

**2015 Report to the US Secretary of Transportation  
United States Department of Transportation  
2015 Intelligent Transportation Systems Program Advisory Committee**

**October 5, 2015**

Section 53003 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), codified at 23 U.S.C. § 515, directs the Secretary of the U.S. Department of Transportation (DOT) to establish an ITS Program Advisory Committee (ITS PAC) subject to the Federal Advisory Committee Act, 5 U.S.C., App. 2.

In response to the legislative directive, the Secretary established the ITS PAC in 2006. The current ITS PAC was reconstituted on June 4, 2014, and members were appointed to two-year terms. The ITS PAC membership consists of 18 members, 12 of whom served on the previous Committee, and 6 new members.

The ITS PAC is charged with reviewing areas of ITS research being considered for funding by the Department and advising the Secretary on policy matters related to the ITS program. Further, the USDOT is also directed to submit an annual Report to Congress in February of each year, which includes:

- All recommendations made by the ITS PAC during the preceding calendar year;
- An explanation of how the Secretary has implemented those recommendations; and
- The reasons for rejecting the recommendations not implemented.

**ITS PAC Activities 2015**

The Committee met three times in 2015: February 4-5, May 13, and August 13. Two of the meetings were in held in person in Arlington, VA and one meeting was held via teleconference. At the May 13 meeting, the ITS PAC discussed numerous topics related to the development of future ITS. These topics included, among other things, the impact of shared mobility, the growth of public transportation ridership in and around our urban centers, data sharing policies for automated and connected vehicles, the declining investment in transportation infrastructure, and ITS trends in vehicle freight technology. After much deliberation, the Committee formed five subcommittees to explore the following topics for consideration of its Advice memorandum to the Secretary:

- Data,
- Funding,
- Public Transport,
- Shared Mobility,
- Scenario Planning, and
- Work Force Development

The five ITS PAC subcommittees met in person and via conference call to deliberate the subject areas. The subcommittees members shared their professional expertise, engaged with industry experts, and consulted with the ITS JPO staff as needed. After careful deliberation, the subcommittees reported over 30 recommendations to the ITS PAC. The ITS PAC reached consensus

on four key topics: 1) Data, 2) Funding, 3) Public Transport, 4) Shared Mobility, and 5) Workforce Development which are summarized in this report.

The ITS PAC recognizes that some of the recommendations in this report concern subject areas that are under consideration by the JPO and others that may require coordination with other public and private entities with varying jurisdiction over the subject matter. In addition, additional research and cost for certain enhancements may be needed to provide the tools needed to execute these recommendations. Where necessary, the ITS PAC encourages the ITS JPO to collaborate with appropriate entities and seek the necessary funding and authority to implement the recommendations.

**DATA.** Automated and connected vehicle applications promise to transform our nation's transportation system through the use of wireless communications networks that will have the ability to generate, capture, and share real-time data about our environment, mobility, and personal safety. Increasing concerns about the vulnerability, security, reliability, and ownership of this information will likely have a dramatic impact on consumer adoption and the emergence of such vehicle applications. An assessment of how other industry sectors have addressed similar data issues could provide guidance for the handling of automated and connected vehicle data applications.

**Data Policy Consistency.** Data sharing is likely to be a significant, if not essential, element of a successful connected vehicle and automated vehicle implementation. Currently data policies, addressing issues such as ownership, liability, security, and use, differ widely among the states and with the Federal Government. It is essential that data policy not lag behind the emergence of connected and automated vehicles. AASHTO, along with the DOT and state Traffic Record Coordinating Committees, should be a source for helping with this subject.

*Recommendation 1. The USDOT CIO should convene a connected vehicle forum representing the states to drive consistent data policies across the states and with the Federal Government.*

**Data Decomposition.** While data sharing policies should be harmonized across the states and Federal Government, it is reasonable that different policies may apply to different types and sources of data. For example, vehicle location might have some privacy concerns, while road condition information, local weather, and traffic measurement may not be as sensitive. A solution to data sharing policy harmonization might be easier to obtain by first decomposing the overall data list into different types of data that may allow different policies regarding release.

