Welcome from co-chairs
Welcome to Minnesota DOT
Webinar agenda overview
AVS and 2020 update

Presentations (10-15 minutes each)
Effects of COVID-19 on AVs, current and future
Annie Chang, SAE International
Ed Straub, SAE International

Effects of COVID-19 on shared mobility, current and future
Susan Shaheen, UC Berkeley

Time for a new transportation paradigm?
Tim Papandreou, Emerging Transport Advisors

Responses (5 minutes each)
Academic
Steve Shladover, UC Berkeley

Public
Paul Ajegba, Michigan DOT

Private
Sandra Larson, Stanley Consultants

Group discussion, facilitated by chairs
Webinar: Impacts of COVID-19

Wednesday, May 13, 2020
Webinar Protocol

• Participants are automatically muted
• Ask questions anytime using Q&A box
• After presentations, Forum members can raise hands and ask questions aloud once unmuted
• Non-Forum members can ask questions via Q&A box and we will address as many as we can
Mission

Bring together public, private, and research organizations to share perspectives on critical issues for deploying automated vehicles and shared mobility. Discuss, identify, and facilitate fact-based research needed to deploy these technologies how and when it will inform policy to meet long-term goals:

• Increase safety
• Reduce congestion
• Enhance accessibility
• Increase environmental and energy sustainability
• Encourage economic development and equity
Public Agency Participants

- U.S. Department of Transportation
- U.S. Department of Energy
- Transport Canada
- Local Agencies
  - Maricopa County DOT
  - Maricopa Council of Governments
- State Agencies
  - Caltrans & California DMV
  - Florida DOT
  - Michigan DOT
  - Minnesota DOT
  - Ohio DOT
  - Virginia DOT
  - Washington State Transportation Commission
  - Washington State DOT
Academic Research Participants

• AAA Foundation for Traffic Safety
• Southwest Research Institute
• Texas A&M Transportation Institute

Private Sector Participants

• Alliance for Automotive Innovation
• Toyota
• Econolite
• Stanley Consultants
TRB Committee Participants

• TRB Executive Committee
• TRB Standing Committees
  • Vehicle-Highway Automation
  • Intelligent Transportation Systems
  • Emerging Technology Law
  • Emerging and Innovative Public Transport and Technologies
  • Travel Analysis Methods Section
  • Subcommittee on Emerging Ridesharing Solutions
Partner Liaisons

• National Academies’ Divisions/Boards (4)
• Partner Associations
  • AASHTO
  • APTA
  • ITE
  • ITS America
  • SAE International
  • I-95 Corridor Coalition
Forum Co-Chairs

Jane Lappin  
Retired Director, Government Affairs & Public Policy, Toyota Research Institute

Cathy McGhee  
Director, Virginia Transportation Research Council

Greg Winfree  
Agency Director, Texas A&M Transportation Institute
Forum Products

• TRB e-Circular “Preparing for Automated Vehicles & Shared Mobility”
• Directory of Information Resources, continuously updated
• Interactive sessions at TRB Annual Meeting and the Automated Vehicles Symposium
Critical Research Needs

• Listed approximately 150 critical research needs, with annual updates
• Ranked top 10 research issues
• Developing white papers listing state of each research topic and remaining research gaps
2020 Workshops & Reports

• Vision(s) for a “fully evolved” future
• Importance and role of connectivity
• Potential impacts on government & private sector
• Financing, funding, and economic implications
• Potential impacts on our traditional research processes & programs
Welcome to New Members

Kristin White
CAV Executive Director, Minnesota DOT

Daniela Bremmer
Cooperative Automated Transportation Development Manager, Washington State DOT
Today’s Presentations

Effect of COVID-19 on AVs
Annie Chang
SAE International

Effect of COVID-19 on AVs
Ed Straub
SAE International

Effect of COVID-19 on Shared Mobility
Susan Shaheen
UC Berkeley

COVID-19 and New Paradigms?
Tim Papandreou
Emerging Transport Advisors

Steven Shladover
UC Berkeley PATH

Paul Ajegba
Michigan DOT

Sandra Larson
Stanley Consultants
Research Needs Express

As all aspects of transportation deal with the unfolding effects of the COVID-19 pandemic, there are research needs, gaps and potential ways to leverage innovation revealing themselves across all modes, systems and disciplines in transportation. In keeping with the mission of the National Academies of Sciences, Engineering and Medicine to provide trusted, timely, impartial and evidenced-based information exchange and research, we are issuing an urgent and directed call for Research Needs Statements specific to Transportation and Pandemics.

