

THE ROAD AHEAD

Intelligent and Transformative Transportation
The Next Generation of Mobility – *A Public Policy Roadmap for 2017*

The Intelligent Transportation Society of America (ITS America) is the nation’s leading advocate for the technological modernization of our transportation system by focusing on advancing research & deployment of intelligent transportation systems (ITS).

ITS America’s unique asset is a membership that spans State and Local public agencies (road, transit, and other transportation infrastructure operators), private companies (auto, telecom, IT and emerging tech, consumer apps and electronics, industrial electronics, shared-use mobility, and freight/logistics), and research and academic institutions that are bringing new technology from our nation’s test tracks and labs to our roads, cars, trucks, motorcycles, and public transit systems. These members come to one table—ITS America—to shape the next generation of transportation driven by technology and data.

ITS America seeks to revitalize our infrastructure and modernize our outmoded transportation system. Broadly, we seek to improve the safety and efficiency of our transportation networks and our nation’s economy, standard of living, and health and security. Transportation connects communities and is the lifeblood of commerce. It widens job opportunities and is essential to addressing equity, poverty, unemployment, and access to education and health care. Last year alone, 35,092 people died on our roads—the highest fatality rate since the 1960s. We believe “intelligent transportation” can address the broadest spectrum of challenges and opportunities.

Our objective is to grow our economy and improve our quality of life through innovative technologies that enhance the *mobility, safety, security, privacy, sustainability* and *accessibility* of our transportation system in the next decade. Safety, security and privacy in particular are critical and must be addressed by the technology sector along the entire technology lifecycle—in design, development, deployment, and operations. ITS America seeks to grow collaboration within industry and between private and public sectors in these critical areas.

Our values are optimism in the transformative power of technology to solve our hardest problems and faith in sharing, collaboration, and partnerships. Our cross-sector collective competencies are in establishing a mindset and culture of cooperation to advance innovation, and know-how in integrating “intelligent” technologies to improve the efficiency, safety, predictability, and resiliency of our transportation system. We believe:

Intelligent Transportation Can Strengthen the Economy at its Foundation. The total nationwide price tag of travel delays alone is \$160 billion, or \$960 per commuter. [1] Furthermore, excluding transportation-related construction and manufacturing, transportation comprises 3% of the national non-farm workforce. In the \$17 trillion U.S. economy, vehicle crashes in 2010 cost almost \$1 trillion in lost productivity and lost lives. [2]

Intelligent transportation IS the Next Technological Revolution: Tech booms are defined by powerful clusters of new and dynamic technologies that drive productivity. Promising technology and service clusters are forming around:

1. Vehicles (“Connected/Automated Vehicles” and “Delivery Drones”);
2. Infrastructure (“The Internet-of-Things”); and
3. Transportation Users (“Mobility as a Service” and “When-I-Want-It/Where-I-Want-It Logistics”).

“Integrated deployment” is the clustering of innovations within technology ecosystems, and in the case of many infrastructure-based technologies, through public-private partnerships. Integrated deployments represent investments where the productivity gains produced are greater than the sum of their individual technology parts.

Intelligent Transportation Can Save Tens of Thousands of Lives Each Year and Billions of Dollars. NHTSA reported in 2016 that 35,092 people were lost in crashes on U.S. roadways during 2015—an increase from 32,744 in 2014. The 7.2% increase is the largest percentage increase in nearly 50 years. The estimated number of people injured on the Nation’s roads increased in 2015, rising from 2.34 million to 2.44 million injured people. New vehicle technology such as connected and autonomous crash avoidance and driving automation systems are game changers.

Next generation driver-vehicle interfaces, such as artificial intelligence-based natural language processing can ensure drivers can retrieve critical traffic, weather, navigation and dispatch information they need, without distracting from the critical task of driving. Advanced traffic management infrastructure and Vehicle-to-Infrastructure (V2I) communications can smooth traffic flow as well as reduce pollution and crashes.

Intelligent Transportation Gets More Bang for Less Buck. New mobility models, infrastructure service partnerships, and modes of transportation leverage underutilized assets and put them to productive use. The “sharing economy” expands mobility by leveraging idle vehicles. Unmanned air vehicles (UAVs) will make productive use of underutilized airspace to speed freight delivery. Sidewalk delivery drones will leverage pedestrian pathways. In infrastructure, smart parking matches drivers with spots and congestion pricing matches road capacity to trip demand to achieve shorter, more predictable travel. Behind of all these advancements is an “Internet-of-Things” model that pools data from vehicles, road infrastructure, and mobile devices and leverages it across many applications to advance commerce and improve mobility, safety, and security.

