



 | Mobility  
Initiative

# Annual Report

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2021  
\_edition

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# Message from the Director

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It is my honor to share with you this report outlining the Mobility Initiative's activities in its first year of existence. What started as a vision in early 2020 has now become an established and burgeoning institution.

Over the course of our first ten months, we have engaged more than 50 transportation faculty members in developing the Initiative's intellectual framework, built the Mobility Forum for knowledge exchange (with an average of 130 attendees per week for 14 weeks), designed the Initiative's website as a platform for communication, established our funding 'rules of engagement', engaged industry experts in our Entrepreneurship Dialog series, and re-invigorated the transportation education system through a new curriculum design and greater faculty participation, resulting in a doubling of applicants for the 2021 cycle. And we are just getting started.

The Initiative is a direct response to societal needs. The world of mobility is changing rapidly with new technologies, new players, new needs, and, significantly, new values. We believe that there is a gap in academic leadership in the field of mobility; and we seek to fill that gap by shaping the conversation and offering new innovations that could transform the system.

MIT is in a unique position to do exactly that by harnessing the knowledge power that already exists at the Institute through cross-disciplinary research projects and initiatives targeted at the field's core needs. We are a knowledge generator and a center for knowledge exchange.

As we look forward, we are eager to expand the Initiative's reach in our second year with new research projects, increased civic engagement, and a re-invigorated education program. We had the privilege of surveying the mobility landscape and working to understand both its challenges and its needs in our first year. Now, at the precipice of year two, we are rolling up our sleeves and getting to work.

Sincerely,



Jinhua Zhao

Executive Director, MIT Mobility Initiative

Edward and Joyce Linde Associate Professor of City and Transportation Planning



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# Vision

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Building a next-generation mobility system that is safe, clean, and accessible


Mobility and transportation are at the dawn of the most profound changes with an unprecedented combination of new technologies (autonomy, electrification, computation, and AI) meeting new and evolving priorities and objectives (decarbonization, public health, and social justice). And the timeframe for these changes – decarbonization in particular – is short in a system with massive amounts of fixed, long-life assets and entrenched behaviors and cultures. It's this combination of new technologies, new purposes, and urgent timeframes that makes an **MIT-led Mobility Initiative critical at this moment.**

The MIT Mobility Initiative (MMI) is a 30-year effort designed **to effect fundamental changes in the long-term trajectory of sustainable mobility development in pursuit of a mobility system that is safe, clean, and accessible.**

MMI coalesces all mobility and transportation activities at MIT, knitting together the efforts on research, education, entrepreneurship, and civic engagement at the Institute into a greater whole. That includes both strengthening research opportunities through cross-disciplinary coordination and filling key society gaps through knowledge development and exchange.

We convene and connect individuals across levels, sectors, and disciplines, coalescing insights and developing a research agenda to **catalyze large-scale changes across the mobility landscape.**

The profound changes roiling the world of mobility require balanced and informed leadership--leadership that can reach across a diverse array of sectors to inform and shape outcomes. The MIT Mobility Initiative is designed to fill that gap.



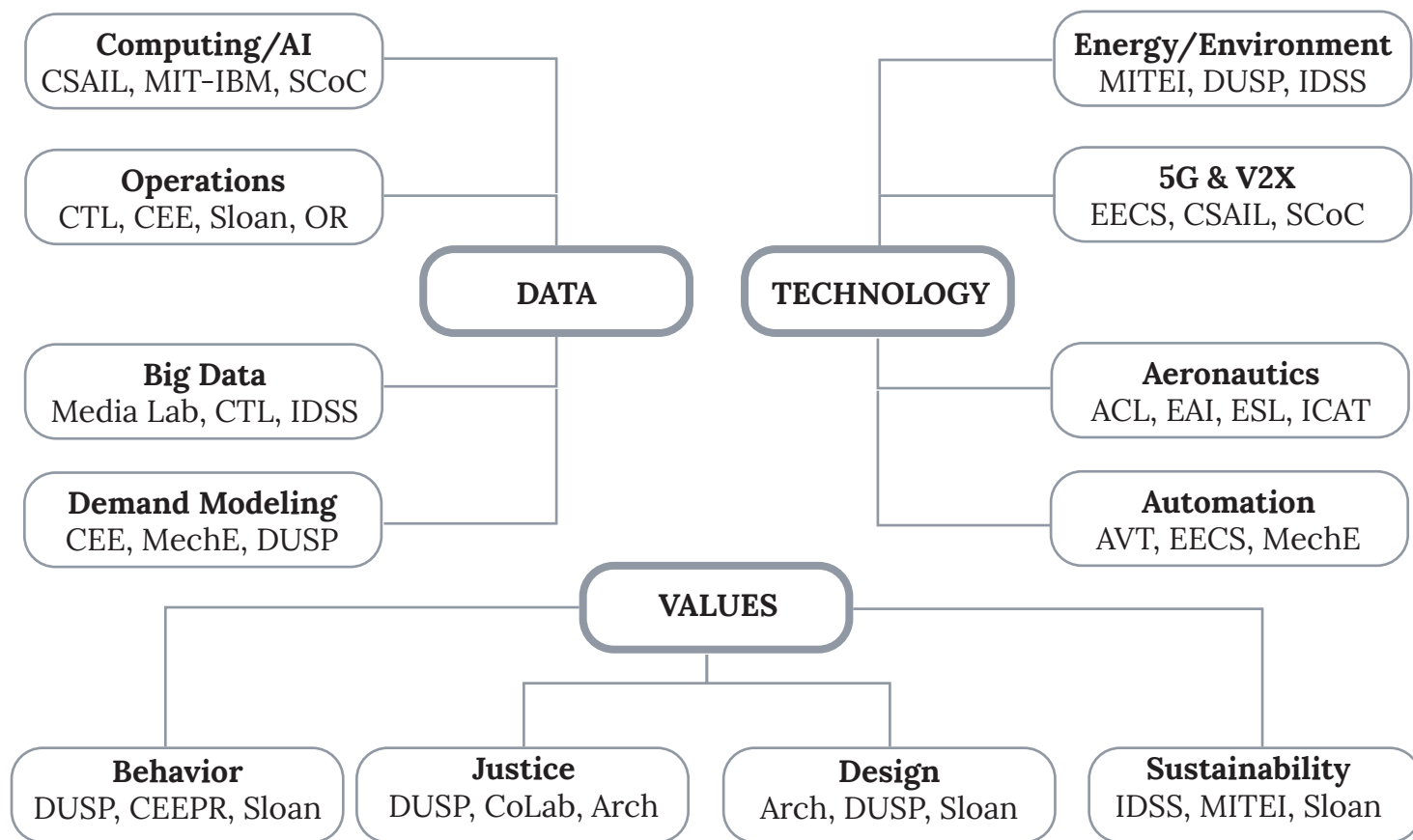
“MIT has a long and proud history in transportation research and education—and strong, multi-disciplinary leadership in the field is perhaps more essential than ever as communities and cities are uncertain about their mobility future.”

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# Our Value

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Weaving together developments in data, technology, and values to create a whole with a greater impact than the sum of its parts



AVT: Advanced Vehicle Technology Consortium; CEE: Civil and Environmental Engineering; CSAIL: Computer Science & Artificial Intelligence Laboratory; CTL: Center for Transportation and Logistics; DUSP: Department of Urban Studies and Planning; EECS: Electrical Engineering & Computer Science; MechE: Mechanical Engineering; OR: Operations Research; SCoC: Schwarzman College of Computing





# Core Pillars

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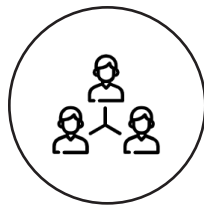
## RESEARCH

Intellectual coordination across the Institute & management of cross-disciplinary research projects



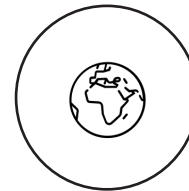
## EDUCATION

Management and renovation of MIT's storied transportation education programs and initiatives



## ENTREPRENEURSHIP

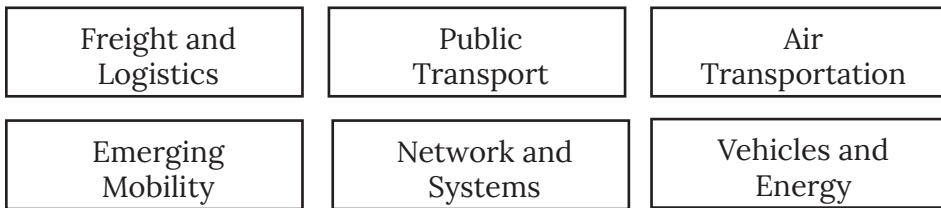
Home to MIT's mobility innovation ecosystem and network of entrepreneurs