In order to expedite the capture of these more specific Research Needs Statements, we have provided a survey to enable our volunteers to contribute to this body of knowledge rapidly and easily. Once these statements are quickly vetted by TRB staff, we plan to make them publicly available for researchers, institutions, and funding agencies to view, build on, and consider as part of future projects.

*Please note, there is no funding available through TRB associated with this call for research needs.*

[http://www.trb.org/main/CallforRNSTransportationAndPandemics.aspx](http://www.trb.org/main/CallforRNSTransportationAndPandemics.aspx)
trb.org/AVSMForum

Katherine Kortum (kkortum@nas.edu)
Mark Norman (mnorman@nas.edu)
EFFECT OF COVID-19 ON AUTOMATED VEHICLES

EDWARD STRAUB, DM
Director, SAE Office of Automation
edward.straub@sae.org
4 major trends in mobility

- Electrified
- Connected
- Automated
- Shared
Effect of COVID-19 on Automated Vehicles

**AV Technology Development**

- Fundamentals
- Component performance & development
- System level simulation
- Physical testing protocols
- Investment

**AV Deployment**

- Rethinking use cases
  - Design
- User behaviour and preferences
- Personal use / Transit
  - Riskier driver behaviour compared to pre-stay-home orders [Zendrive](#)
  - Decreased use of transit and rideshare
  - Protocols / risk mitigation measures
Considerations for a possible future...

<table>
<thead>
<tr>
<th>Test &amp; Development</th>
<th>Use cases &amp; Niches</th>
<th>Growth &amp; Consolidation</th>
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<tbody>
<tr>
<td>1-2 years</td>
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<tr>
<td>Simulation</td>
<td>Evaluate business</td>
<td>Response to evolving</td>
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<td>Fundamentals</td>
<td>case forecasts</td>
<td>environment</td>
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<td>Components</td>
<td>Deliveries</td>
<td>Solidified business</td>
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<td>Behaviours</td>
<td>User / consumer</td>
<td>cases</td>
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<td>Physical test</td>
<td>preferences</td>
<td>Maturing technologies</td>
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<td>protocols</td>
<td>Social interaction</td>
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<td>Infrastructure</td>
<td>Normalizing interactions</td>
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<td>modification</td>
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<td>1-5 years</td>
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<td>1-5+ years</td>
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Uncertain future in transportation

- Public-transit ridership (70 - 90 percent drop in major cities) [McKinsey]
- Ride sharing (60 - 70 percent drop) [McKinsey]
- 17% less likely to use ridesharing going forward [Axios]
- Regulatory uncertainty influences investments
  - Balancing new technologies or traditional infrastructure?
- Hygiene and distancing requirements
- Changes to street and sidewalk usage
Road safety in our “new normal”

TRB AV/SM Forum
Webinar on Effect of COVID-19

May 13, 2020

Annie Chang
Head of New Mobility
SAE International
annie.chang@sae.org
HELLO
my name is

ANNIE CHANG
Head of New Mobility

SAE International
Mobility & COVID - Seattle

Seattle State of Emergency
March 5, 2020

Washington State “Stay Home, Stay Healthy” Order
March 23, 2020

Analysis by Chang & Miranda-Moreno, 2020; data from Apple Mobility Index & data.world
Traffic crashes - Seattle

Seattle State of Emergency
March 5, 2020

Washington State “Stay Home, Stay Healthy” Order
March 23, 2020

Daily crashes

↓53%
p-val <0.005
using BSTS w/ covariates
post-period starting 3/5

Analysis by Chang & Miranda-Moreno, 2020; data from Seattle Open Data
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Mobility & COVID - NYC

NYC State of Emergency
March 12, 2020

NY State “Stay at Home” Order
March 20, 2020

Analysis by Chang & Miranda-Moreno, 2020; data from Apple Mobility Index & data.world

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Fatal & injury crashes - NYC

NYC State of Emergency
March 12, 2020

NY State “Stay at Home” Order
March 20, 2020

↓63%
p-val <0.005
using BSTS w/ covariates
post-period
starting 3/12

Analysis by Chang & Miranda-Moreno, 2020; data from NYC Open Data
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Fatal & injury crashes by mode - NYC

NYC State of Emergency
March 12, 2020

NY State “Stay at Home” Order
March 20, 2020

↓62%
p-val <0.005
using BSTS
post-period
starting 3/12

↓71%
p-val <0.005
using BSTS
post-period
starting 3/12

↓56%
p-val <0.005
using BSTS
post-period
starting 3/12

motorist

pedestrian

cyclist

Analysis by Chang & Miranda-Moreno, 2020; data from NYC Open Data

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Road safety in our “new normal”

WHAT WE KNOW

• Mobility & crashes have decreased
• Travel speeds have increased (in some cities)

WHAT WE DON’T KNOW

• Will we continue to travel less?
• Will our travel mode preferences evolve?
• How long will our “new normal” last?