Intelligent Transportation Creates Higher Skill, Higher Paying, and More Secure Jobs. Traditional road building creates jobs in the construction trades and engineering. Intelligent transportation jobs are technology-focused and sustainable over the lifetime of new infrastructure. These jobs, such as traffic system operations and maintenance and traffic engineering, will grow with new deployments such as Vehicle-to-Infrastructure V2I systems. Furthermore, new workforce skills will be required to repair and maintain future advanced connected and automated vehicles.

Today, we find ourselves in the midst of a whirlwind period of innovation in transportation that is changing the fundamental makeup of entire industries. Consequently, Federal, State, and Local government officials face the difficult challenge of how to shape public policy that fosters innovation while serving as a catalyst for safe and efficient intelligent transportation. As a result, ITS America convened its members—from across the private, public, and research/academic spheres—to create a public policy roadmap aimed at spurring the deployment of transformative mobility technologies.

ITS America’s objectives are two-fold:

1. Urge President Donald Trump and Congress to build transportation infrastructure that is the technological envy of the world and is an engine of economic growth and global competitiveness—by including the recommendations in this Roadmap in their infrastructure proposals.
2. Provide a technology-driven roadmap for policymakers at the Federal, State, and Local levels of government to rebuild and modernize transportation infrastructure, and in turn, communities, with smart transportation investments that create jobs, save lives, and get more bang for the buck by leveraging underutilized transportation assets

As the nation’s leading advocate for the technological modernization of our U.S. transportation systems, ITS America is the only organization that represents interests and expertise from across the transportation spectrum. Yet our goal is singular, to advance and accelerate research and deployment of new technologies and an ecosystem that sustains and grows innovation. Our unique makeup of public, private and research leaders is rooted in the fact that ITS America began as an official advisory board to the U.S. Department of Transportation on road technology. While now independent, we continue to stand united in our support of the federal government’s efforts to move our nation forward.

Our members stand ready to work closely with President Donald J. Trump and the 115th Congress to build a transportation infrastructure that is the technological envy of the world—a national system that is an engine of economic growth and global competitiveness.

Regina Hopper
President and CEO
Intelligent Transportation Society of America

THE ROAD AHEAD – EXECUTIVE SUMMARY OF POLICY RECOMMENDATIONS

I. Accelerate the Deployment of Intelligent Transportation

Reduce Vulnerability to Cyberattack and Build Public Confidence in the Security of New Technologies Expand support at the State and Local levels to address cybersecurity of infrastructure. Address security at the Federal level where it makes sense, especially where it can convene and resolve approaches and agreements to address vulnerability. Resist uncoordinated efforts by or requests for Federal agencies to impose disparate requirements, such as a recent petition for the Federal Communications Commission (FCC) to regulate Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) security and privacy in a way that conflicts with National Highway Traffic Safety Administration (NHTSA) and Federal Trade Commission (FTC) activity.

Establish the Foundation for the Deployment of Automated Vehicles: Build public confidence by achieving broad industry participation in the NHTSA Automated Vehicles Policy development process. Revise the guidance where it serves that purpose. Engage with States, safety regulators, and advocates to address their concerns about testing as well as to help them in establishing processes that would help the transition from testing to larger scale deployment. Advocate for changes or clarifications to Federal Motor Vehicle Safety Standards or other authorities to support new technologies (e.g. for Automated Vehicle, ADAS, visibility, lighting, etc.).

Work with Industry and Policymakers to Advance Applied and General Artificial Intelligence (AI) to Improve Transportation: Advocate for appropriate applied AI research and data sharing in reference to safety and security engineering, and identify and address rare dangerous or ethically challenging AI scenarios. Monitor progress with general AI, directing attention to potential long-term positive and negative disruptive economic impacts.