*Recommendation 2. The ITS JPO should analyze the data available from connected and automated vehicles and categorize it in levels of sharing sensitivity based on data content, data source, and data destination.*

**Other Industry Data Policies.** Industries, such as health care, banking, energy sector, and wireless, have dealt successfully with mobile wireless data sharing and privacy and could serve as a model for comparison and provide lessons learned for the automotive industry. In addition, there are existing Federal regulations that deal with data sharing that might serve as a starting point.

*Recommendation 3. The ITS JPO should identify other industries that engage successfully in consumer data sharing and identify policies, procedures, and public outreach that have contributed to success.*

**GPS/GNSS Data Reliability and Integrity.** The critical function of GPS data in connected and automated vehicles is vulnerable to natural and malicious corruption. NHTSA has noted these concerns. There are technology concepts in study or development for terrestrial, airborne, and spaceborne solutions for enhancing the accuracy and reliability of GPS data. The DOT should investigate these solutions for applicability to connected and automated vehicle positioning needs.

*Recommendation 4. The ITS JPO should convene a forum to invite technology presentations from industry and academia on potential solutions to GPS reliability assurance, including natural loss of signal or corruption, as well as intentional malicious denial of signal and accuracy. The ITS JPO should evaluate these solutions and develop a path to resolving the GPS vulnerability issue for connected and automated vehicles.*

**Connected Vehicle Benefit Measurement.** Connected vehicles will collect a lot of data as they deploy. In order to measure the real-world effectiveness of the connected vehicle initiative, it will be important to ensure that the right data are collected and communicated to a central facility with appropriate analytics and evaluation at the facility to measure and evaluate crash, injury, and fatality reductions.

*Recommendation 5. The ITS JPO should develop a comprehensive plan for evaluation of benefits and performance of the connected vehicle system once operational, including the data and analytical procedures required for such evaluation.*

**Safety-Related Defect Prediction and Diagnosis.** Connected vehicle data may provide an opportunity to analyze safety defects of onboard systems and components and, possibly even, predict problems as components degrade and exhibit anomalous behavior.

*Recommendation 6. The ITS JPO should conduct a study, in cooperation with NHTSA, of the opportunities for data collection from onboard systems to analyze and potentially predict safety-related defects in the vehicle.*

## **FUNDING**

The level of transportation funding has not kept pace with system needs, creating a significant challenge for financial resources at all levels of government. There is broad consensus that funding challenges are occurring at a time when the transportation system needs more investment. Many mobility, safety, and environmental concerns, public investments in ITS continue to compete directly with critical core maintenance and capacity needs. It is clear that greater public and private investment in ITS strategies will be necessary to realize the potential benefits.

The combination of fiscal constraints and the evolving operating environment supported by technological change represents a new opportunity to examine what role the private sector can play in the provision of ITS services. Among the questions that should be explored are:

- What are the opportunities for the public sector to engage the private sector to advance and accelerate deployment, in the same way public-private partnerships (or P3s) are used for infrastructure construction?
- Is there value in the public sector's physical or digital assets? Are there new, untapped revenue streams that could translate into mutually beneficial arrangements with the private sector to advance deployment? What are the opportunities, as well as the barriers?
- What is the federal role in supporting multi-state and multi-agency coalitions, which could provide larger scale applications of P3 that benefit from economies of scale?
- How can P3s play a role in ongoing operation and maintenance of ITS, which is a key public agency concern? Are there models for risk transfer of lifecycle maintenance to the private sector, especially given an evolving technological landscape?
- What is the policy and legislative framework needed to support innovative use of P3s for ITS services?

Finally, a broader discussion is needed on the future role of federal funding and the responsibilities of states and local governments in filling the ITS funding gap.