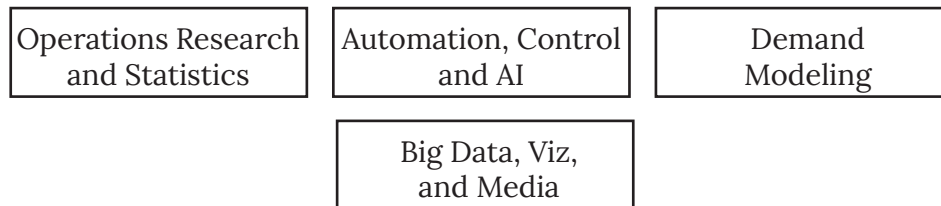
## CIVIC ENGAGEMENT

Offering leadership in efforts to drive social & environmental changes in the world of mobility

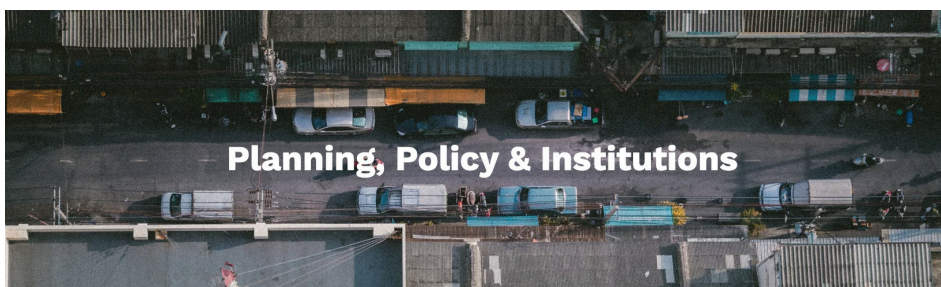
# Intellectual Structure



MIT's wide array of research addresses the systems-level challenges as well as the myriad different transport phenomena and their interactions that promise to define our mobility system for generations to come.



Developments in computation and analytics are allowing us to better understand and optimize systems and flows to better serve needs and to improve efficiency--opening the door for a new conceptualization of mobility itself.



The timeframe for addressing the challenges of integrating new technology with new values is short in a system with fixed assets. MIT researchers are leading the way in innovative economic, policy, and design strategies to help shape and adapt these critical systems.



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# At a Glance

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The Mobility Initiative's first year by the numbers

134

average attendees of the MIT Mobility Forum (across 14 total sessions)

9,770

unique visitors to the MMI website since its launch in late June

68

MIT faculty or researchers who are participants in the Initiative

19

companies that have expressed interest or attended targeted events

23

CEOs or company founders who participated in the Entrepreneurship Dialogue series

25

research labs that are affiliated with and participants in the Initiative

110

alumni who have expressed interest in being involved

21

number of events held in the Initiative's first 8 months

13

number of research clusters at the Institute

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# Event Series

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Events help us to fulfill our many functions, offering opportunities to exchange research, to educate, to bring entrepreneurs into the fold, and to inform and support the public and non-profit sectors.

## MOBILITY FORUM

A weekly seminar series, the MIT Mobility Forum offers an opportunity to showcase the groundbreaking transportation research occurring across the Institute. Faculty members present their latest insights, ideas, and innovations, followed by a lively discussion. Attendees averaged 134 individuals per event, including MIT faculty, students, alumni, and affiliates. Speakers ranged from the MIT MediaLab's Sandy Pentland to IDSS professor Jessika Trancik.

“I feel honored for being able to attend. It has become a positive highlight at the end of my work week and has consistently given me good food for thought.”  
*Mobility Forum participant*

## ENTREPRENEURSHIP DIALOGUES

A series of dialogues between entrepreneurs and mobility industry experts to offer insights into the mobility landscape, the experience of being an entrepreneur and opportunities for innovation. Offered as part of MIT's new Mobility Ventures course, the events were open to the wider MIT community. Speakers included Hyperloops Jay Walder, Aptiv's Karl Iagnemma, MTA's Mark Dowd, and Rivian's RJ Scaringe, among many other distinguished guests.

## MIT MOBILITY SUMMIT

To be launched in Fall 2021, MIT's yearly Summit will showcase the latest research and innovation in the realm of transportation. It will convene leaders and thinkers from across the globe representing the public, private, and non-profit sectors to encourage cross-sector collaboration in setting a research agenda and driving innovation to create a transportation system that is more sustainable, equitable, and efficient.



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# Mobility Forum Events

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## Introducing the MIT Mobility Initiative

**Jinhua Zhao**

*Director, MIT Mobility Initiative; Associate Professor of Transportation and City Planning*

September 11, 2020

## The Social Consequences of Mobility Systems

**Sandy Pentland**

*Director, MIT Human Dynamics Laboratory and MIT Media Lab Entrepreneurship Program*

September 18, 2020



## Autonomous Vehicles, Mobility, and Employment Policy

**John Leonard**

*Samuel C. Collins Professor of Mechanical & Ocean Engineering, Department of Mechanical Engineering*

September 25, 2020

## Microlocation in Transit: The New York City Subway System

**David Mindell**

*Professor of the History of Engineering; Manufacturing Professor of Aeronautics and Astronautics*

October 2, 2020



## The Edge of Optimization: Large Scale Transportation Systems

**Dimitris Bertsimas**

*Boeing Leaders for Global Operations Professor of Management*

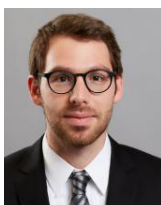
October 9, 2020

## Reducing GHG Emissions: Technical Options & Societal Choices

**Bill Green**

*Hoyt C. Hottel Professor in Chemical Engineering*

October 16, 2020



## The Inefficiency of Dynamic Pricing in Ridehailing Systems

**Daniel Freund**

*Assistant Professor of Operations Management at the MIT Sloan School of Management*

October 23, 2020

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# Mobility Forum Events *contd*

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## Mobility Services Without Carbon Emissions

**Jessika Trancik**

*Associate Professor of Energy Studies, Institute for Data, Systems, and Society*

November 6, 2020

## Transportation Systems Resilience

**Saurabh Amin**

*Robert N. Noyce Assistant Professor, Department of Civil & Environmental Engineering*

November 13, 2020



## The Global Rise of Platform Firms in Urban Mobility Markets

**Jason Jackson**

*Ford Career Development Assistant Professor in Political Economy and Urban Planning*

November 20, 2020

## On-Demand Urban Aerial Mobility Planning

**Alexandre Jacquilat**

*Assistant Professor of Operations Research and Statistics at the MIT Sloan School of Management*

December 4, 2020



## Value of Time: Evidence from Auctioned Cab Rides

**Tobias Salz**

*Castle Krob Career Development Assistant Professor of Economics, Department of Economics*

December 13, 2020



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# Entrepreneurship Dialogues

## A Snapshot

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**Karl Iagnemma**, President and CEO at Motional

**Julia Steyn**, Chief Executive Officer at Bolt Mobility



**Jay Walder**, CEO at Virgin Hyperloop

September 9, 2020



**Reilly Brennan**, Founding General Partner at Trucks & Lecturer at Stanford

**Mary Chan**, Managing Partner at VectoIQ



**Regina Savage**, Managing Director at Morgan Stanley

December 2, 2020



**Seleta Reynolds**, General Manager at LADOT

**Michael Hurwitz**, Director of Transport Innovation, Transport for London

October 21, 2020



**Mark Dowd**, Chief Innovation Officer at New York MTA

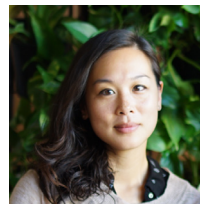
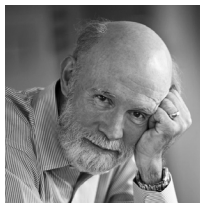
**Kate Fichter**, Assistant Secretary for Policy Coordination, MA DOT



**RJ Scaringe**, Founder & Chief Executive Officer of Rivian

**James Womack**, Founder and Senior Advisor of Lean Enterprise Institute

November 6, 2020



**Tiffany Chu**, CEO and Co-founder at Remix

December 9, 2020

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# RESEARCH

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As a core competence of the Mobility Initiative, we have worked over the course of our first year to develop a research agenda and create a framework for large-scale, high-impact research engagements with external actors and internal partners. We have identified four core areas of value for which we are designing a series of expert roundtables as funded by participants to support MIT faculty research projects. The Mobility Initiative serves as a key platform through which to instigate cross-disciplinary, multi-faculty projects and to connect academic research with on-the-ground needs in the public and private sectors.

