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Forum on Preparing for Automated Vehicles and Shared Mobility

Mini-Workshop on the Roles of Government and the Private Sector

July 15, 2019
Orlando, Florida

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Preface

The deployments of automated vehicles, shared mobility services, and other transformational transportation technologies have the potential to dramatically increase safety, reduce congestion, improve access, enhance sustainability, and spur economic development. However, success in meeting these goals is not assured, and there are significant risks that these deployments could cause unintended consequences.

The National Academies-TRB Forum on Preparing for Automated Vehicles and Shared Mobility was officially launched in early 2018 to facilitate evidence-based research needed to deploy these technologies in a manner and timeframe that informs policy to meet these long-term goals. This e-circular summarizes a workshop held by the Forum to discuss the roles of government and the public sector as these technologies are advanced.

Virginia Reeder of the I-95 Corridor Coalition and Scott Schmidt of the Alliance for Automobile Manufacturers authored the paper, and it was reviewed by Jim Mahugh, Washington State DOT; David Zipper, German Marshall Fund; Raj Ponnaluri, Florida State DOT; Daniel Sperling, University of California Davis; and Katherine Kortum and Mark Norman, Transportation Research Board.

ACKNOWLEDGMENTS

A small volunteer group of Forum members and TRB staff planned and organized the mini-workshop described in this report. Members of this group were:

- Patricia Hendren, I-95 Corridor Coalition (cochair)
- Scott Schmidt, Alliance of Automobile Manufacturers (cochair)
- Katherine Kortum, TRB
- Mark Norman, TRB
- Virginia Reeder, I-95 Corridor Coalition

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Introduction

In order to better inform all forum members and generate discussion on the strategic crosscutting issues of deployments of automated vehicles (AVs) and shared mobility (SM) services, members are holding a series of "mini-workshops" in 2019. These mini-workshops focus on answering three main questions:

1. Why the subject area is of critical importance;
2. What the current state of play is; and
3. What the future might hold.

The Potential Impacts on Roles of Different Levels of Government and Private-Sector Mini-Workshop occurred on July 15, 2019, in Orlando, Florida. This workshop summary includes key takeaways, panelist remarks, summaries of breakout group discussions, panelists' reactions to these discussions, and a set of key takeaways.

Workshop Format and Agenda

This mini-workshop explored the potential impacts on roles of different levels of government and the private sector. It was designed with four objectives in mind:

1. Explore what the roles of local, state, and federal and private sector should be and could be.
2. Explore what the different agencies need from each other in order to play that role.
3. Encourage new ways of thinking about how this could all work.
4. Provide participants with something concrete they can take back to their own roles.

The mini-workshop opened with a panel of three speakers with different perspectives, each providing insight toward how their roles might shift.

- David Zipper, German Marshall Fund, provided perspectives on SM and AVs, mobility as a service (MAAS), and local-level government roles.
- Raj Ponnaluri, Florida Department of Transportation (DOT) offered his perspective from the state government level, particularly related to data.
- Scott Schmidt, Auto Alliance, represented the auto manufacturers' perspective.

After the panel remarks, participants broke into five breakout groups, each assigned to a stakeholder group:

1. City–local,
2. Transportation network companies (TNCs),
3. Transit,
4. State government, and
5. Original equipment manufacturers (OEMs).

Following these conversations, each breakout group shared highlights from their conversations, and then panel members then reacted to these summaries.

Summary of Panelist Presentations

Presentations from the meeting are available online at http://www.trb.org/trbavsmforum/July2019TRBAVSMForumMeeting.aspx.

DAVID ZIPPER
German Marshall Fund

David Zipper kicked off the panel portion of the workshop with his presentation titled "MAAS, Urban Mobility Data, and AVs." He emphasized that we should all assume that the future of urban mobility will be shared and that users will want seamless experiences. This reality brings up a number of questions related to roles of agencies. Who is selling what in the marketplace? Who owns and has access to the data? How will AVs will fit into this landscape?

Uber sells transit tickets in Denver on their platform. While there is a benefit to TNCs as they begin to do this, there are going to be headaches for travelers. Will the public have to manage many apps in order to access all of the options? We should consider other alternatives; one to look to is Whim, the all-in-one multimodal transportation app in Finland, where the government has passed legislation to require providers to show all of the options available. Is this a role we would like our government to take? If so, what level of government is appropriate?