**Build Support for State and Local ITS Funding Through Deployment Initiatives.** State and local governments, with support from the Federal-aid program and their own funding, are responsible for capital and operating costs for ITS implementation. Quantification of costs and benefits through real applications will be essential for supporting additional ITS investment. Accelerated deployment programs have been effective in demonstrating the value of new transportation strategies in tangible ways and making the case for investing transportation dollars more effectively.

To seed future investments in ITS, funding should be committed to state and local deployments addressing these specific elements:

- Quantification of traveler and agency costs and benefits, extending beyond the usual aggregate performance measures for mobility, safety, and environmental aspects to individualized traveler benefits and the opportunity costs of ITS versus traditional transportation strategies.
- Emphasis on deployments that encompass multiple regions and agencies.
- Dedication of a portion of funding to rural ITS deployment at a level that is informed by safety metrics.
- Consideration of state and local funding match requirements that do not place an undue burden on local agencies to compete and that recognize ongoing operation and maintenance costs as a commitment to implementation.
- Simplification of grant requirements that minimize administrative burdens for state and local agencies.
- Assessment of how costs could change as agencies scale up from pilot deployments.
- Commitment of a portion of deployment funding for communication and outreach of results to policy makers and the public, given that a new way of investing will require a

clearly understood value proposition for state and local policy makers and their constituents.

*Recommendation 7. The ITS JPO should continue awarding deployment grants and the US DOT should support these at a minimum of \$100 million annually, over and above dedicated research funding.*

**Innovative Funding Through Public-Private Partnerships (P3).** P3s include a broad scope of contracting, financing, and project delivery arrangements and are used in varying forms for transportation projects around the world, frequently to accelerate implementation in the absence of adequate public funding. Private sector partners that financially support a transportation project recover costs and earn a return on their investment through a revenue stream generated from the transportation asset. Public sector assets with the potential to be monetized include rights-of-way (for example, as a resource exchange for communications backhaul service in rural areas) and data produced by the agency. Within the ITS realm there has been precedent: the private sector has displayed a willingness to purchase, deploy, and operate parking meter systems and automated speed and red light enforcement systems.

*Recommendation 8. The ITS JPO should conduct research and stakeholder engagement to assess the role public-private partnerships can play in filling the funding gap for ITS.*

## **PUBLIC TRANSIT**

Public transit ridership is growing. In 2014, transit ridership in the United States was at a 50 year high. This growth in ridership has been a constant and is projected to continue as our nation's population increases, especially in and around our urban centers, as our Senior Citizen population grows and as millennials have de-prioritized driving a car in favor of walking, biking, shared modes (e.g., carsharing, bikesharing, and ridesharing), and public transportation.

Public transportation, is one of the safest modes of travel and has the ability to significantly increase the capacity of our transportation system in a positive way that promotes efficient land use, enhances air quality, and addresses environmental justice concerns.

Undoubtedly, increasing the use of public transportation will be good for the future of our nation. Some of the reasons why public transportation is not even better used today are:

- The overall image or attractiveness of the mode,
- The perception of safety, and
- That service coverage and frequency of public transit in many areas is not ideal due to high operational costs and inefficiencies.

**Public Transit is Safe But Can Be Safer.** Mishaps on public transit, which oftentimes garner significant media attention, skew the perception of the safety of the mode. How can ITS technology be used enhance the safety of buses and trains? Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications and data exchange are promising ITS technologies to enhance public transit safety. While private automakers have very active R&D efforts and are making great strides in incorporating technologies in cars that enhance safety, and

the perception of safety, the current economic model does not allow the same for transit vehicles. If the Government does not do it, it will not get done. Deployment is relatively easy as: 1) a limited number of public entities control almost all of the market, and 2) equipment (buses, trains and vans) is located in mass at central facilities to assist deployment and maintenance of hardware and software.

