Connected Vehicle Environment:

Governance Roundtable Proceedings from June 20, 2011

U.S. Department of Transportation

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16. Abstract

This report documents a governance roundtable discussion hosted by the Intelligent Transportation Systems (ITS) Joint Program Office (JPO) on June 20, 2011 at the U.S. DOT's John A. Volpe National Transportation Systems Center in Cambridge, Massachusetts. This discussion was organized as a first step towards establishing an ongoing process for developing a governance framework for the V2V/V2I Connected Vehicle environment. The objectives of the discussion were to: 1) gather information from experts on the topic of governance and how it is defined across different industries; 2) identify multiple approaches to evaluating and developing a governance structure or model; and 3) obtain guidance from roundtable experts and observers on a set of next steps. The roundtable was structured as a one-day forum that engaged six experts in a discussion of governance from a non-transportation perspective.

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Executive Summary

Connected Vehicle Environment

Connected vehicle research is being sponsored by the United States Department of Transportation (U.S. DOT) to leverage the capabilities of wireless technology to make surface transportation safer, smarter, and greener. It is a multimodal initiative that aims to enable interoperable networked wireless communications among vehicles, the infrastructure, and passengers' personal communications devices. The research is being administered within the Intelligent Transportation Systems Joint Program Office (ITS JPO) and focuses on the following areas:

- **Connected Vehicle Safety Applications:** Designed to increase situational awareness and reduce crashes through vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) data transmission by supporting safety applications. Further research will incorporate heavy vehicle crashes including buses, motor carriers, and rail.

- **Connected Vehicle Mobility Applications:** Provides a connected, data-rich travel environment. These applications would capture real-time data from equipment located on vehicles and infrastructure to enhance transportation management.

- **Connected Vehicle Environmental Applications:** Generate and capture environmentally relevant real-time transportation data and use this data to create support and facilitate "green" transportation choices.

- **Connected Vehicle Technology Policy and Institutional Issues: Engage stakeholders** to help guide policy research and options.

The issue of governance is critical to the deployment of these transformative technologies. Research into governance will help address such issues as: the level of governance and when it is needed; roles and responsibilities; ongoing decision making and conflict resolution; and how to analyze governance needs and understand appropriate models for governance.

The ITS JPO organized this roundtable as a first step towards establishing an ongoing process for developing a governance framework for the V2V/V2I Connected Vehicle environment. Understanding that there is expertise in the area of governance for other industries, the roundtable experts were invited to bring their knowledge of challenges, best practices, existing models, process and analytical steps for establishing the most effective options for governance.

Participants in the Discussion

The roundtable discussion took place on June 20, 2011 at the U.S. DOT's John A. Volpe National Transportation Systems Center in Cambridge, Massachusetts. The objectives of the discussion were to: 1) gather information from experts on the topic of governance and how it is defined across different industries; 2) identify multiple approaches to evaluating and developing a governance structure or model; and 3) obtain guidance from roundtable experts and observers on a set of next steps.

The roundtable was structured as a one-day forum that engaged six experts in a discussion of governance from a non-transportation perspective. Most of the experts have an academic background, consult on a regular basis, and have had experience working within a government organization, utility, non-profit, consulting, or legal organization. The participants represented a variety of topical areas, ranging from technology to law (see pages 4-5 for a list of participants and background details).

Sixteen observers were present during the governance roundtable discussion. A complete list of all those in attendance can be found in Appendix A. The role of the observers was to learn and ask relevant questions, but not to solicit advice in any manner. The moderator occasionally asked observers to provide background information, pose questions, or to clarify points. This roundtable was conducted in accordance with all Federal Advisory Committee Act (FACA) guidelines.