Regarding data, the ride-hail industry is the first mode to be a truly shared model, but those providers are resistant to sharing data. With the next modes (i.e., e-scooters), cities are requiring that the companies provide data. About 40 cities are using the Mobility Data Specification, developed by the City of Los Angeles. This specification requires that mobility companies share data in real time. The goal is to try to limit chaos on the roadways as AVs begin to show up, but many questions remain about how this will all unfold. AV OEMs are pushing for smooth data sharing. As all relevant players sort out their roles and responsibilities, data sharing will inevitably be a critical piece.

In response to a participant question, Zipper discussed the fact that there is huge potential in the area of courier service and delivery, although it does not get much attention. It represents a real opportunity to get some of the larger trucks off urban streets in particular. There has not been much analysis done in this area compared to the amount of analysis about passenger traffic, but it would be a great research project.

RAJ PONNALURI
Florida Department of Transportation

Raj Ponnaluri presented next on the topic of tackling data challenges. He began by stating that although everyone is focused on data, we still often do not know what data sets are coming out of new CV and AV projects. As we explore the opportunities and understand the roles of OEMs, agencies, and others, partnerships with third parties will be crucial. However, it will be just as important to understand the outcomes of those partnerships.

It is incumbent on all agencies to be aware of the different perspectives of the stakeholders. For example, operations and maintenance data are key for local agencies, and states

need to support local partners in that. Private companies are looking for real-world test beds and the data they get from these pilot opportunities are perhaps their most critical output. States need to understand that these start-ups and their investors are assuming a great deal of risk and also need to be sensitive to what they require to be able to assume that risk.

Florida DOT has developed an enterprisewide information technology strategy to manage its data sharing; this strategy is termed as the Reliable, Organized, Accurate Data Sharing (ROADS) initiative. ROADS provides many benefits, though a V2X data platform (including vehicle-to-infrastructure and vehicle-to-vehicle) will be required to leverage data emerging from the CV and AV projects. One great challenge is that there are no established public methods on data sharing, and we need micro-level and real-time data now. However, the sheer amount of data is a barrier. Conducting return-on-investment analyses will be critical for all agencies as we determine how to allocate resources, how to share data, and what to do with the new information we are able to access.

SCOTT SCHMIDT
Auto Alliance

Scott Schmidt rounded out the panel from the perspective of auto manufacturers with a presentation titled “Infrastructure Considerations to Accelerate Deployment of Highly Automated Vehicles.” He began by emphasizing that all infrastructure benefits (lane markings, signage, etc.) that need to be upgraded for AVs will also benefit human drivers today.

Given the current level of variability in road system infrastructure, vehicle manufacturers are working to develop automated driving system (ADS) -operated vehicles that can accommodate a wide range of potential road infrastructure conditions. However, ADS developers face substantial challenges in developing systems that operate on highly variable and complex road systems, especially in construction zones. Where road infrastructure is inadequate or not reliably maintained, ADS-operated vehicle manufacturers will likely limit the operational design domain (ODD) of their vehicles and or geo-fence difficult roads–intersections to avoid them. OEMs would like to have several features of the roadway infrastructure standardized and maintained to a level that is appropriate for connected and automated vehicle (CAV) use.

In addition, the focus will remain on designing “infrastructure independent” technology, which will lead to more complicated and costly systems and likely inhibit deployment. Schmidt also explained the steps that public agencies can take across all infrastructure categories (e.g., lane markings, traffic signals and signs, construction zones, intersection crosswalks, and speed bumps) to facilitate a “hands-on” approach that will help accelerate development and deployment of AVs.

Summary of Breakout Sessions

Following the panel session, participants were randomly assigned to one of five breakout groups. Once the group assembled, the groups were assigned a role from which they would consider AV- and SM-related policy questions: OEM, state government, TNC, city or local government, and transit agency. From the perspective of this assigned role (and not the one they normally take in their professional capacity), participants spent 1 h discussing and answering the following four questions:

1. From the perspective of [your group] why would you want to support AV and SM?
2. Infrastructure. What is [your group]'s relationship to the infrastructure needed (user, owner, operator)? What is [your group]'s role today in ensuring infrastructure supports AVs? How will this need to change as the adoption of AVs increases? Does this role change if the AVs are part of a SM service?
3. Data. What is [your group]'s relationship to data in AV and SM (consumer, creator, owner)? What is [your group]'s role today in ensuring the data supports AV and SM? How will this need to change as the adoption of AV and SM increases?
4. Testing. What is [your group]'s relationship to testing new AV and SM technology? What is [your group]'s role today in ensuring that testing supports progress in AV and SM? How will this need to change as the adoption of AV and SM increases?

Following these questions, groups identified what they need from their fellow partners (e.g., the other groups represented) and any barriers they saw to playing the role(s) they identified.