*Recommendation 9. The ITS JPO should increase the priority of public transit testing and researching of V2V and V2I connected vehicle technologies.*

**Research Is Needed On Developing A “Standard” For The Industry To Ease Procurement and Deployment.** Public transit can be more attractive to consumers and have a better image, if it were easier to understand, easier to use, and better coordinated with other or similar modes. Although much work has been done (and resources spent) on “real-time” information systems, many are unreliable, expensive to deploy, and not compatible with other connecting modes or even connecting transit systems. These connecting systems not only include other public transit systems serving the same market but also include vanpools, carsharing, and bikesharing.

It is imperative to enhance the speed, efficiency, productivity, cost and volume of high quality public transit that will be needed in the future. Some of the tools that can be deployed to increase speed and efficiency of public transit are:

- a. Traffic signal prioritization systems,
- b. Exclusive lanes,
- c. Bus on shoulder programs,
- d. Enhanced real-time information regarding congestion delays,
- e. Dynamic routing, and
- f. Intermodal connections to shared modes, as well as augmentation of public transit services in underserved areas and to aid with peak shaving.

Unfortunately, the advantages of these tools are not universally recognized at this time by the transportation industry, and the marginal increased cost of these enhancements may not be customarily included in funded project cost.

*Recommendation 10. The ITS JPO should conduct research on developing “best practices” for transportation industry tools that increase speed and efficiency,, outlining the advantages both for public transit customers and single occupancy motorists. The goal for this research is to develop incentives for such tools being integrated into more highway system projects.*

## **SHARED MOBILITY**

Shared mobility—the shared use of a vehicle, bicycle, or other low-speed mode—is an innovative transportation strategy that enables users to have short-term access to transportation modes on an “as-needed” basis. Shared mobility includes carsharing; personal vehicle sharing (peer-to-peer carsharing and fractional ownership); bikesharing, scooter sharing; shuttle and microtransit services; ridesharing (carpooling/vanpooling); and ridesourcing/transportation network companies (TNCs), which are also known as ride-hailing.

Given the current state of shared mobility and its potential to dramatically impact the U.S. surface transportation system, public policy needs to evolve alongside these shared mobility modes to support its growth and innovation without compromising safety and accessibility. Research could also accompany this policy work.

**Federal Policy Guidance.** Providing policy guidance from the federal level would assist the management and growth of shared mobility services (e.g., model legislation and setting forth standards on consistent levels of safety, security, and consumer protection). Definitions and best practices would help to resolve confusion among various shared mobility models. At present, there is notable confusion about definitions, benefits, and the impacts of shared mobility modes (e.g., ridesharing and ridesourcing/TNCs).

*Recommendation 11.* *The ITS JPO should direct research at providing federal policy guidance regarding governance (federal, state, and regional levels); best practices; model legislation; and definitions.*

**Engaging the Federal Transit Administration and Public Transit Agencies.** The perspectives of public transit agencies on shared mobility are important (e.g., does shared mobility complement or complete with public transit?). There is a strong federal interest due to FTA's role in public transportation. For instance, FTA has not yet recognized shared mobility in its planning and definitions nor its grant-making process. Further, more FTA outreach to public transit agencies on shared mobility is needed.

*Recommendation 12.* *The US DOT should focus research on creating a framework for recognizing shared mobility in the context of FTA's role and relationship with public transit agencies. This framework should be integrated with FTA and the ITS JPO's current research program (e.g., Mobility on Demand).*

**Focusing on Accessibility in Shared Mobility Deployment.** Most shared mobility services are used by individuals who have higher educational backgrounds and income levels and primarily in urban areas. What public policies could be introduced to mainstream such services to other societal groups (e.g., low-income carsharing policy developments in California, older mobility)? Furthermore, how could these services spread to suburban and rural areas to meet the mobility needs of individuals living in these locations? Finally, an area that could stifle shared mobility growth is accessibility specifically related to: 1) the Americans with Disabilities Act (ADA), Title II access and public transportation requirements and 2) Title VI of the Civil Rights under FTA requirements.