Ongoing projects range from a partnership with the US Department of Energy to develop innovative transit operation planning and control strategies using machine learning techniques to a collaboration with the Boston-based Barr Foundation on transit stigmatization following the COVID-19 pandemic to incentivize sustainable travel choices.



## Knowledge Exchange

*Goal:* Develop a platform for dynamic intellectual exchanges at MIT

*Method:* Cutting-edge event series and faculty engagement across projects



## Knowledge Development

*Goal:* Attract, manage, and conduct high-impact projects and reports.

*Method:* Public and private sector engagement to support key research projects

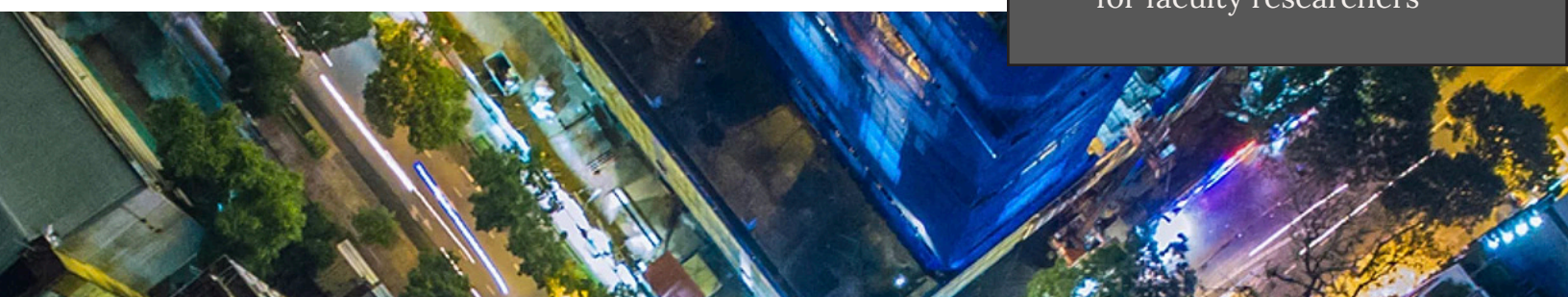
### Research Spotlight

The Initiative has partnered with the Chicago Transit Authority during the COVID-19 pandemic to create a council of the largest US transit agencies in order to support transit recovery through insights into ridership trends and efforts to optimize revenue projections.



### NEXT STEPS

- Solidify industry engagement plan for expert roundtables
- Secure funding for targeted research projects
- Identify areas of priority for faculty researchers





# Executive Roundtables

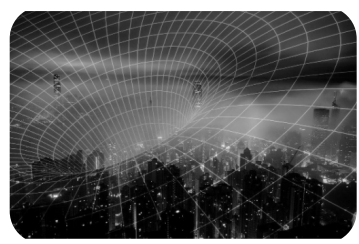
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## MOBILITY & DATA

Optimizing **data exchange, collection, and collaboration** to facilitate system integration

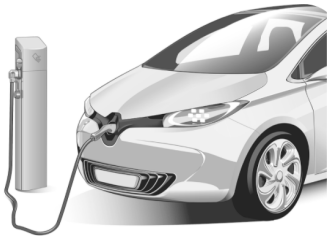
*Faculty Lead: **Sandy Pentland***  
Director, MIT Human Dynamics Laboratory and MIT Media Lab Entrepreneurship Program



## MOBILITY & 5G/V2X

Establishing a framework for technological and regulatory advancements in **5G and sensors**

*Faculty Lead: **Sanjay Sarma***  
Vice President, MIT Open Learning and Fred Fort Flowers and Daniel Fort Flowers Professor of Mechanical Engineering



## MOBILITY & ELECTRIFICATION

Identifying & shaping a pathway towards **widespread electrification**

*Faculty Lead: **Bill Green***  
Hoyt C. Hottel Professor in Chemical Engineering



## MOBILITY & PUBLIC TRANSIT

Developing **more resilient transit networks** & supporting a post-pandemic recovery

*Faculty Lead: **Jinhua Zhao***  
Director, MIT Mobility Initiative and Associate Professor of City and Transportation Planning

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# EDUCATION

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MIT boasts a long-standing, storied, cross-disciplinary graduate program in transportation. Students choose from a wide range of introductory and advanced transportation-related subjects to build an education that prepares them to be the leaders of tomorrow's transportation system. The MIT Mobility Initiative is redesigning and expanding the education curriculum, incorporating more faculty advisors, and working to attract a wide range of candidates from diverse backgrounds. MIT has long been a leader in the field of transportation research and recent changes serve to solidify that reputation and to fill a global gap in cross-disciplinary transportation-focused education. More details on curriculum updates can be found in the appendix.

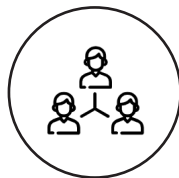


## Manage existing programs

*Goal:* Centralize and optimize program management and improve student experience

*Highlights:*

Attracted double the applicants as compared to 2019 through improved outreach, including website redesign, webinar, and stakeholder engagement

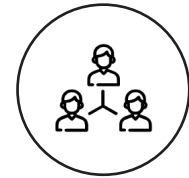


## Enhance the curriculum

*Goal:* Expand mobility-related coursework and incorporate new disciplines

*Highlights:*

Incorporated new coursework into the curriculum, and updated MST and PhD program requirements



## Design new degrees

*Goal:* Introduce new degrees for easier integration across disciplines

*Highlights:*

Initiated approval process for updates to existing degrees and additions of new degrees and formats, including X+T

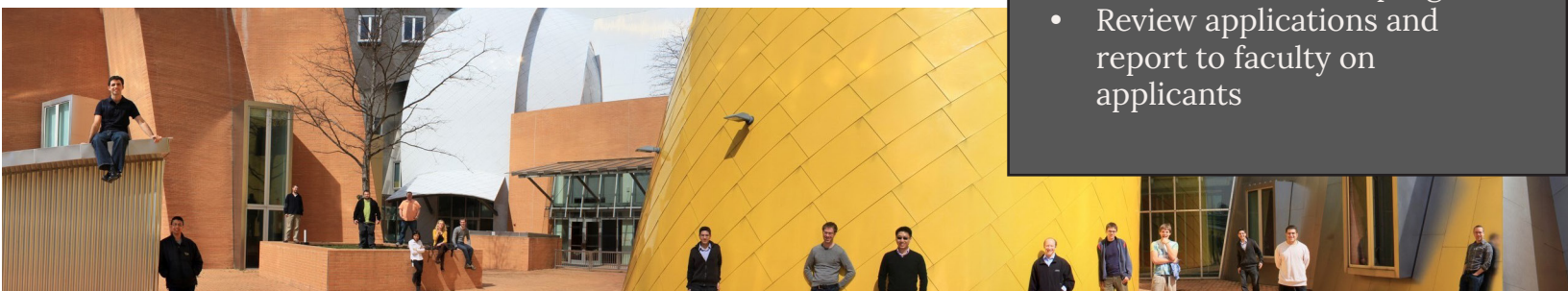


### Education Spotlight

The Initiative is pleased to announce it is accepting applications for the Dan Roos Fellowship for transportation dissertations, awarded annually to the strongest transportation-related dissertation at the Institute.

