Aeromechanics
Technology, The Boeing Company*



Monali Shah

*Director, Global Intelligent
Transportation, HERE*



BAC: New Members, New Companies

Sustaining

Ken Sain

*CEO & VP, Digital Aviation &
Analytics, Jeppesen, A Boeing
Company*



Mike Wychocki

*Chairman & Chief Marketing Officer,
EAGLERAIL Container Logistics*





BAC Member Guests Here Today

- Noam Alon, Managing Director, Innovation and Engagement, United Airlines, Inc.
- Susmitha Bellam, Director, Product Management, HERE, Inc.
- Kelley Regan Bradley, Client Service Manager, TranzAct Technologies, Inc.
- Brian Donnelly, Industrial Account Manager, Rail, Uptake
- Mason Eustis, Fleet Optimization & Customer Service Manager, Canal Barge**
- William Glenn, Chief Commercial Officer, Wells Fargo Rail

** also a speaker today



BAC Member Guests Here Today

- Christine Izuakor, Manager, Global Security, Strategy & Awareness, United Airlines, Inc. **
- Douglas Reese, Chief Strategy and Growth Officer, GE Transportation Digital Solutions**
- Michael, Scimeca, Chief Technology Officer, EagleRail Container Logistics
- Steve Zink, EVP and Chief Operating Officer, AM General

** also a speaker today

Guests & Speakers Here Today

- Jason Bergman, Senior Vice President, Enterprise Sales, Dicom Transportation Group
- Mike Dektas, Marketing Manager, Workhorse
- Eric Ervin, Vice President, Engineering & Technology, J. B. Hunt Transport, Inc.
- James Gagne, President, SEKO Logistics
- Joe Hutter, Senior Vice President, Business Development, Daifuku/Wynright

Membership Committee

- Vicki Bretthauer
- Lee Clair
- Norm Carlson
- Rob Hart
- Kathleen Ross
- Justin Zubrod
- Meeting held in July 2017
 - Establish metrics on membership and track (# by mode, M/F, etc.)
 - ~50 companies as candidates
- Target Areas:
 - Shippers, International Carriers, Trucking, Logistics, Equipment Manufacturers, Technology Cos., Autonomous Cos.
- Next meeting: January 2018

Meeting Planning Committee

- Price Blackford
- Mike Burton
- Peeter Kivestu
- Jean Regan

- Meeting held in July 2017 helped identify meeting topics
- Next meeting: November 2017

- Seeking new Committee Members

60th Fundraising Committee

- Paul Schneider, Chair
 - Regg Jones
 - Ben Mclean
-
- Report from Paul Schneider at the end of our meeting this morning