*Recommendation 13.* *The ITS JPO should conduct research on how we could best incentivize and mainstream shared mobility services to a broader group of individuals in a range of environments (i.e., urban, rural, suburban) through crosscutting public policies (e.g., tax credits, pilot programs, crediting systems, incentives/discounts, use of transportation benefit credits, best practices, etc.). This research should also include developing model policy guidance on how best to address accessibility and ADA concerns in conjunction with the FTA and public transit authorities, along with local/regional stakeholder input, as appropriate.*

**Dedicate Resources to Planning Issues and Shared Mobility.** There are notable planning issues associated with shared mobility services. Modelers are struggling with how to forecast demand. The federal government could lead discussions around model development (e.g., Labor, Housing and Urban Development, Environmental Protection Agency, US DOT), as well as on performance metrics. It is important to develop cross-cutting models and common metrics (e.g., reduced greenhouse gas emissions), as feasible, for measuring, monitoring, and forecasting growth. Furthermore, since technology is changing rapidly, it is important to consider how connected vehicles / automated vehicles will interface with shared mobility services and what impacts could be expected on labor, the economy, land use, auto ownership, safety, insurance, cyber-terrorism, etc. in the short-, mid-, and longer-term.

*Recommendation 14. The ITS JPO should conduct research on the role of models and metrics to capture shared mobility with a multi-agency approach, including best practices. This should also include understanding of where shared mobility will and will not work, potential impacts, and opportunities for expansion to other environments (e.g., rural, suburban) and future innovations (e.g., Connected Vehicle and automated vehicles).*

## **WORKFORCE DEVELOPMENT**

The American transportation workforce is at a crossroads, facing a perfect storm of impending challenges. Within the next ten years half of the current workforce will be eligible to retire, which includes many highly experienced and skilled practitioners across the spectrum of transportation specialties, ranging from construction to public transit operations to engineering design and planning to maintenance. At the same time, many current and incoming transportation professionals lack training in important emerging issues and technologies. In particular, communication technologies, information systems, and other advanced technologies are playing a rapidly expanding role in the daily operations of our nation's Intelligent Transportation Systems. Transportation agencies are increasingly looking to these technologies for potential cost-effective solutions to growth, mobility, and safety challenges, so agencies must have skilled personnel who can not only plan and deploy these systems, but also operate and maintain the infrastructure, vehicles, and equipment. For example, the near-term advent of connected vehicles / automated vehicles suggests that transportation professionals need a strong understanding of how these vehicles function and interact, as well as their potential contribution to and impacts on our transportation systems.

There is an urgent need to evaluate the knowledge, skills, and abilities of the current workforce and to identify the critical training and skill needs for the future workforce. Technology knowledge and training must be incorporated into the professional development of both current and future practitioners, at management and planning levels, in operational facilities, and in the field. In addition, effective transportation development is increasingly multi-disciplinary and multi-jurisdictional, so the next generation of practitioners must be prepared to think holistically to work in both urban and rural environments and to collaborate with state, national and even global partners.



*Recommendation 15. The ITS JPO should conduct a national and international scanning tour of surface transportation agencies (DOTs, public transit agencies, rail, etc.) to identify critical future investments in workforce development, in particular those that relate to enhancing technology skills of personnel who operate and maintain transportation systems, infrastructure, and vehicles.*

*Recommendation 16. The ITS JPO should leverage FHWA Regional WFD Centers of Excellence. Using the knowledge gained from the scanning tour, identify collaborative initiatives with each of the FHWA Regional Workforce Centers of Excellence. Identify cooperative opportunities to enhance curriculum development, training resources, and apprenticeship programs for current and incoming transportation personnel.*

*Recommendation 17. The ITS JPO should coordinate and host a National Summit on Transportation Workforce Development to engage public and private stakeholders and to develop training initiatives based on findings from the scanning tour.*

### **Conclusion**

This concludes the ITS PAC report and recommendations for the ITS JPO and other US DOT agencies. We hope the ITS JPO finds the recommendations of value, and we look forward to its response. We are honored to serve on the ITS PAC and hope that this report will result in beneficial actions.

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