### NEXT STEPS

- Finalize MST and PhD curriculum redesign
- Complete internal MIT approval process
- Introduce new X+T program
- Review applications and report to faculty on applicants

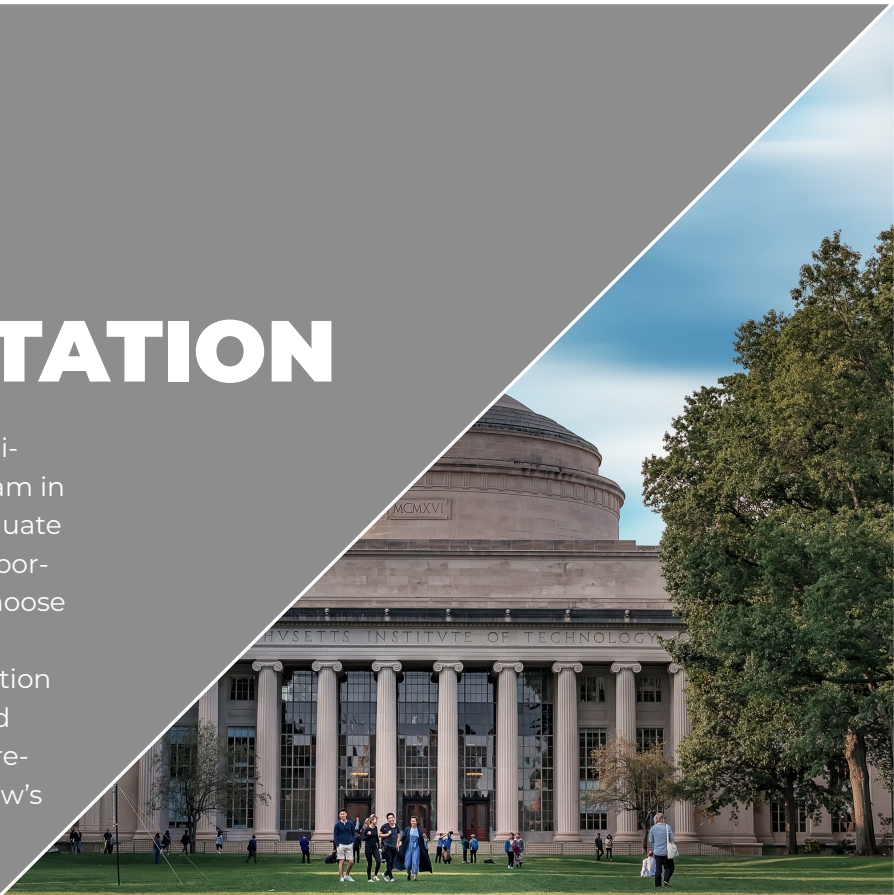




## Graduate Programs

# TRANSPORTATION

Led by MIT's Mobility Initiative, the Institute's cross-disciplinary graduate program in transportation provides a variety of graduate degrees for students interested in transportation studies and research. Students choose from a wide range of introductory and advanced subjects related to transportation and engage with real-world projects and challenges to build an education that prepares them to be the leaders of tomorrow's transportation system.



### Master of Science in Transportation

The Master of Science in Transportation (M.S.T.) degree program emphasizes the complexity of transportation, lying at the intersection of technology, operations, planning, management, and policy-making. The program is interdepartmental, drawing on coursework, faculty, and research staff from across MIT. During the two-year program, students work closely with a research advisor to select an individually-designed area of focus within the realm of transportation. Requirements include coursework across different aspects of transportation, as well as specialized work in the designated area of choice.



### Interdepartmental Doctoral Program in Transportation

The interdepartmental doctoral program in transportation provides a structured and follow-on doctoral program for students enrolled in MIT's Master of Science in Transportation program or other transportation-related masters degree programs at MIT or elsewhere. The interdepartmental structure of the program allows students greater flexibility in developing individual programs of study that cross both disciplinary and departmental lines. The program is administered by the Transportation Education Committee, a faculty committee responsible for admissions and oversight of program requirements.

**To apply, visit [mmi.mit.edu/education](http://mmi.mit.edu/education)**



**13** Research Clusters  
**25** Research Labs  
**50** Faculty Members

Mobility and transportation are at the dawn of profound change with an unprecedented combination of new technologies meeting new—and evolving—priorities. The newly founded MIT Mobility Initiative (MMI) serves to unite mobility-related research across MIT to help drive these necessary changes in the long-term trajectory of sustainable mobility development. As part of the Initiative, **MIT's storied transportation education program offers opportunities to address the major challenges facing transportation today, through real-world partnerships, hands-on projects, entrepreneurship and more.**

### CONTACT US



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# ENTREPRENEURSHIP

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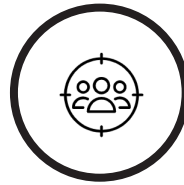
Innovation has existed in the genes of MIT since its very founding. As one of the nation's first land-grant colleges, the Institute was designed to deliver a practical education—one that emphasizes learning by doing and prioritizes developing solutions to complex (yet invariably compelling) problems. This year, the Mobility Initiative developed coursework related to entrepreneurship, engaged MIT's impressive cadre of alumni who are transportation entrepreneurs, and established a framework for cultivating a new mobility-focused entrepreneurial community within the Institute.



## Expand coursework

*Goal:* Encourage & cultivate student innovation

*Method:* Fall 2020 has marked the first iteration of the MIT Mobility Ventures course, co-taught by industry expert John Moavenzadeh, instigating student innovation in the field of mobility.



## Strengthen the ecosystem

*Goal:* Tap into existing entrepreneurship resources at MIT and expand mobility-related venture opportunities



## Engage experts

*Goal:* Incorporate the voices of alumni, industry experts, and the public sector to help educate students and inform research

## NEXT STEPS

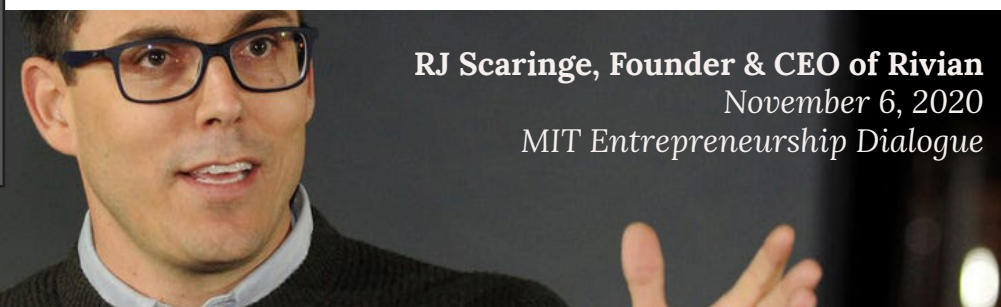
- Expand Entrepreneurship Dialogue Series
- Establish the Mobility Venture Prize
- Expand internal MIT entrepreneurship-related network and relationships

## Partnership Spotlight

The Initiative has been actively working with the Martin Trust Center for Entrepreneurship and MIT

designX

DesignX to both develop new coursework and mobility-related venture support.



**RJ Scaringe, Founder & CEO of Rivian**  
November 6, 2020  
MIT Entrepreneurship Dialogue

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# CIVIC ENGAGEMENT

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At MIT, we work to offer cutting edge analysis, research, and innovation in service to society. This involves working with governments, organizations, and students to build a better world through social, environmental, and technological changes. As part of that mission, the Mobility Initiative strives to support cities and communities across the globe in better understand the challenges facing them and to offer platforms and solutions to address their needs.



## Knowledge dissemination

*Goal:* Communicate pertinent research findings clearly & effectively

*Method:* Public events, navigable platforms, and convening individuals with overlapping interests

*Highlight:* The Mobility Initiative has teamed up with the Sasaki Foundation to organize a mobility equity symposium in Spring 2021 to help drive the dialogue around mobility equity and establish a shared research agenda.



## Knowledge generation

*Goal:* Engage in research with social and environmental impacts



Identifying a pathway to zero carbon mobility by 2050



Developing and catalyzing innovative policy frameworks for technology deployment



Establishing a framework for mobility equity & universal accessibility

## NEXT STEPS

- Organize Equity Symposium (Spring 2021)
- Finalize civic-oriented research agenda
- Incorporate community voices into pertinent roundtables and research projects



Tamika Butler  
Mobility Equity Expert  
October 14, 2020  
MIT Mobility Forum

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# Financial Strategy

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Engaging on multiple fronts to establish a firm basis

## Membership Model

A model for industry engagement based on MITEI's and CSAIL's industrial membership models. Companies can select from three membership tiers: founding (targeted, sponsored research), affiliate (group-based seed research funding), and associate (access to MMI activities, research, and events).

## Executive Roundtables

A targeted iteration of the associate membership model, we have identified four areas of value where MIT can serve as a convener and thought leader around which we intend to build a series of expert roundtables. Members pay to participate, identifying priority areas for faculty research and selecting competing faculty projects for funding.