Summary of the Day

The moderator for this discussion was Mr. Robert Johns from the Volpe National Transportation Systems Center. Mr. Johns welcomed the experts and observers and discussed the objectives for the day (see a copy of the agenda in Appendix B). He introduced Mr. Terry Regan from the Volpe National Transportation Systems Center as co-facilitator. He then introduced the sponsor of the roundtable discussion, Ms. Valerie Briggs from the Intelligent Transportation Systems Joint Program Office. Ms. Briggs then presented an overview of the U.S. DOT's ITS Program and the research being conducted under the Connected Vehicle program (see Appendix C for a copy of the slides).

The experts were then asked to introduce themselves and briefly explain their experience with governance structures. The observers also introduced themselves and provided an overview of their experience in the transportation field.

The first session began by exploring how governance is defined, what elements are critical to governance, and how these elements operate as part of a governance model. The second session used concepts discussed in the previous session to begin the discussion on how to address governance needs for the Connected Vehicle program and what steps are involved in developing governance options. The third session focused on the risks and challenges associated with developing governance. Finally, the roundtable concluded with a summary of key takeaway points compiled during the day and provided an opportunity for any final questions and comments.

The experts expressed an interest in remaining engaged in the Connected Vehicle governance process and stated interest for participating in another roundtable where the ITS JPO would present preliminary options for a governance model.

Discussion Summary

The governance roundtable was divided into the following sessions:

- Overview of the ITS Program and Connected Vehicle Research

- Introduction of Experts and Observers

- Concept of Governance and Existing Models

- Developing Governance

- Risks and Challenges

- Outcomes, Key Takeaways and Next Steps

Overview of the ITS Program and Connected Vehicle Research

To anchor the roundtable discussion, Ms. Briggs presented an overview of the US DOT's ITS Program, including its vision, goals and structure. The vision is of a connected transportation system in which vehicles, fixed infrastructure and mobile devices share information with each other, allowing them to manage their interactions for their collective benefit. The primary goal is safety—crash avoidance—but a broad range of other valuable applications is also envisioned. The program is structured in terms of classes of benefits: safety, mobility, and the environment. Cutting across those program areas is work in application, technology and policy development.

Presentation slides for the ITS Program and Connected Vehicle Research discussion can be found in Appendix C of this document.

Introduction of Experts and Observers

Each expert was asked to introduce themselves and to discuss their background, relevant roles, and experiences in defining governance structures. The objective of these introductions was to highlight the range of expertise and perspectives of the roundtable participants. Biographies of each of the experts are listed below.

Lisa Blomgren Bingham is the Keller-Runden Professor of Public Service at Indiana University's School of Public and Environmental Affairs, Bloomington. She is also a Visiting Professor of Law at the University of Nevada at Las Vegas Boyd School of Law and a Senior Research Fellow at the Maxwell School of Syracuse University. Her current research examines dispute systems design and the legal infrastructure for collaboration, dispute resolution, and public participation in governance.

Aaron Brauer-Rieke is a Plesser Fellow at the Center for Democracy and Technology (CDT). CDT is a non-profit public interest organization dedicated to promoting the democratic potential of the open and decentralized global Internet, by conceptualizing, developing and implementing public policies that will keep the Internet open, innovative and free. Prior to joining CDT, Aaron worked as a law clerk at Weil, Gotshal & Manges LLP, where he focused on patent and digital media litigation. Aaron also interned with the ACLU of Northern California, where he focused on privacy, free speech, and emerging technology issues.

Hans K. Klein is Associate Professor in the School of Public Policy at the Georgia Institute of Technology. His main area of research is Internet governance, especially as it relates to globalization. He also studies community media, especially public, educational, and governmental (PEG) access television, and political organizing using the Internet. Other research interests include US technology policy for large technical systems and theories of the social construction of technology.

Jon M. Peha is a Professor at Carnegie Mellon University (CMU) in the Department of Engineering & Public Policy and the Department of Electrical & Computer Engineering, but has been on leave from CMU for over two years to serve in the U.S. Government, first as the Chief Technologist of the Federal Communications Commission, and then as Assistant Director of the White House Office of Science & Technology Policy. His research spans technical and policy issues of communications networks, including spectrum management, broadband Internet, wireless networks, video and voice over IP, communications for emergency responders, universal service, secure Internet payment systems, dissemination of copyrighted material, e-commerce, and network security.