Establish the Foundation for the Deployment of Vehicle-to-X Safety and Mobility Communications: Advance a Federal standard for passenger vehicle V2V and push USDOT guidance on V2I to ensure smooth deployment of Dedicated Short Range Communications (DSRC) by addressing vehicle interoperability, security, and privacy. Advance same standards for trucks and buses. Establish paths for upgrading V2V and V2X standards when next generation wireless systems, such as 5G, are deployed in telecom networks over the long term, addressing same issues as above.

Build Broadband Infrastructure and Secure Spectrum to Support Advanced Vehicle and Transportation Infrastructure Technologies: Include broadband networks in any infrastructure legislation, including broadband funding for rural or otherwise hard-to-serve areas. Support a technology-driven approach to spectrum sharing between Wi-Fi and DSRC that allows Wi-Fi use in the 5 GHz band, but in a way that preserves the safety and utility of DSRC without unduly burdening road users and transportation infrastructure operators..

Upgrade our Infrastructure to Accommodate New Automotive Technologies: Encourage more operational research in addressing how infrastructure upgrades will complement new vehicle technology deployment, such as connected and automated vehicles. Upgrade road technology infrastructure—such as power, communications, and security—to ease expansion of vehicle-to-infrastructure mobility and safety applications. Advocate updates to uniform traffic control device standards and traffic codes where helpful.

Breathe New Life into our Nation’s Transportation System by Expanding Technology Integration: Provide guidance and support to Federal, State, and Local agencies on the best way to integrate disparate Federal competitive grant programs to achieve broader safety, mobility and accessibility outcomes. Use programs to encourage deployment of smart community technologies to improve access to jobs, healthcare, education, and housing. Besides mobility and safety, advise on how programs can address sustainability and resiliency. Seek programs that can provide better-than-before environmental health—outcomes such as lower emissions and noise. Seek programs that can make transportation networks more resilient to adverse events such as severe weather and to support emergency operations such as evacuations.

Policy Recommendations Executive Summary Continued

Expand Freight Mobility by Establishing Unconventional Systems, such as Ground Delivery “Bots” and Unmanned Aerial Vehicles (UAVs), as New Modes of Freight Transportation: Address constraints to UAVs in next Federal aviation reauthorization and encourage testing and safety/traffic management models for industry and public sector cooperation. For ground delivery unmanned robots, encourage a “complete streets” design approach to their integration.

II. Remove Roadblocks for Deployment of Intelligent Transportation

Build Public Confidence in the Privacy, Security, and Safety of New Transportation Technologies: Expand support at the State and Local levels to address privacy of infrastructure technology solutions, and encourage industry and public sector to establish policies such as the auto industry’s recent Privacy Principles for Vehicle Technologies and Services. Work to implement existing architecture and standards for ensuring anonymity for Vehicle-to-X communications using DSRC, and engage with NHTSA, FTC, and FCC if necessary..

Leverage Technology to Address the Problem of Distracted Driving Where There Are Practical Solutions and work to change driving culture: Encourage more research to understand the complexity of Distracted Driving and the factors that elevate crash risk (or potentially reduce crash risk as in the case of safety technologies). Where necessary, establish industry guidelines for new types of driver interfaces, such as voice command systems.

Bridge Gaps between Research & Development and Deployment of New Technologies: Advocate for more collaborative investment in high-risk/high-reward R&D and operational testing. Use “challenges” and other competitions to foster innovation in getting new technologies and integrated systems deployed. Establish a clear roadmap for architecture and standards that are needed to accelerate technology deployment from a commercial/public procurement perspective. Identify needs to create or maintain architecture and standards that assure quality, safety, security, accessibility, interoperability, and reliability of products, processes, and services for critical initiatives—such as connected and automated vehicles, or systems that address vulnerable road users (e.g. pedestrians, cyclists, etc.). Examine workforce education and training needs to determine if lack of technical skills is limiting deployment of new technologies, especially in public infrastructure. With government and industry partners, promote the lifecycle of research, development, adoption, performance management and technology tracking.

Research on Advanced Technologies and Long Term Impacts to our Transportation System: Establish a clear Federal role and list of priorities that can enable a cross-fertilization of ideas, techniques, and discoveries around foundational elements supporting commercialization of connected and automated vehicle new concepts of mobility such as UAVs. Examine long-term issues such as job dislocation because of technology changes and balance those changes with immediate gains from new technology jobs. Analyze skills and education requirements to facilitate new technical jobs in auto and road technology management and maintenance.