## Foundation Support

In addition to industrial engagement, we have identified several subject areas for which there might not be industrial support, but for which there is a gap in societal value. We have embarked on a number of proposals within those fields to engage in research and diversify the Initiative's financial backing.

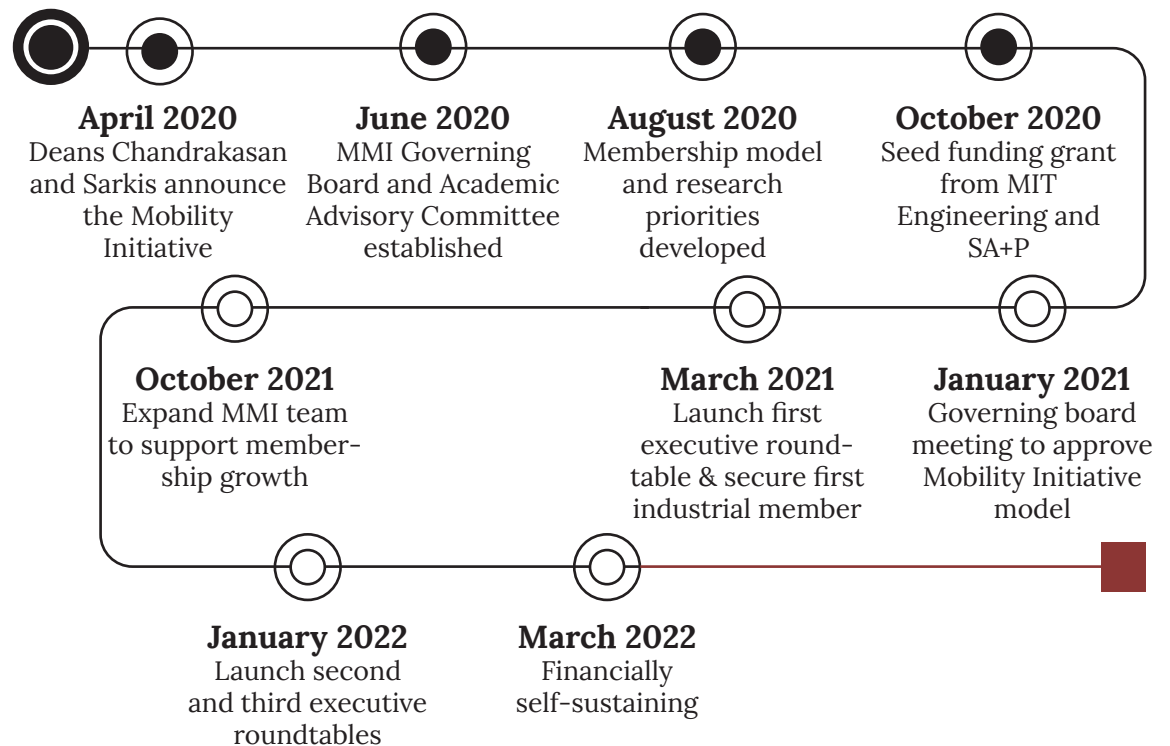
## Endowment

Fulfilling our vision of leading the transformation of a sustainable mobility system requires a degree of financial independence. We are thus partnering with key financial actors at MIT to identify opportunities for endowed funding in addition to industrial, foundation, and non-profit engagement.

# External Projects & Events

In addition to the financial support outlined on the previous page, the Mobility Initiative is also committed to knowledge development. This notably includes research projects and events with a wide range of partners. Currently, the Initiative is working with the **World Business Council for Sustainable Development**, the **Barr Foundation**, and the **Chicago Transit Authority**, among others on a wide array of research projects within the realm of mobility. We have also presented as part of **CoMotion**, led commuting behavior change workshops, and lectured widely.

## Timeline





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# Partnerships

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Building a strong foundation through internal and external networks



Partnerships serve as the platform for the Mobility Initiative's very existence. At its core a multi-disciplinary effort, the Mobility Initiative is grateful to have been able to draw on key support from Anantha Chandrakasan with the **School of Engineering** and from Hashim Sark-

is with the **School of Architecture and Planning** as well as key partnerships with the **Schwarzman College of Computing** and the **Sloan School of Management**. Looking forward to our second year, we seek to strengthen and deepen these collaborations.



The MIT Energy Initiative has also served as a key partner in the Mobility Initiative's first year of existence. As an organization with complementary interests, the MMI has been working with MITEI on a number of fronts, including events (a joint forum, and a joint R&D conference), a membership model, and research itself (decarbonization).

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# Partnerships *continued*

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## GENERAL COUNSEL

The OGC has offered extensive support both in strategic advising for our membership model development and in anticipating alliance management. We will continue to actively engage with the team to finalize the membership and engagement structure.



We have developed an active and dynamic relationship with MIT's ILP office, offering MMI/ILP webinars, engaging in roundtables with ILP's executive members, and conducting meetings with a number of ILP member companies. ILP membership is included in our membership model.

## FOUNDATIONS & ALUMNI

We have also had extensive interactions with MIT's foundations and alumni teams to better broadcast the Mobility Initiative's efforts to alumni and to better engage foundations as part of our research and outreach efforts. Both offices have been active event participants.



### FACULTY

As the lynchpin of the Initiative, the MMI has been actively working with faculty members to identify core areas of research, to expand the education program, and to instigate entrepreneurship. Over 60 faculty members have signed on to the Initiative.



### STUDENTS

The Initiative has worked to re-invigorate student groups and to include student voices in the program's redesign. Students will be helping to drive forward mobility equity initiatives in the coming months.



### ALUMNI

As a key intellectual resource, alumni have been actively invited to participate in MMI events and were surveyed as part of the launch to help shape the Initiative's intellectual direction. The results from the survey can be found in the appendix.

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# Communication

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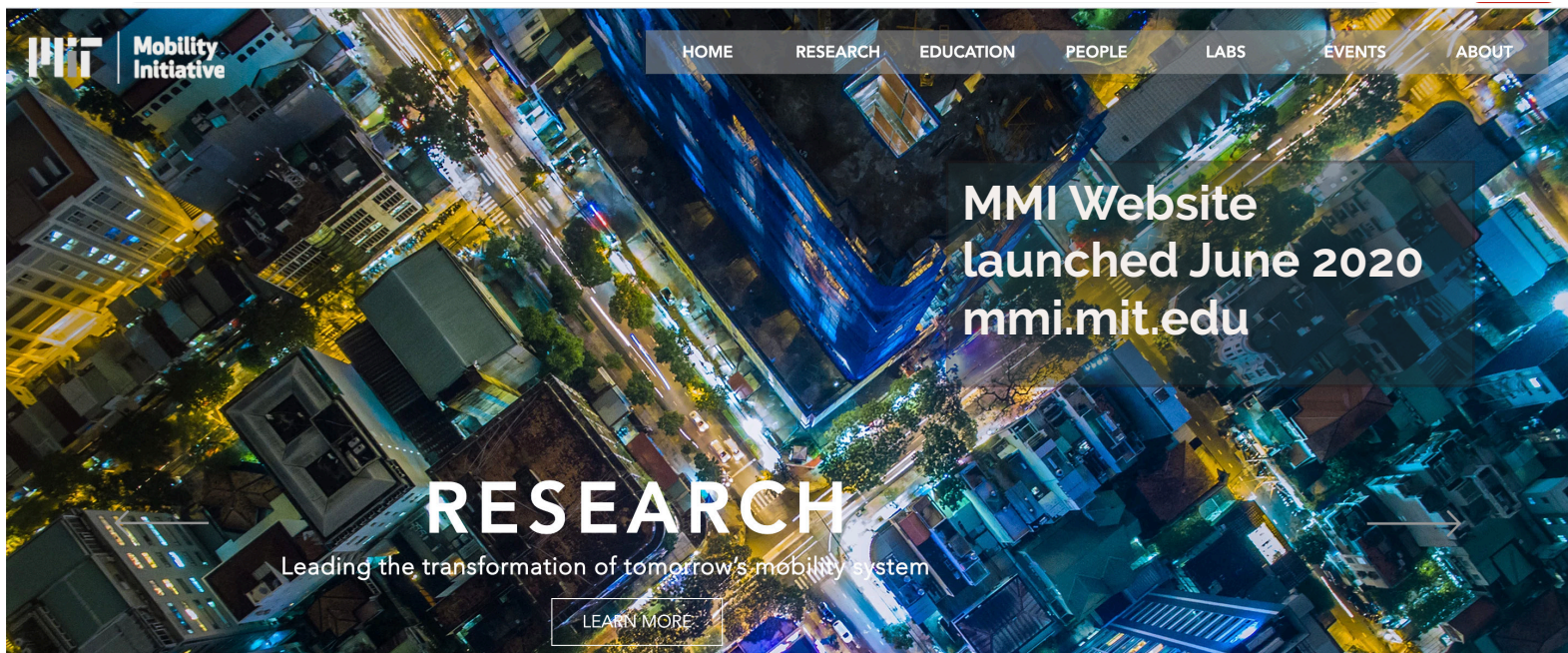
Introducing the Mobility Initiative to the world

Communication has served as one of our primary areas of effort in our first year. That includes designing platforms for communication with the worlds both inside and outside of MIT, establishing a brand, and, significantly, communicating with our key stakeholders.