Jim Rossi is a Professor and Associate Dean for Research at Florida State University College of Law. He teaches Torts, Administrative Procedure, Antitrust, and Energy Law and Policy. Professor Rossi is recognized for his scholarship on participation in administrative procedure at both the federal and state levels, as well as his work on legal and economic barriers to competition and climate change policies in energy industries.

Stefaan G. Verhulst is the Chief of Research at the Markle Foundation, a private, not-for-profit philanthropy working to advance health and national security through the use of information and information technology. Verhulst is also a Senior Research Fellow at the Center for Global Communications Studies, Annenberg School for Communications, University of Pennsylvania; an Adjunct Professor in the Department of Culture and Communications at New York University; and a Senior Research Fellow for the Center for Media and Communications Studies, Central European University in Budapest. He has served as consultant to various international and national organizations, including the Council of Europe; European Commission; United Nations Educational, Scientific and Cultural Organization (UNESCO); World Bank Group; United Nations Development Programme (UNDP); United States Agency for International Development (USAID); and the United Kingdom Department for International Development (DFID).

Concept of Governance and Existing Models

This session focused on the concept of governance, what critical elements are necessary in a governance structure, and how these elements operate as part of existing governance models within the public sector and/or industry. The following two questions were used to launch the discussion:

- In what industries or areas are existing governance models applicable?
- What best practices can be drawn from prior experiences?

The following industries and areas were highlighted by the experts as models of governance structures:

1. **Healthcare Industry / Health Information Technology**
   - *Markle Connecting for Health*
     This is a public-private collaboration whose goal is advance the quality of healthcare in the United States through innovations in information technology. Connecting for Health has created a framework of policy and technology practices for exchanging medical information while protecting privacy.
   - *US Dept of Health and Human Services (HSS)*
     HSS is currently in the process of developing a Nationwide Health Information Network. Two Federal Advisory Committees have been initiated to advise HSS – 1) Health Information Technology Standards Committee to advise on federal health IT standards issues; and 2) Health Information Technology Policy Committee to establish a framework for governance of the Nationwide Health Information.

2. **Public Safety / Emergency Response Communications**: Highlights the issue of interoperability between first responders and public safety agencies as well as issues dealing with spectrum sharing.

3. **National Institute of Standards and Technology (NIST):** NIST is the federal technology agency that works with industry to develop and apply technology, measurements, and standards. This provides an example of challenges with technology adoption due the private sector struggling with costs and impacts. NIST is also working on cyber security issues, such as the National Strategy for Trusted Identities in Cyberspace, that can provide relevant examples.

4. **Internet / ICANN (Internet Corporation for Assigned Names and Numbers)**: ICANN coordinates a global governance structure and develops policy to oversee all of the Internet's unique identifiers or addresses. ICANN is an example of governance structures already being in place (implemented by the US Department of Commerce) but then dismantled and reconstructed to transition management to the global community. Developing the structure and technical standards also has societal and political implications: for instance, when they were developing web addresses whether or not to use "xxx" as a URL suffix became a critical social challenge to moving forward.

5. **Smart Grid:** This project aimed at modernizing the electrical transmission and distribution system within the United States to increase efficiency and to give consumers better control

over their electricity usage and costs. Governance issues include dealing with privacy of consumer data and security issues as well as answering the question of data ownership. The answers to these questions can create implications for innovation.

6. **Telecommunications / Cell phone industry:** The governance of the cell phone industry is relevant (may not necessarily be a model) but a parallel transportation communications system.

7. **Privacy reports:** The Federal Trade Commission and Department of Commerce both released separate preliminary reports on consumer privacy at the end of 2010. Each report has differing but interesting views on privacy and enforcement.