III. Support New and Long-Term Funding and Financing for Technology-Driven Mobility and Intelligent Transportation Infrastructure Deployment

Increase Overall Investments in Transportation with a Greater Focus on Technology: Support new and long-term sustainable funding and financing in transportation infrastructure that expand technology-driven mobility investments and preserves the broad ITS eligibilities under the Fixing America’s Surface Transportation Act (FAST Act) to fund technology capital projects and operations and maintenance. Advocate for flexible policies regarding Federal/State/Local matching requirements (e.g., 100% Federal funding upfront for technology-driven mobility infrastructure investments).

Policy Recommendations Executive Summary Continued

Promote Innovative Models in Transportation Funding, Finance, Partnerships and Performance Measures:

Address potential use of a tax overhaul to fund new and long-term transportation infrastructure and systems with a focus on technology-driven mobility investments.

IV. Reinvest in our Communities through Smart Technology

Communicate the Benefits and Facilitate Deployment of Smart Community Technologies: To increase support by elected officials and policymakers as well as the general public, show how ITS can improve everyday life. Use the narrative to inspire and make the business and economic case for a safer, faster, more equitable, efficient, and sustainable transportation system.

Encourage Federal Funding Flexibility and New Funding Mechanisms: Advocate for flexible policies regarding Federal/State matching requirements (e.g., 100% Federal funding upfront with a back-end match by Locals/State for continuing operations) and other implementation provisions in the FAST Act and any new infrastructure bill related to the deployment of smart technology for communities. Examine the potential use of a tax overhaul to fund infrastructure investment plans. In any new infrastructure bill, examine requiring that a percentage of all infrastructure funding must be allocated for Smart community/tech-driven mobility. Emphasize performance goals.

Identify Innovation Champions at the Local Level and Educate Them on the Tools for Experimentation: Encourage communities to allow Chief Technology Officers or other appropriate officials to use Other Transaction Authority, pilot programs, and similar programs to bypass onerous, time-consuming procurement procedures. Encourage the FHWA to enable better flexibility in the States by using performance level conditions measures instead of the traditional measures. Examine Federal restrictions on sole sourcing. Study means to add flexibility to communities (e.g. States, Cities, MPOs, etc.).

Support Proposals that Integrate Federal “Smart Communities” Programs and Provide Resources Where Appropriate: Support legislative efforts that would improve coordination of smart community programs across the Federal government. Provide State and Local governments with technical assistance and resources to help foster the deployment of smart community technologies. Support STEM education and training required for the development and operation of smart communities. Support the necessary R&D to enhance the functionality—including cybersecurity and privacy protections—of smart community technologies.

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THE ROAD AHEAD – PUBLIC POLICY RECOMMENDATIONS

Recent advances in robotics, artificial intelligence, and wireless communications have inspired an industry race to make the next generation of mobility a reality. On everything from advanced, data-based traffic management to commercializing the first driverless cars, trucks and buses, ITS America is working with its broad range of members to identify the opportunities and challenges to integrating these systems into our current transportation system.

I. Accelerate the Deployment of Intelligent Transportation

Reduce Vulnerability to Cyberattack and Build Public Confidence in the Security of New Technologies: Much attention needs to be paid to the challenge of cybersecurity. Internet of Things technologies increase the probability that attackers may compromise safety and mission critical services, representing an entirely new level of potential vulnerability for critical infrastructure. Along with safety, security must be addressed by the industry along the entire technology lifecycle—in design, development, deployment, and operations. Federal support in improving the institutional and technical capacity of States and Local transportation authorities is critical as well as information sharing, where appropriate, with industry on potential vulnerabilities and risks. Immediate actions:

- Expand support at the State and Local levels to address cybersecurity of infrastructure.
- Address security at the Federal level where it makes sense, especially where it can convene and resolve approaches and agreements to address vulnerability.
- Resist uncoordinated efforts by or requests for Federal agencies to impose disparate requirements, such as a recent petition for the Federal Communications Commission (FCC) to regulate Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) security and privacy in a way that conflicts with National Highway Traffic Safety Administration (NHTSA) and Federal Trade Commission (FTC) activity.

Establish the Foundation for the Deployment of Automated Vehicles: Highly automated vehicles require testing on roads before they can be proven for commercial use, despite their promise. Public confidence in the safety of the technology must be first achieved and then expanded in order for the technology to succeed commercially. Industry and the research community must focus their efforts on creating a comfort-level regarding safety assurance, testing, and deployment.