OPPORTUNITY

• Rethink our travel behavior & streets
COVID-19 Impacts: Public Transit, Shared Mobility & Social Equity

Susan Shaheen, Ph.D.
Director, Resilient and Innovative Mobility Initiative
UC Institute of Transportation Studies
Professor, Civil and Environmental Engineering,
UC Berkeley
Presentation Overview

• COVID-19 Challenges/Opportunities
• Social Equity Considerations
• Public Transportation & Shared Mobility
• Rights-of-Way & Curbs
• Trends: Current & Possible Future
• Navigating a New Normal
COVID-19 Crisis …

• Economic recession causing devastating impacts on employment & transportation
• Gas tax revenue reductions
  • VMT down: 39% in Detroit, 39% Miami, 44% in Los Angeles, 49% in Dallas, 52% Seattle
• Public transit operators reduce schedules, routes, and operating hours
• Many drivers getting more reckless
• Shared mobility companies redirecting service, closures, and layoffs
• Need to quickly address immediate job and transportation impacts & restore safe / healthy mobility
Social Equity Considerations

• Critical to understand inter-relationships among job and food access, housing, public health, and mobility

• Need to ensure lack of mobility does **not** exacerbate poverty and homelessness

• Opportunities for public transit operators, cities, and private companies to advance mobility needs and strengthen economic resilience, particularly for most vulnerable populations
COVID-19 Opportunities…

• 6% drop in CO2 emissions predicted in 2020
• VMT and number of car crashes down
• Active transport policies:
  • Milan announces 22 miles of streets to be converted to pedestrian / bicycle space
  • Buenos Aires expanding active transportation infrastructure
• Opportunities for slow streets, telecommuting, shared mobility & public transit options
• Focus on policy, partnerships & people
• Create more equitable, innovative, sustainable & resilient transportation
Public Transit Impacts

- APTA forecasts reduction in farebox revenue of 75% over next 6 months
- Public transit reducing schedules, routes, operating hours; social distancing, free transit/suspended fares
- Some increasing off-peak/low-density service gaps (e.g., Miami Metrobus/Go Nightly)
- Public transit agencies eligible to receive $25B in emergency funding (CARES Act)
**TRANSIT APP SURVEY**

- Active public transit users skewed toward low-income households
- Food service & healthcare represent greatest percentage of travelers
- Very little mode shift for those still traveling (U.S. and Canada)
- Spanish speakers more likely to continue using public transit (i.e., Los Angeles)
Rebuilding Trust in Public Transportation

PUBLIC TRANSIT DECLINE
- Public transit likely slower to recover as travelers exercise social distancing & fear higher-occupancy modes
- More likely if COVID-19 has multiple waves (e.g., resurgence in infections, new viral strands, etc.)

PUBLIC TRANSIT RENAISSANCE
- Ridership increases due to economic hardship and restructured services
- Innovations and bold policy measures (e.g., free transit and subsidies, microtransit options)
- Flexible financial model to reinforce this
Micromobility Impacts Varied

- In NYC, Citi Bike ridership increased 67% compared to March 2019
- Washington, D.C.’s CaBi expanding low-income access to $5 annual memberships
- Notable layoffs (e.g., Bird, Lime, Jump)
- In Mid-April, Lime suspends all service except South Korea
- Number of companies enhancing cleaning procedures (e.g., NanoSeptic handlebars)
Micromobility: Policy Response

**Favorable Developments**

- Free/discounted memberships/use for small businesses and/or public (Kansas City, Memphis)
- Free/discounted memberships for essential workers (Boston, Brookline, Chicago, Salt Lake City, Washington DC)
- Shared micromobility service workers deemed essential (Baltimore)
- Used for restaurant deliveries (Syracuse)

**Unfavorable Developments**

- Ban/ceased operations due to COVID-19 transmission concerns (Miami, Sacramento)
TNCs & Pooling