The Initiative engages not only in knowledge development, but also in knowledge dissemination and in convening key stakeholders across the mobility landscape.

From a tactical perspective, we have thus designed and launched a website, established a social media presence, and developed a brand and copy that serve to communicate the Initiative's goals and efforts.

We consider it essential that we clearly and consistently communicate with all individuals involved in the Initiative, and that we offer portals of all shapes and sizes for individuals to learn more about who we are and what we do.





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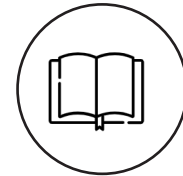
# Next Steps: Our Core Pillars

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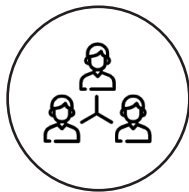
## RESEARCH

- Solidify industry engagement plan for expert roundtables
- Secure funding for targeted research projects
- Identify areas of priority for faculty researchers



## EDUCATION

- Finalize MST and PhD curriculum redesign
- Complete internal MIT approval process
- Introduce new X+T program



## ENTREPRENEURSHIP

- Expand Entrepreneurship Dialogue Series
- Secure funding for Mobility Venture Prize
- Expand internal MIT entrepreneurship-related network and relationships



## CIVIC ENGAGEMENT

- Organize Equity Symposium (Spring 2021)
- Finalize civic-oriented research agenda
- Incorporate community voices in pertinent roundtables and research projects

## Goals

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*December 2021*

3 company members  
1 targeted research project  
2 topic area stakeholder roundtables

*December 2023*

10 company members  
3 targeted research projects  
4 topic area stakeholder roundtables



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# Team

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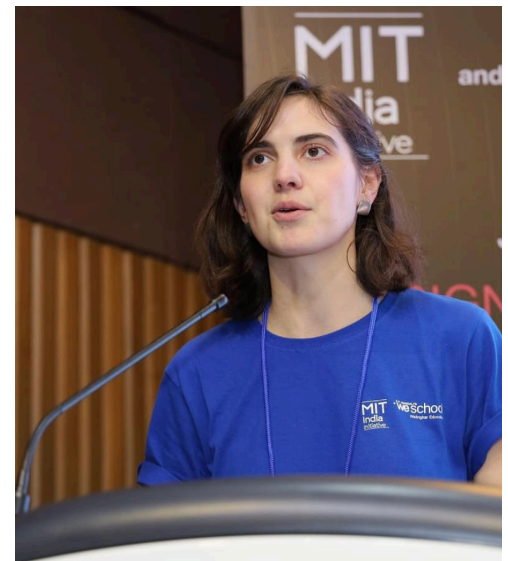
## Executive Director: Jinhua Zhao

Jinhua Zhao is the Associate Professor of City and Transportation Planning at the Massachusetts Institute of Technology (MIT). Prof. Zhao brings behavioral science and transportation technology together to shape travel behavior, design mobility system, and reform urban policies. He develops methods to sense, predict, nudge, and regulate travel behavior and designs multimodal mobility systems that integrate automated and shared mobility with public transport. He sees transportation as a language to describe a person, characterize a city, and understand an institution.

Prof. Zhao directs the JTL Urban Mobility Lab and Transit Lab at MIT and leads long-term research collaborations with major transportation authorities and operators worldwide, including London, Chicago, Hong Kong, and Singapore. He is the co-director of the Mobility Systems Center of the MIT Energy Initiative, and the director of the MIT Mobility Initiative. He very much enjoys working with students.

## Program Manager: Anne Hudson

Anne is the program manager for MIT's Mobility Initiative. Her research focuses on preparing cities for next-generation transportation technologies. Prior to her time at MIT, she worked as an energy policy analyst and researcher at the Center for Strategic and International Studies in Washington DC, honing an expertise on energy transitions in Europe as well as 'frontier' energy innovations. She has also worked in communications for a wide variety of urban mobility clients, ranging from car-sharing company Zipcar to bike-sharing company Zagster. She received dual masters degrees from MIT in Urban Planning and Transportation Science and her bachelors in World Politics and German Literature from Hamilton College.



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# Governing Board

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**CYNTHIA  
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Professor of  
Engineering



**ANANTHA  
CHANDRAKASAN**  
Dean, MIT School  
of Engineering



**DAN  
HUTTENLOCHER**  
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Schwarzman  
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Computing



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Dean, MIT School  
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Planning



**SANJAY  
SARMA**  
Vice President, MIT  
Open Learning



**DAVID  
SCHMITTLEIN**  
John C Head III  
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School of  
Management

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# Academic Advisory Committee

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**HAMSA  
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Professor of Aeronautics and Astronautics



**MOSHE  
BEN-AKIVA**  
Edmund K. Turner  
Professor in Civil Engineering



**ERAN  
BEN-JOSEPH**  
Professor of Landscape  
Architecture and Urban  
Planning



**DIMITRIS  
BERTSIMAS**  
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Research, Associate Dean  
of Business Analytics



**CHARLIE  
FINE**  
Chrysler Leaders for  
Global Operations  
Professor of Management



**JOHN  
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Professor of Mechanical  
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Professor in EECS, Co-Director,  
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and Manufacturing,  
Professor of Aeronautics  
and Astronautics



**AMADEO  
ODONI**  
T. Wilson Chair  
Professor Emeritus of  
Aeronautics & Astronautics



**ASU  
OZDAGLAR**  
Distinguished Professor  
& Department Head,  
EECS; Deputy Dean of  
Academics, SCoC



**SANDY  
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Toshiba Professor of  
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PERAKIS**  
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Professor of Management,  
EMBA Faculty Director,  
ORC Co-Director



**DAN  
ROOS**  
Japan Steel Industry  
Professor, Emeritus,  
Civil and Environmental  
Engineering



**DANIELA  
RUS**  
Andrew (1956) and Erna  
Viterbi Professor of  
Electrical Engineering  
and Computer Science



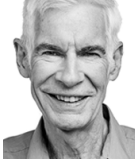
**YOSSI  
SHEFFI**  
Director of the MIT  
Center for Transportation  
& Logistics



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# Advisory Committee *continued*

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**NIGEL  
WILSON**

Professor Emeritus,  
Civil and Environmental  
Engineering



**CHRIS  
ZEGRAS**

Professor of Trans-  
portation and Urban  
Planning

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# Acknowledgements

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We would like to thank many individuals for their contributions of all shapes and sizes to the Initiative, including first and foremost Dean Anantha Chandrakasan and Dean Hashim Sarkis for their crucial support, as well as our Governing Board and our Academic Advisory Committee, comprised of many faculty members who have supported us both in re-envisioning MIT's transportation education program (including Saurabh Amin, Cindy Barnhart, Dimitris Bertsimas, Moshe Ben-Akiva, Patrick Jaillet, Chris Knittel, Amedeo Odoni, Georgia Perakis, Yossi Sheffi, Nigel Wilson, and Cathy Wu) and in developing the Initiative's overall strategy (including Eran Ben-Joseph, Charlie Fine, Thomas Magnanti, David Mindell, Sandy Pentland, and Daniel Roos, Daniela Rus, Fred Salvucci, Sanjay Sarma, and Yossi Sheffi).

Many Institute leaders and departments have been immensely supportive of the Initiative's journey, including Maria Zuber, Richard Lester, Marty Schmidt, Bob Armstrong, Chris Ze-gras, and Ali Jadbabaie.