ITS America believes that Federal, State and Local agencies can provide maximum flexibility to allow for testing to establish a definitive safety track record. As these technologies are proven out, industry—driven by data—can establish common safety standards regarding safety assurance, performance, and operational design standards. “Partially” automated vehicles such as “Autopilot” Advanced Driver Assistance Systems (ADAS) already are commercially available; therefore, industry, regulators, and safety advocates must educate drivers on the limitations of the technology and risks of misuse. Immediate actions:

- Build public confidence by achieving broad industry participation in the NHTSA Automated Vehicles Policy development process. Revise the guidance where it serves that purpose.
- Engage with States, safety regulators, and advocates to address their concerns about testing as well as to help them in establishing processes that would help the transition from testing to larger scale deployment.
- Advocate for changes or clarifications to Federal Motor Vehicle Safety Standards or other authorities to support new technologies (e.g. for Automated Vehicle, ADAS, visibility, lighting, etc.).

Work with Industry and Policymakers to Advance Applied and General Artificial Intelligence to Improve Transportation: The last decade saw the creation of dynamic markets and exchanges for transportation data and an ecosystem of suppliers across a number of domains: *driver* navigation, dispatch, traffic, and weather; *vehicle* diagnostic and crash prevention data; as well as adaptive *infrastructure* and “smart cities.” Having machines tap historical datasets to train artificial intelligence (AI) is the next evolutionary step in transportation technology.

Current applied AI improves voice command systems in vehicles to reduce driver distraction and makes driver services more accessible, improves the effectiveness of crash prevention systems in automated and unmanned vehicles, and optimizes passenger and freight routing or traffic control when congestion, weather, or other disruptions occur. Ensuring that applied AI takes into considerations driving culture, traffic codes, traffic management practices, vehicle safety assurance, and even broader ethical standards will be a challenge that must be collectively addressed through future research and technology development. Immediate actions:

- Advocate for appropriate applied AI research and data sharing in reference to safety and security engineering, and identify and address rare dangerous or ethically challenging AI scenarios.
- Monitor progress with general AI, directing attention to potential long-term positive and negative disruptive economic impacts.

Establish the Foundation for the Deployment of Vehicle-to-X Safety and Mobility Communications:

Technologists agree that there is a fundamental need for cars to talk to each other and to the infrastructure to advance vehicle automation and large scale active traffic management in the long term. ITS America supports the USDOT efforts to establish a Federal Motor Vehicle Safety Standard for short-range V2V communications. ITS America also believes that a Federal standard for V2V will be key to ensuring interoperability, privacy and security, and that those standards will help support modernization of our traffic control systems through V2I communication that can improve traffic flow and reduce crashes in our most congested areas and problematic rural and suburban corridors. Immediate actions:

- Advance a Federal standard for passenger vehicle V2V and push USDOT guidance on V2I to ensure smooth deployment of Dedicated Short Range Communications (DSRC) by addressing vehicle interoperability, security, and privacy. Advance same standards for trucks and buses.
- Establish paths for upgrading V2V and V2X standards when next generation wireless systems, such as 5G, are deployed in telecom networks over the long term, addressing same issues as above.

Build Broadband Infrastructure and Secure Spectrum to Support Advanced Vehicle and Transportation Infrastructure Technologies:

Safer and more efficient highways and roads of the future require upgraded telecommunications network infrastructure—including antennas, fiber optic wireline connectivity, and more spectrum to handle the explosion of data coming from millions of cars, traffic signals, road sensors, and more. Telecom often requires transportation right-of-way access (e.g. pole attachments) along roadways for network, infrastructure. Intelligent transportation requires advanced broadband networks providing ultra-fast speeds high bandwidth capable of carrying increased network traffic, and lower latency that minimizes delays in communications. Dedicated spectrum also is important to guarantee low latency, high availability sensing, and communications to support mission critical crash avoidance, driving automation, and active traffic management. ITS America seeks to ensure that any spectrum sharing efforts with either short range vehicle communications (5.9 GHz) or radars addresses critical risks to vehicle/infrastructure services. Immediate actions:

- Include broadband networks in any infrastructure legislation, including broadband funding for rural or otherwise hard-to-serve areas.
- Support a technology-driven approach to spectrum sharing between Wi-Fi and DSRC that allows Wi-Fi use in the 5 GHz band, but in a way that preserves the safety and utility of DSRC without unduly burdening road users and transportation infrastructure operators.