At the conclusion of the hour, all workshop participants reconvened and a reporter from each group provided a summary of their group's conversation.

OEM GROUP

Enhanced safety and market competitiveness were key reasons why OEMs would want to pursue AV technology and SM. Given demographic shifts (aging population) and the fact that many younger adults want mobility but do not want to drive, this group felt that new OEM business models emphasizing higher levels of automation would be needed to sustain corporate viability and growth.

OEMs and ADS developers will need to provide guidance on what the most-critical aspects of infrastructure are to support deployment. In addition, standardization of infrastructure was important as well as development of specialized (AV-specific) infrastructure in limited geographic zones to support initial deployments of L4 use cases.

There are many categories of data that need to be considered. For example, AVs will need to access critical infrastructure information such as work zones, etc. Vehicles themselves will likely need to provide operations data to jurisdictions to support management of SM and road usage, and they will need to record safety data related to pre- and post-crash conditions. OEMs will also have the responsibility to ensure the cybersecurity of any vehicle-related data and transmissions.

Both virtual and physical on-road testing are essential to the safe development and deployment of AV technology. With respect to on-road testing, OEMs will need authorization from road jurisdictions that may require legislation and regulation. Part of that legislation–regulation would likely include definitions and limits on liability.

OEMs also seek consistency of regulatory requirements between states and other local jurisdictions. Some participants felt that the development of more coordinated test sites would also help accelerate development and deployment.

The OEM group also identified the following barriers to the role they foresee playing: money or political will–risk aversion; overly burdensome regulations; public perception; and competition between states and cities.

STATE GROUP

The state group reported that their reasons for supporting AV and SM fall within three categories: resource allocation, advancing agency goals (e.g., safety, mobility, economic development, equity, environment—which vary by context), and ensuring consistency across boundaries. Their needs from their partners covered the range of close working relationships through coalitions and other arrangements, data, plans, and a readiness to move forward. In many cases, states lead the way for local jurisdictions, and states generally own most of the infrastructure.

The group organized their thinking around infrastructure into four critical categories: physical, communication, contingency response communications system, and new standards. For data, they explored the roles of the consumer, creator, owner, and partner. As with other groups, they determined that data must be in an open format the still protects privacy. Ideally, states and local agencies would share their progress toward these data standards and formats to avoid starting from scratch with each new deployment. For testing, the group emphasized the need for consistency and for the state to be aware of all projects going on. A theme of this group was that the public sector should play the role of steward of the private sector as AVs become reality.

TNC GROUP

The TNC group supported AV and SM to achieve leveraging of research and investment, accessibility, issues with labor markets, safety, profit, and good stewardship of mobility. They discussed that there are both positive and negative outcomes regarding land use changes. The group also saw these new trends as an opportunity to work in partnership with the regulators.

Regarding infrastructure, many TNCs do not want to wait for the infrastructure, but as the AV and SM systems get bigger, there will be a need for that. It will be critical for TNCs to work in cooperation and collaboration with the infrastructure owners.

With respect to data, standards are critical and this group would look to the public sector for development of those. However, there is a balance to be found with government and how much it “stands in the way” or “gets out of the way.” The TNCs will be viewing data from the utility standpoint.

The greatest barriers this group identified are not-in-my-backyard thinking; lack of data standardization; new or different partnerships and collaboration; a higher demand than what

technology can provide; true equity and access; funding; vehicle communications; and how to incorporate these new models into long-range planning.

CITY–LOCAL GOVERNMENT GROUP

This group identified a range of reasons for wanting to be invested in AV and SM, including safety, equity, access, and economic development. The group recognized that the elected officials leading these entities would be looking for some early wins and wanting to show how these investments would be able to benefit the community.

Cities and local agencies will look to the state and federal governments for leadership and guidance in data standards and collection, including for legislation that protects the data from discovery in court. Some expressed a preference for the state and federal governments to consider an opt in–opt out policy approach for data sharing that provides the flexibility of joining.

A local government has a clear role as an infrastructure owner–operator but also in the realm of providing or leasing fiber. Nonetheless, strong asset management is not occurring at most city and local levels. As questions about what to invest in and how to maintain new types of infrastructure emerge, they will need some clear guidance from partners to facilitate these practices and decisions and to develop a sustainable funding plan to build and maintain CAV-related infrastructure. The conversation about data with the public will be critical as privacy and cybersecurity questions arise.

TRANSIT GROUP

The transit group is interested in AV and SM to address first mile–last mile needs, labor costs, and service improvements for all users. Transit's role within the infrastructure realm includes maintaining right-of-way (ROW); potentially working to create car-free zones; facilitating connected infrastructure; procuring new vehicles; and creating modal connection points at curbs.