• Dramatic usage declines
• Partnerships for essential workers and medical appointments
• In mid-March, Lyft and Uber suspend pooled ride options due to COVID-19 transmission concerns
Rights-of-Way and Curb Management

Goods Delivery

- Parking Conversion / Additional Loading Zones for Pick-Up/Delivery (e.g., Annapolis, Austin, Raleigh, Seattle, Washington, DC)
- Parking Fee Waivers for Pick-Ups (Hartford)
- Short-Term Pick-Up Zone Permits (Minneapolis)
- Curbside No Stopping Rules Suspended (Madison)
- Reduction in Parking Time Limits to Encourage Short-Term/Shared Use (Tucson)
- Signage for Designated Pick-Ups (South Bend)

Active Transportation

- Automatic Pedestrian Signals (e.g., Arlington, Kansas City, Los Angeles, Providence)
- Street closure to vehicle traffic during pandemic for active transportation/social distancing (Boston, New York City, Minneapolis, Oakland, Providence)
<table>
<thead>
<tr>
<th>Macroeconomic Environment</th>
<th>Pandemic Response (6-24 Months)</th>
<th>Recovery (~2-3+ Years)</th>
<th>Mitigation</th>
<th>Preparation</th>
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<tbody>
<tr>
<td></td>
<td>- Disruptions to supply chains and labor</td>
<td>- Stronger recovery in public transit and shared mobility service sectors (e.g., TNCs)</td>
<td>- Auto and mobility sectors increase use of automation in supply chains</td>
<td>- Enhanced cleaning protocols</td>
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<td>- Lower oil prices</td>
<td>- Oil prices return to pre-COVID ranges</td>
<td>- Monitor infectious diseases</td>
<td>- Continuity of operations and continuity of mobility/delivery plans</td>
</tr>
<tr>
<td>Consumer Behavior</td>
<td>- Shifts away from higher occupancy modes; increases in deliveries and telecommuting</td>
<td>- Uncertain / depends on length/depth of pandemic and recession; policy levers</td>
<td>- Consumers continue social distancing and physical travel substitution</td>
<td>- Consumers prepared for future outbreaks (masks, gloves, social distancing, etc.)</td>
</tr>
<tr>
<td>Policy Environment</td>
<td>- Economic stimulus</td>
<td>- Policies to reduce VMT/GHG emissions (e.g., telecommuting, HOVs, active transport)</td>
<td>- Transport sector implements practices to prevent infectious disease</td>
<td>- Transport sector implements practices to respond to infectious disease (e.g., increased cleaning, etc.)</td>
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<td>- Support for public transit, telecommuting</td>
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<tr>
<td>Technology Response</td>
<td>- Testing AVs for contactless applications</td>
<td>- AV adoption delays due to virus and economic disruption</td>
<td>- Industry develops cleaning protocols for AVs (e.g., UV light)</td>
<td>- AVs ready for future infectious disease scenarios</td>
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</tbody>
</table>
Navigating A New Normal

- Turn crisis into opportunity
- Key role for public policy (e.g., public transit finance, telecommuting, micromobility)
- Focus on people’s needs central to response
- Maximize social & environmental benefits in transportation recovery, particularly social equity
- How can shared mobility help households that are no longer able to afford a personal vehicle?
- Understand impacts/opportunities for taxi and TNC drivers who have invested in car loans to generate income
THANK YOU

HTTPS://WWW.UCITS.ORG/RIMI/
Key Phases

- Trigger
- Triage
- Pivot
- Recover
- Transform

Concept: Timothy Papandreou  ETA 2019
Icons: The Noun Project various artists
New Work Normal

On Site

Off Site

Concept: Timothy Papandreou  ETA 2019
Icons: The Noun Project various artists
Business Models

Own

Ride

Rent
New Sharing Normal

Rider Protocols

Trusted Networks

Touchless Travel

Concept: Timothy Papandreou  ETA 2019
Icons: The Noun Project various artists
New Commerce Normal

In Store  Delivery  Pick-up

Concept: Timothy Papandreou  ETA 2019
Icons: The Noun Project various artists
Passenger  Deliveries  Tasks
Transformative Resilience

Consolidation  Restorative Partnerships  Digital Integration

Concept: Timothy Papandreou  ETA 2019
Icons: The Noun Project various artists
Guardrails

- safety
- equity
- interconnectivity
- affordability
- sustainability
emergingtransport.com/contact
Timothy Papandreou
@tpap_