Upgrade our Infrastructure to Accommodate New Automotive Technologies: ITS America believes that road infrastructure must be more accommodating and predictable for next generation vehicles. For fully automated vehicles to navigate safely, roadways must be better maintained and operated, traffic signals further standardized and connected (e.g. V2I), and road signage and lane markings must be maintained or upgraded. New driving conventions, such as how robotic vehicles might “wave through” pedestrians on crosswalks, will be required for robotic vehicles to interact with other road users. Operations research must be conducted in order to ensure that the

infrastructure and traffic codes can be adjusted where necessary to accommodate these new classes of advanced vehicles. Immediate actions:

- Encourage more operational research in addressing how infrastructure upgrades will complement new vehicle technology deployment, such as connected and automated vehicles.
- Upgrade road technology infrastructure—such as power, communications, and security—to ease expansion of vehicle-to-infrastructure mobility and safety applications
- Advocate updates to uniform traffic control device standards and traffic codes where helpful.

Breathe New Life into our Nation’s Transportation System by Expanding Technology Integration: An Internet-of-Things technology ecosystem is developing, but road agencies may be left behind. Integration of multiple technologies infrastructure has been slow, but pays off handsomely. Technologies such as infrastructure monitoring can be leveraged by multiple applications (active traffic management, asset management, traveler information) that all reduce fender benders and other disruptions to traffic—reducing pressure to build new capacity at critical bottlenecks. Rural safety requires more technology to reduce crashes, bridge integrity monitoring to improve infrastructure, and commercial vehicle technologies to smooth freight movements between cities. Market based solutions such as congestion pricing and other travel demand management strategies are important in congested areas. Virtual integration of shared-use mobility with transit is underway to bridge gaps in mobility. Immediate actions:

- Provide guidance and support to Federal, State, and Local agencies on the best way to integrate disparate Federal competitive grant programs to achieve broader safety, mobility and accessibility outcomes. Use programs to encourage deployment of smart community technologies to improve access to jobs, healthcare, education, and housing.
- Besides mobility and safety, advise on how programs can address sustainability and resiliency. Seek programs that can provide better-than-before environmental health—outcomes such as lower emissions and noise. Seek programs that can make transportation networks more resilient to adverse events such as severe weather and to support emergency operations such as evacuations.

Expand Freight Mobility by Establishing Unconventional Systems, such as Ground Delivery “Bots” and Unmanned Aerial Vehicles (UAVs), as New Modes of Freight Transportation: The last mile is the most cumbersome and expensive part of package delivery. New robotic systems under development such as wheeled delivery robots or low altitude unmanned aerial vehicles to address the last-mile could fundamentally change logistics and retail services. Recent Federal Aviation Administration regulations to allow commercial use of UAVs supports traffic reporting and other transportation remote sensing applications but falls short of what is needed to support expanded freight mobility. Restrictions prohibiting “beyond visual range” operation and possibly other limits will hamper commercialization of UAVs. Work needs to take place to expand testing and operations of UAVs. Immediate actions:

- Address constraints to UAVs in next Federal aviation reauthorization and encourage testing and safety/traffic management models for industry and public sector cooperation.
- For ground delivery unmanned robots, encourage a “complete streets” design approach to their integration.

II. *Remove Roadblocks for Deployment of Intelligent Transportation*

Build Public Confidence in the Privacy, Security, and Safety of New Transportation Technologies: New vehicle and traffic management technologies are largely data driven. They have the potential to reduce injuries and fatalities dramatically, but the driving public may be concerned about the privacy implications. For all categories of intelligent transportation, work needs to be done to ensure privacy requirements are well understood, implemented correctly, and communicated clearly to all stakeholders. Outreach needs to be conducted to ensure that drivers (or road agencies) do not eschew new safety technologies because of concerns over privacy. Immediate actions:

- Expand support at the State and Local levels to address privacy of infrastructure technology solutions, and encourage industry and public sector to establish policies such as the auto industry’s recent Privacy Principles for Vehicle Technologies and Services.
- Work to implement existing architecture and standards for ensuring anonymity for Vehicle-to-X communications using DSRC, and engage with NHTSA, FTC, and FCC if necessary.