8. **Fair Information Practice Principles (FIPPs):** FIPPs offer a solid model on how to best deal with information from a privacy perspective and information management perspective. The Department of Homeland Security (DHS) has a very well designed set of FIPS. The Department of Health and Human Services (HHS) and Organisation for Economic Co-operation and Development (OECD) also have good FIPS in place.   Using FIPS implements a process of identifying for what purpose the information will be collected and determine if the correct information is being collected.

9. **Cognitive radio:** This is an example of governance structure that used to be a federal government function, but is now in a private sector laboratory which has been delegated a government role. Also deals with issues concerning wireless governance, spectrum sharing and white space.

When discussing these industries, the experts highlighted the following critical elements of governance and lessons learned from their own experiences:

- Multi-stakeholder engagement is critical.
- Accountability structures must be in place to prevent certain actors from dominating the process.
- Technology and policy should be developed simultaneously. Avoid developing technology and then evaluating policy as an afterthought. If technical standards have been established early without considering governance, it becomes more difficult to integrate and implement a sound governance structure later in the process.
- Governance should be developed in concert with policy and the two should not be divided into separate tracks. There is concern that having policy and governance as separate tracks and expecting to marry the two ideas at the end of the process could be difficult.
- Technical decisions are rarely only technical decisions, instead they tend to have social and economic implications.
- Identify "veto points" early in the process. At a minimum, stakeholders that have the ability to say yes or no to a project should be involved early. It is important to identify the impact of stakeholders being able to reject in downstream implementation.
  - Example: An observer shared an example of a state department of transportation using federal funding as a 'tool' to support deployment. However,

under new administration, the federal funding for the mobility application was stopped due a policy shift. This was an unpredictable veto, but identifying it early as a potential veto point could have pointed to the need for a 'Plan B'.

- o Example: Looking at electric power transmission as a model, there are at least 15 different agencies that have potential veto power over high-voltage lines. The Obama Administration helped establish an MOU among the agencies about the basic *process* for citing any such power line, rather than having them dive into the details of a particular power line and negotiate on a case-by-case basis.

- Examine all possible linkages and tradeoffs for involved stakeholders. This will help to prevent issues from cropping up unexpectedly throughout the process.

- Consider what information is being collected and stored. This may warrant establishing a privacy working group. Examine questions such as: What information are you collecting? How long will it be stored? How is the consumer or public being informed? There needs to be "privacy by design" early in the process. It is important to understand that not all information can or should be treated equally.

- Identify the intersection between governance and information, specifically the role of information ownership. Consider the implications for innovation and competition based on the governance structure and data ownership.

- Identify and separate the types of information gathered (for instance, data can be classified as generic, androgynous, user specific, or incentive-based, among others) and determine if the governance structure will include the right to exclude access to certain information. Consider if collecting different types of information will result in different policy implementations.

- Examine the end-to-end principle:
    - o In an 'open network', such as the Internet, there are very few control points in the network itself and it is based on simplicity and openness.
    - o The Internet is constantly "bleeding" access / data, which spurs innovation, making it easy for entrepreneurs to gather data and generate new ideas. Bleeding can have positive aspects.
    - o Open standards and open access can be beneficial, but one should remain conscious of possible security issues.

- When evaluating government stakeholders, look from both the horizontal and vertical perspective. Horizontally means evaluating all inter-agency ties within one level of government. Vertically is between different levels of government, for example, between state and local. Typically, local and state entities are responsible for implementation, which could have a large effect on governance.

- It is necessary to integrate all of the stakeholders by crossing boundaries and viewing holistically.

- Engage the public and give voice to all groups during the governance process.

Developing Governance

The purpose of this session was to examine how the concepts discussed in the previous section can be applied to the Connected Vehicle program. First, the discussion focused on identifying elements that a governance framework should or should not include. Also discussed are the steps involved in developing a set of governance options for the Connected Vehicle program.