This group has an inherent interest in sharing data and looks forward to working with partners on that. They raised questions about the need to keep the public interest in mind when managing data and whether a public agency can be the aggregator of all AV and SM data. The transit group looks to testing as a way to enhance service further (e.g., bus rapid transit, reducing parking).

The transit group will need to collaborate with partners to achieve dedicated ROWs and to find ways to share limited infrastructure. Elected officials will need to be involved to force data sharing. This group stated that while transit agencies often have a hard time "letting go" of what they do but they will have to give up some control in order to achieve the desired goals. This may include rethinking ways for buses to pick up and let off passengers.

PANEL REACTIONS TO BREAKOUT GROUP PRESENTATIONS

Individual panelists then shared their thoughts about the discussions presented by the breakout groups.

- For entities with a role in planning:
  - AVs need to be planned for—not just considered in the operational context, but how to model these travel behaviors is challenging. Transit and freight will be the first level of deployment, so those entities need to be involved in the planning.
  - As we look ahead and plan, we need to remember that land use changes over time. An area that might be rural today may quickly become suburban or even urban. We should be thinking about AVs when planning new development.
  - Representatives from France attended and reported on their "Great Rendezvous on the Robomobile Life" in June 2019. This event is an open forum for questions and debates on all of the changes that robomobility could involve. (Robomobility is the French term for "pervasive driverless mobility of persons and goods.") The event is designed to inform the long-term choices of both public and private players, both in France and internationally. Comparing French and U.S. priorities indicates that as the United States builds out, U.S. priorities may change and land use planning may become a higher priority.
- For entities with a role in regulatory efforts:
  - We need to achieve a regulatory balance. A lack of guidelines will not serve the community well. As one example, SAE is developing on-road testing standards that can be used as state and city requirements.
  - If we are to provide a seamless user experience across all modes, the states or federal government are going to have to get involved and help determine what minimum levels of data sharing is needed and how it should be accomplished.
  - The competition among states and cities could pose a risk; if standards get too relaxed to try to draw in pilot testers, some participants felt that there could be safety concerns.
- And finally:
  - As evidence accumulates that ride sharing is increasing congestion (but with increased vehicle-miles traveled per trip, and a reduction in transit use), the TNCs need to work with partners to alleviate these impacts.
  - Return-on-investment studies and benefit–cost analyses will be key to helping elected officials and other leaders see the value in moving forward with investment.
  - Collaboration is happening in many places for states (e.g., American Association of State Highway and Transportation Officials, Transportation Research Board, I-95 Corridor Coalition), but we also need to create places for local governments and other agencies to collaborate.
  - AVs will not be the only players in future transportation systems. Micromobility, TNCs, transit, and traditional automobiles will all play a part as well.

Key Takeaways

Based on discussions of individual forum members and attendees, key takeaways from the workshop included the following.

Current roles will pave the way, but partnerships and relationships will need to change.

It is inevitable that the new technology associated with AVs and SM will impact our transportation network, options, behaviors, and needs. While many traditional roles may not shift drastically (e.g., infrastructure operator, transit service provider), each party will need to listen and collaborate with a new set of partners to ensure that we realize the benefits, work through the challenges, and solve the inevitable issues.

The key is to acknowledge what we do not know.

There has been a great deal of hype about the advent of AVs and SM. Pieces of the envisioned future already exist, but large questions remain about the technology, implementation, policies, and the many expected outcomes and impacts. It is incumbent on all stakeholders to acknowledge openly that the path forward is not clear, and the actions of different partners can affect the way things unfold. This shared understanding will allow for the most comprehensive and creative solutions.

Everyone wants guidelines, frameworks, etc.

With all of these unknowns, each entity is looking for guidelines and frameworks that establish key roles and responsibilities as well as consistent yet flexible regulatory approaches within which to move forward with technology development, policy adoption, and new responsibilities. Understandably, those who have traditionally provided this structure are hesitant to adopt practices in the face of an unknown future and with the concern that too much regulation could hinder innovation. In addition, most states have indicated a preference for an open format that still protects data privacy, and the structure of such a system is not yet clear.

Consistency and standardization are critical, but it is unclear who should establish that.

There may need to be a few new seats at the table with a slightly different set of perspectives in order to find that balance between a set path and room for playing in the sand box.

Vehicle manufacturers will continue to push agencies to improve existing traffic control devices.

Where road infrastructure is inadequate or not reliably maintained, ADS-operated vehicle manufacturers may limit the ODD of their vehicles or geofence difficult roads–intersections in order to avoid them.

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