Leverage Technology to Address the Problem of Distracted Driving Where There Are Practical Solutions and work to change driving culture: Public awareness and education programs are an immediately critical element to reducing driver distraction and must be aggressively pursued to change our seemingly rapidly changing driving culture. However, technological advancements make it possible for drivers to receive critical safety information about the driving environment (e.g. navigation/dispatch systems, and advanced driver assistance systems, etc.). New interfaces such as voice command to control secondary driving tasks like navigation are promising, but constraints on their use should be thoroughly evaluated before technical, legislative, or regulatory remedies are put in place. Immediate actions:

- Encourage more research to understand the complexity of Distracted Driving and the factors that elevate crash risk (or potentially reduce crash risk as in the case of safety technologies).
- Where necessary, establish industry guidelines for new types of driver interfaces, such as voice command systems.

Bridge Gaps between Research & Development and Deployment of New Technologies: Once R&D is completed, new technologies can take decades to be deployed widely. Constraints are often lack of knowledge of cost benefits, lack of expertise in implementing and operating complex systems, and budgetary and procurement challenges. Immediate actions:

- Advocate for more collaborative investment in high-risk/high-reward R&D and operational testing. Use “challenges” and other competitions to foster innovation in getting new technologies and integrated systems deployed.
- Establish a clear roadmap for architecture and standards that are needed to accelerate technology deployment from a commercial/public procurement perspective.
- Identify needs to create or maintain architecture and standards that assure quality, safety, security, accessibility, interoperability, and reliability of products, processes, and services for critical initiatives—such as connected and automated vehicles, or systems that address vulnerable road users (e.g. pedestrians, cyclists, etc.).
- Examine workforce education and training needs to determine if lack of technical skills is limiting deployment of new technologies, especially in public infrastructure.
- With government and industry partners, promote the lifecycle of research, development, adoption, performance management and technology tracking.

Research on Advanced Technologies and Long-Term Impacts to our Transportation System: More Federally funded research around operations and economic research is needed to understand how newly deployed technologies—in the aggregate—might impact transportation systems on a local, regional, and national basis. Use of artificial intelligence is an obvious opportunity to improve safety and mobility, but presents unique challenges that need to be addressed. Human interaction with new technologies such as automated vehicles and the risks of driver distraction still need to be better understood. Immediate actions:

- Establish a clear Federal role and list of priorities that can enable a cross-fertilization of ideas, techniques, and discoveries around foundational elements supporting commercialization of connected and automated vehicle new concepts of mobility such as UAVs.
- Examine long-term issues such as job dislocation because of technology changes and balance those changes with immediate gains from new technology jobs. Analyze skills and education requirements to facilitate new technical jobs in auto and road technology management and maintenance.

III. Support New and Long-Term Funding and Financing for Technology-Driven Mobility and Intelligent Transportation Infrastructure Deployment

Increase Overall Investments in Transportation with a Greater Focus on Technology: Rebuilding and modernizing infrastructure are critical for States and Cities to be competitive in an increasingly global economy. Every \$200 billion in additional infrastructure spending creates \$88 billion more in wages and increases GDP growth by more than a percentage point.[4] Unfortunately according to the American Society of Civil Engineers, the gap between current investment and what is needed to rebuild and modernize the U.S. infrastructure totals more than \$1 trillion.[5] The number one constraint to the deployment of infrastructure technology has been the lack of adequate funding and innovative financing options. Immediate actions:

- Support new and long-term sustainable funding and financing in transportation infrastructure that expand technology-driven mobility investments and preserves the broad ITS eligibilities under the Fixing America’s Surface Transportation Act (FAST Act) to fund technology capital projects and operations and maintenance.
- Advocate for flexible policies regarding Federal/State/Local matching requirements (e.g., 100% Federal funding upfront for technology-driven mobility infrastructure investments).

Promote Innovative Models in Transportation Funding, Finance, Partnerships and Performance Measures: Promote immediate inclusion of technology in infrastructure through public-private partnerships and performance measures. Immediate actions:

- Address potential use of a tax overhaul to fund new and long-term transportation infrastructure and systems with a focus on technology-driven mobility investments.