There were several overarching themes for suggested approaches to building a governance system, recognizing that there is not one governance structure that will suit all needs. The key point is to learn from existing models – think in terms of what principles should be embedded within the governance system and then look at models for best practices based on principles. The first step in building a governance system is to define the mission, set goals, and list principles you want to adhere to based on the established mission. This is followed by mapping the exiting governance structure to identify interests and stakeholders, existing processes and functions, and actions that have already been taken that may affect the outcome of the program.

Defining Mission and Goal Setting

- First determine a mission for the program. Experts asked if the mission was to create a platform upon which others can innovate, or is the mission to create a closed system where information is only exchanged through trusted entities? The participants saw these as two fundamentally different foci. A focused mission will help to define and evaluate the work ahead.

- Using the mission as a guide, establishing and understanding substantive goals of the program lays the foundation for establishing good governance. What is the ultimate goal?

- Define the principles necessary for what you want to achieve and based on the mission established. The principles should be defined early so that people will trust the process. Governance processes should include:

  o Participation / Voice – Those who will be impacted by the system will need to be part of the decision making process

  o Accountability – How do you deal with disputes?

  o Representation – Recognize stakeholder participation and interests

  o Transparency – Need to be clear on how and why decisions were made

  o Efficiency – Recognize that there are trade-offs with participation

  o Flexibility – Don't lock into decisions that may lead to stalled innovation

- Identify best practices to use as models when developing principles. As questions such as "What are models for accountability? Dispute resolution? Transparency? Participation? Voice? Efficiency and effectiveness?" Use a blend of models to create the program best suited to meet mission and goals.

- Evaluate the list of defined principles. For example, should accountability outweigh other principles?

- Separate goals from regulatory tools.

- Do not lose sight of the mission once it is established. How does the proposed governance structure support the mission? Remember that it is not about adopting technology; instead it's about what you want to do with the technology. For example, the electronic medical records initiative is not about the technology for collecting records, but about improving health. The performance measures or goals developed for this initiative should be based on improving heath in this case. Records are only the technological tool.

Prior to further discussion of next steps in establishing a governance structure, the experts asked for further description and clarification of what the goals are for the Connected Vehicle program. Ms. Briggs stated that the first and foremost goal of the program is to protect safety by reducing crashes and the resulting deaths and injuries. It was further explained that safety applications are based on different concepts than mobility applications, resulting in potentially different goals. Safety applications will use a more controlled environment with an architecture based on trust and interoperability. Mobility applications may be an open platform with basic, minimal standards to potentially create an entrepreneurial environment. Research is ongoing to determine how basic data standards can be established for mobility applications that allow openness for innovation and other opportunities but can also provide the necessary controls required for safety.

Observers provided feedback of this view based on their own experiences. Several comments were made about how in their experience and day to day operations, that there is less distinguishing between mobility and safety, and that in some cases, mobility is the primary focus (from the perspective of an owner / operator). This highlighted how various stakeholders are viewing the Connected Vehicle environment from different perspectives. The experts agreed that this shows the possible tensions between goals. This helps to identify where the most contentious issues lie and by identifying them early in the process they will not be a surprise further down the road. This demonstrates why the goal setting exercise is so valuable.

Ms. Briggs also explained that the National Highway Traffic Safety Administration (NHTSA) has committed to conducting the evaluation for making an agency decision on V2V safety applications in light (passenger) vehicles in 2013 and heavy (trucks and buses) vehicles in 2014, which could result in a decision to move forward with regulation to require technology on new vehicles, processes to encourage consumer adoption, identification of the need for additional research or no action. The decision processes will require a rigorous evaluation of the research results.

Specifically related to the Connected Vehicle program, the experts provided the following input when trying to establish goals:

- When defining goals, remember to consider tradeoffs:
    - What are the trade-offs of establishing trust for safety applications?
    - What information can't be collected based on this system?
    - If data isn't trusted and I can't collect it, am I losing valuable data?
- Identify the leverage points for the 2013 and 2014 (NHTSA) agency decisions.