The Initiative notably would not exist today without the tireless support of a number of key advisors, who have routinely offered their time, ideas, and insights to the Initiative and its many efforts. We would like to thank John Moavenzadeh and Jim Womack in particular, as well as our cadre of insightful experts including Stephen Zoepf, Andrew Salzberg and David Block-Schachter.

Finally, we would be loathe to omit the many individuals who have invested time in supporting our activities, including the ILP team (Karl Koster, Todd Glickman, and José Ramos), the SA+P team (Ken Goldsmith and Karen Yegian), the CEE team (Kiley Clapper and Max Martelli), and the OGC team (Meghan Fenno, Adi Gottumukkula, Grace Leung, and Julie Kukharenko) and the SA+P team (Barbara Feldman and Nicholas Marmor), as well as advisors Bill Aulet, Will Sanchez, and Svafa Gronfeldt among many others. And we have been lucky to have a fantastic support cast of students, as well, including Nick Caros and Yunhan Zheng.



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# APPENDIX

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# Mobility Forum: Spring 2021



## Chris Knittel

George P. Shultz Professor of Applied Economics

Friday, February 12, 2021



## Cathy Wu

Gilbert W. Winslow Career Development Assistant Professor, Civil and Environmental Engineering

Friday, February 19, 2021



## Joe Coughlin

Founder and Director, MIT AgeLab

Friday, February 26, 2021



## Yossi Sheffi

Elisha Gray II Professor of Engineering Systems

Friday, March 12, 2021



## Steve Graves

Abraham J. Siegal Professor of Management

Friday, April 2, 2021



## Moshe Ben-Akiva

Edmund K. Turner Professor in Civil and Environmental Engineering

Friday, April 9, 2021



## Sanjay Sarma

Vice President for Open Learning and Fred Fort Flowers and Daniel Fort Flowers Professor of Mechanical Engineering

Friday, April 16, 2021



## Patrick Jaillet

Dugald C. Jackson Professor of Electrical Engineering and Computer Science

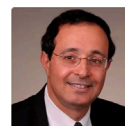
Friday, April 23, 2021



## Chandra Bhat

Editor, Transportation Research Part B; Director, US DOT Center on Data-Supported Transportation Operations and Planning (D-STOP)

Friday, April 30, 2021



## David Simchi-Levi

Professor of Civil and Environmental Engineering and Director, MIT Data Science Lab

Friday, May 7, 2021



## Elisabetta Cherchi

Co-Editor in Chief Transportation Research Part A: Policy and Practice; Professor of Transport, Newcastle University, UK

## Juan de Dios Ortúzar

Co-Editor in Chief Transportation Research Part A: Policy and Practice; Emeritus Professor, Department of Transport Engineering and Logistics, Pontificia Universidad Católica de Chile

Friday, May 14, 2021



## Yafeng Yin

Editor-in-Chief, Transportation Research Part C: Emerging Technologies; Professor and Associate Department Chair of Graduate Programs, Department of Civil and Environmental Engineering, University of Michigan

Friday, May 21, 2021

# Entrepreneurship Dialogues



Karl Iagnemma, President and CEO at Motional

Julia Steyn, Chief Executive Officer at Bolt Mobility



Jay Walder, CEO at Virgin Hyperloop

**September 9, 2020**



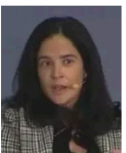
Michael Ableson, CEO Arrival Automotive

Peter Kunsch, Head of Audi Tech Intelligence Boston



Thomas Andrae, Mobility Investor

**September 21, 2020**



Clara Fain, Chief Financial Officer at Via

Rasheq Zarif, Managing Director & Future of Mobility Tech Leader at Deloitte



**September 30, 2020**



Jascha Franklin-Hodge, Executive Director at Open Mobility Foundation

Regina Clewlow, CEO & Co-founder at Populus



Stephen Smyth, Co-founder and CEO at Coord

**October 13, 2020**



Seleta Reynolds, General Manager at LADOT

Michael Hurwitz, Director of Transport Innovation, Transport for London



**October 21, 2020**



RJ Scaringe, Founder & Chief Executive Officer of Rivian

James Womack, Founder and Senior Advisor of Lean Enterprise Institute



**November 6, 2020**

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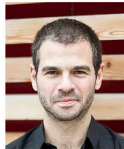
# Dialogues *continued*

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Anna Dietrich, Co Executive Director of the Community Air Mobility Initiative

Assaf Biderman, Founder and CEO of Superpedestrian



**November 16, 2020**



Reilly Brennan, Founding General Partner at Trucks & Lecturer at Stanford

Mary Chan, Managing Partner at VectoIQ



Regina Savage, Managing Director at Morgan Stanley

**December 2, 2020**



Mark Dowd, Chief Innovation Officer at New York Metropolitan Transportation Authority

Kate Fichter, Assistant Secretary for Policy Coordination at Massachusetts Department of Transportation



Tiffany Chu, CEO and Co-founder at Remix

**December 9, 2020**



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# Participating Faculty

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Robert N. Noyce Career  
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Professor

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# Faculty *continued*

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Chrysler Leaders for Global Operations Professor of Management

**Daniel Freund**

Assistant Professor of Operations Management

**Robert Freund**

Theresa Seley Professor in Management Science at the Sloan School of Management at MIT

**Stephen Graves**

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**John Heywood**

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**Jonathan How**

Richard Cockburn Maclaurin Professor of Aeronautics and Astronautics

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**Sertac Karaman**

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**Chris Knittel**

George P. Shultz Professor of Applied Economics

**Jing Li**

William Barton Rogers Career Development Professor of Energy Economics

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# Faculty *continued*

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search Center Co-Director

**Carlo Ratti**

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Lab Director

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tics and Astronautics

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Electrical Engineering  
and Computer Science

**Sanjay Sarma**

Vice President for Open  
Learning at MIT

**Fred Salvucci**

Senior Lecturer and Se-  
nior Research Associate



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# Faculty *continued*

---

**Tobias Salz**

Castle Krob Career  
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Professor of Economics

**Andres Sevtsuk**

Charles and Ann Spaulding  
Career Development As-  
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ergy Studies

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Director of the MIT  
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Gilbert W. Winslow  
(1937) Career Develop-  
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Professor

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tion and Urban Plan-  
ning

**Jinhua Zhao**

Edward H. and Joyce  
Linde Associate Profes-  
sor of Transportation  
and City Planning

**Siqi Zheng**

Samuel Tak Lee Pro-  
fessor, CRE, DUSP and  
SA+P

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# Participating Labs

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## ABOUT

### LEADING THE TRANSFORMATION OF TOMORROW'S MOBILITY SYSTEM

Mobility and transportation are at the dawn of the most profound changes with an unprecedented combination of new technologies (autonomy, electrification, computation and A.I.) meeting new and evolving priorities and objectives (de-carbonization, public health, and social justice). And the timeframe for these changes is short in a system with massive amounts of fixed, long-life assets and entrenched behaviors and cultures. It's this combination of new technologies, new purposes, and urgent timeframes that makes an MIT-led Mobility Initiative critical at this moment.

The Mobility Initiative (MMI) is designed to effect fundamental changes in the long-term trajectory of mobility development. It serves to coalesce all mobility and transportation activities at MIT, knitting together our efforts on research, education, entrepreneurship, and civic engagement at the Institute into a greater whole. MIT researchers are poised to deliver high-impact projects in a wide variety of areas, including AI, autonomy, low-carbon technologies, just cities, new mobility, aviation, supply chains, computation, data innovation, and more.



# VALUE PROPOSITION



Real-time access to MIT's latest insights, innovations & research



Connections and partnerships with leaders in government & industry



Opportunities to structure & shape academic transportation-related research



## AFFILIATE MEMBER

[ACCESS TO MIT RESEARCH AND INSIGHTS. \\$75K.](#)

The MMI Affiliate Membership serves as the foundation for all engagement with the Initiative. Members receive access to research, technology, faculty, students, and start-ups across the Initiative's 30+ labs and research groups. The MMI helps members efficiently navigate the on-going research projects at the Institute and to build strong relationships with MIT's many mobility-related researchers. The MMI also helps Affiliate Members develop a research agenda for future research engagements.

Benefits include:

- Access to MIT thought leadership
- Access to student resumes and areas of focus
- Annual MIT Mobility Summit
- MIT Mobility Forum
- Participation in MI-sponsored symposia, colloquia, and seminars
- Invitations to innovation and entrepreneurship programming



# ASSOCIATE MEMBER

SUPPLEMENTING AND BUILDING ON ON-GOING EFFORTS. \$400K.