IV. Reinvest in our Communities through Smart Technology

Communicate the Benefits and Facilitate Deployment of Smart Community Technologies: We are increasingly becoming a more urban and technology centric world. In the United States, more than 85% of the nation’s population live in cities and metropolitan areas. [6] The portion of the world’s population that lives in cities is projected to grow from 50% to nearly 70% by 2050. To adjust to this rapid growth, we will need to identify new ways to assist communities in becoming “smarter” and more efficient. Access to jobs, education, healthcare, and public safety services are critical. Changing how we design, develop, and manage the nation’s critical infrastructure components will be an essential element for any “Smart Community” of the future. Immediate actions:

- To increase support by elected officials and policymakers as well as the general public, show how ITS can improve everyday life. Use the narrative to inspire and make the business and economic case for a safer, faster, more equitable, efficient, and sustainable transportation system.
- Encourage Federal funding flexibility and new funding mechanisms by advocating for flexible policies regarding Federal/State matching requirements (e.g., 100% Federal funding upfront with a back-end match by Locals/State for continuing operations) and other implementation provisions in the FAST Act and any new infrastructure bill related to the deployment of smart technology for communities. Examine the potential use of a tax overhaul to fund infrastructure investment plans.
- In any new infrastructure bill, examine requiring that a percentage of all infrastructure funding must be allocated for Smart community/tech-driven mobility and emphasize performance goals.

Identify Innovation Champions at the Local Level and Educate Them on the Tools for Experimentation:

In most cases at the State and Local level, there is no single public agency that can oversee an integrated “smart community” deployment, so a champion is needed inside government. Procurement processes are often inflexible, making it difficult for public agencies to go outside their traditional base of supply (e.g. start-ups, etc.) or to rapidly iterate and experiment with different technology approaches. Immediate actions:

- Encourage communities to allow Chief Technology Officers or other appropriate officials to use Other Transaction Authority, pilot programs, and similar programs to bypass onerous, time-consuming procurement procedures. Encourage the FHWA to enable better flexibility in the States by using performance level conditions measures instead of the traditional measures.
- Examine Federal restrictions on sole sourcing. Study means to add flexibility to communities (e.g. States, Cities, MPOs, etc.).

Support Proposals that Integrate Federal “Smart Communities” Programs and Provide Resources Where

Appropriate: Support legislative efforts that would improve coordination of smart community programs across the Federal government and provide State and Local governments with technical assistance and resources to help foster the deployment of smart community technologies. Immediate actions:

- Support STEM education and training required for the development and operation of smart communities;
- Support the necessary R&D to enhance the functionality—including cybersecurity and privacy protections—of smart community technologies.

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ITS America's Efforts to Advance Our Legislative, Regulatory, and Other Policy Objectives

ITS America enables cross-industry, research, academia, and public sector collaboration through the thought leadership of its Board, its Leadership Circle, and its Policy and Business and Technology Coordinating Councils. ITS America is establishing a number of task forces to make significant progress in advancing the association's policy priorities as part of this 2017 Roadmap. Groups include:

Task Force on Advanced Vehicles

- Working Groups on Automated and Connected Vehicle Policy
- Working Group on Business Environment and Risk Management

Task Force on Driver/Vehicle Interfaces, Human Factors, and Distraction

Task Force on New Freight Technology & Logistics Environments

- Working Group on Long Haul Freight Technology (e.g., fleet ops, active safety, credentialing, etc.)
- Working Group on Short Haul Freight Technology and Logistics (UAV, surface robots, AVs)

Task Force on Personal Mobility Systems

Task Force on Connected Transportation Infrastructure and Wireless

- Working Group on Traffic Management and Vehicle-to-Infrastructure Communications
- Working Group on Spectrum
- Working Group on Wireless Innovation & Next Generation Technologies

Task Force on Transportation Safety, Security, and Privacy Assurance

- Working Group on Data Sharing and Artificial Intelligence

Task Force on Foundations for Transportation Innovation

- Working Group on Research and Development
- Working Group for Next Generation Workforce
- Working Group on Technology and Access
- Working Group on Sustainability

Task Force on Federal Programs Implementation (FAST Act) and Transportation Finance

ITS America State Chapters

- Working Group on Public Policy Uniformity & Consistency
- Working Group on Federal Performance Measures

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