MMI Associate Membership allows for a deeper level of engagement with on-going transportation research at the Institute. In addition to access to MIT's thought leadership, Associate Members help steer research through seed funding, determining pertinent research challenges and reviewing faculty-proposed projects.

Benefits include:

- Participation on Research Advisory Board
- Facilitation of next-generation research through seed funding
- Access to MIT thought leadership
- Access to student resumes and areas of focus
- Membership to MIT's Industrial Liaison Program (ILP) and start-up exchange
- Fellowship support for graduate students
- Annual MIT Mobility Summit
- MIT Mobility Forum
- Participation in MI-sponsored symposia, colloquia, and seminars
- Invitations to innovation and entrepreneurship programming

# FOUNDING MEMBER

STRUCTURING & SUPPORTING NEXT-GENERATION RESEARCH. \$1M.

The deepest and most extensive form of engagement with the MMI, Founding Members support next-generation mobility research, helping to drive the development of mobility technologies and innovation forward for the benefit of both industry and society. In addition to receiving extensive access to research, faculty, and students, Founding Members instigate 'flagship' research projects, provide seed funding for early-stage research, and support the Institute's Mobility Fellows.

Benefits include:

- Targeted, 'flagship' research programs
- Access to MIT thought leadership
- Participation on Research Advisory Board
- Facilitation of next-generation research through seed funding
- Membership to MIT's Industrial Liaison Program (ILP) and start-up exchange
- Branded fellowships for graduate students
- Access to student resumes and areas of focus
- Annual MIT Mobility Summit
- MIT Mobility Forum
- Participation in MI-sponsored symposia, colloquia, and seminars
- Invitations to innovation and entrepreneurship programming







# BENEFITS

BRINGING RESEARCHERS AND INDUSTRY TOGETHER TO SOLVE TODAY'S MOST PRESSING CHALLENGES

	<b>Founding</b>	<b>Associate</b>	<b>Affiliate</b>
Targeted, flagship research programs	X		
Seed research participation	X	X	
Annual MIT Mobility Summit	X	X	X
Education engagement	X	X	
Innovation & entrepreneurship programming	X	X	X
Access to MIT thought leadership	X	X	X
Research Advisory Board	X	X	
Membership to MIT's Industrial Liaison Program and start-up exchange	X	X	
Participation in MI-sponsored symposia, colloquia, and seminars	X	X	X
MIT Mobility Forum	X	X	X
Access to student resumes and areas of interest	X	X	X

# MOBILITY INITIATIVE ALUMNI SURVEY

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## What are the most important transportation and mobility challenges facing the world that the MIT Mobility Initiative should tackle?



35%

of respondents expressed concerns about the impact of **COVID-19** on public health, transit ridership, transport finance, and governance. How can the public transportation systems be made clean to protect public health? How to bring back transit riders? How can cities and their transit systems remain financially viable during the pandemic? How do we reshape regulatory structures so our transportation systems are governed by enforceable regulations?



41%

of respondents highlighted **equity issues**. Improving transportation access to people with physical and/or social disabilities, ethnic minorities, older adults, children and women is of crucial importance. To many, the failure to address longstanding systemic racism is one of the biggest crises in the country, and we should work on making transportation systems more inclusive.



24%

of respondents emphasized **climate change** as a critical challenge, 21% mentioned decarbonization and 12% mentioned sustainability. Individuals proposed a number of priorities, including improving air quality, reducing noise, and storm water management. Many emphasized the importance of efforts to encourage active and alternative modes of travel, including walking, cycling, and using informal or public transport.



26%

of respondents thought incorporating **new mobility technologies** presents an immense challenge. It is imperative to find the appropriate role for autonomy while evaluating the promise of other new transportation technologies & concepts, ranging from the Hyperloop to micro-mobility to high-speed intercity rail. We should also make sure advances in technology don't make the world worse than it already is, requiring investigations into their potential adverse impacts.



24%

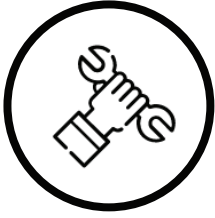
of respondents mentioned **transportation infrastructure funding**. Emphasis was placed on finding funds to equitably implement, sustain, and adapt transportation solutions in the short, medium, and long terms, including providing stable living wage jobs for transportation sector workers; identifying stable revenue sources that accommodate natural differences in cost growth over time between labor- and capital-intensive methods for transportation service delivery; and training future generations of transportation professionals.



- Respondents also highlighted **political barriers** as a major challenge. Political gridlock can prevent bold and decisive action.
- **Data management** emerged as a crucial concern. Who owns the data and how can we build a bridge between the public and private sectors?



## What are MIT's strengths in tackling these challenges?



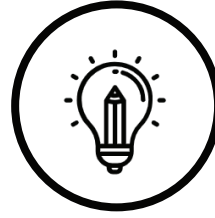
### People

- Diverse & elevated talents and areas of expertise
  - Diversity of ideas
- Commitment to tackling complex challenges



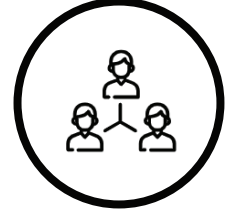
### Education

- Multi-disciplinary and cross-departmental perspectives
- Effective online platform



### Research

- High levels of academic freedom and integrity
- Data-driven research capabilities and large computing power



### Network

- Ties with other top research universities
- Vast alumni network
- Broad-ranging connections with industry and government

---

## How should the MIT Mobility Initiative contribute?

“ Give importance to traditionally smaller subjects such as pedestrian safety and micro-mobility. ”

“ Focus not only on technology problems, but also systems-level problems, on public policy changes and human behaviors. ”

“ Provide technical know-how through partnerships with actual agencies—transportation agencies, cities, states to generate new research and scale up effective solutions to these challenges. ”

“ Bring students that think about different dimensions of the problem into the same classroom: urban planners, economists, business researchers, political scientists, and engineers. ”

---

## Recommendations for improving transportation education at MIT?



### Content

- More practical experiences that address real-world problems
  - A wider perspective and more case studies
  - Prioritization of sustainability and diversity
    - More analytical tools and methods
- Keep public transportation coursework and build out biking/walking related courses



### People

- Hire more professors
- Build a broader collaborative experience across different labs and departments
  - Highlight traditionally under-represented viewpoints
- Invite more transportation professionals to restore the professional focus of the program

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# MST Curriculum Updates

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- CORE
- 1.200 Transportation: foundations and methods (12 credits)
  - Select one of the four (12 credits)
    - 1.202 Demand Modeling      1.208 Resilient Networks
    - 1.260 Logistics Systems      11.478 Beh. Sci. and Urban Mobility
  - 11.S953 Frontier of Transportation Research (3 credits): Fall + Spring
- 

- COMPUTATION/  
ANALYTICS  
(select one)
- 6.439/IDS.131 Statistics, Computation and Applications
  - 6.482 Modeling with Machine Learning: from Algorithms to Applications (subsuming 1.224 Machine Learning for Sustainable Systems)
  - 6.860 Statistical Learning Theory and Applications
  - 6.867 Machine Learning
  - 15.727 The Analytics Edge
- 

- POLICY
- Students required to take one policy-related course
- 

- TECHNOLOGY
- Students encouraged to take one technology-related course
- 

- ELECTIVES
- 1 to 2 individually-designed subjects

---

# PhD Curriculum Updates

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## MST REQUIREMENT

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### GENERAL EXAM

Part 1: Core Knowledge

Part 2: Research Aptitude

Base: Transportation System Analysis +

Five areas of focus

1. Demand
  2. Performance and Optimization
  3. Planning and Policy
  4. Networks
  5. Logistics
- 

SPECIALIZATION Three subjects individually designed for specialization

### General Exam Part 1: Core Knowledge

*Requirement:*

Base + One of the Five Areas of Focus

*Base:*

Transportation System Analysis (the same as MST core)

1.200 + one of (1.202, 1.208, 1.260 and 11.478)

*Five areas of focus:*

1. Demand
2. Performance and Optimization
3. Planning and Policy
4. Networks
5. Logistics

### General Exam Part 2: Research Aptitude

*Three components:*

- A research paper completed by the student
- A review of a relevant publication chosen by the advisor
- Oral presentation and questioning (1.5 hours)
  - 30~45 min presentation
  - 45~60 min committee questions