- Consider two differing approaches to building a governance system and identify which would be more applicable to the Connected Vehicle environment:

- o The organic evolution approach – getting the system up and running and learning by doing. This could build confidence with the things that work early on, a way of "growing" a system. This is a more reactive approach.

- o The holistic approach – a total systems or systems engineering approach which identifies risk areas, creates process and policies to mitigate these risks, institutes controls to ensure compliance with policies, and sets benchmarking metrics to track the success of the initiative. A holistic approach uses a distributed governance model that can bring enterprise (many agencies) to the table early in the process.

- When considering a holistic versus organic approach, it seems that vehicle technology is more holistic in nature because intelligence embedded in a vehicle usually has a long shelf life. This is compared to a cell phone – cell phones go through a generational change about every 2 years compared to a vehicle's 10 years or more.

- Think about how governance and the management framework can change over time and establish a framework that can be adaptable. It is difficult to predict how well governance will adapt to problems for which they were not designed.

- Make a distinction between safety and mobility goals and approaches. The safety goals and approach would seem to generate fewer privacy concerns than the mobility goals and approach. The appropriate role of government may be different in each of these cases.

Examples from other sectors pertaining to goal setting:

- The goal of a particular health space organization was to create interoperable standards. The result was that the organization over-engineered the standards and lost sight of the goals of improving health. It became a tradeoff of health versus the best interoperable system ever. Questions should have been asked such as "What is good enough?" or "What is trusted enough?"

- There was a parallel dysfunction the electric grid industry. There was a large focus on standards but not enough focus on privacy or consumer protections. This imbalance was not aligned with the objectives of SmartGrid.

Key Takeaway Points from Discussion of Mission and Goal Setting

- ➢ It is important to have the mission spelled out from the beginning
    - o Is it about enhancing safety or the environment and mobility?
    - o It is about establishing trust and interoperability?

- ➢ There is a need to better define the program's goal for governance and to ask the question of what is the ultimate goal. Is the ultimate goal safety or are there other themes that we have not explicitly identified? Are there many, possibly wide ranging, goals that need to be satisfied?
    - o Create real-time safety applications
    - o Create an open connected platform that enables a transformative world

- ➢ A goal for V2V/V2I safety systems (to reduce crashes) will require a different governance process versus a goal for enabling mobility and environmental applications. It seems that a

government role may be appropriate for advancing safety, it's not as clear that a strong government role will be necessary for areas outside of safety, such as mobility.

➢ Goals will help to determine which stakeholders will be at the table.

Governance Mapping

After establishing the goals and principles to embed into the governance structure it is important to identify what other agencies or organizations currently exist in the governance space. This can be done through mapping. Mapping helps to understand the lay of the land, identify the coordinating agency, and identify who has the power to enforce interagency coordination. A mapping document should show all of the organizations involved, who they are, who they represent, what their interests area, and their relationship to other stakeholders. It is important to map interests and stakeholders to help better identify which stakeholders should be included in the discussions throughout the process. The experts suggested mapping the following elements:

- Stakeholders – show who is central to the network and what relationships are present between stakeholders
- Roles of Federal, state, and local government
- Roles of public institutions
- Sub-groups of expertise to use in developing multiple working groups
- Groups of stakeholders that could be combined to have a representative in the process, instead of inviting each stakeholder to the table
- Operational network – who is in charge of each particular aspect, who has authority to make decisions?
- Budget categories and public spending trends

Key Takeaway Points from Discussion of Mapping

➢ Define your governance space and identify other stakeholders within it.

➢ Determine what each stakeholder is doing and any relationships present between stakeholders.

➢ Consider how you would need to coordinate with these players to build your governance space.

Developing Governance – Functions and Tools

This discussion began with the question, "What does the ITS JPO need to do to develop a governance structure?" The experts responded that the first step is mapping, as previously discussed. The next step is to identify what different types of governance take place within a system

and what governances are needed. These governances typically are at different levels and could require different processes:

- o   Technical standards
- o   Regulatory governance – involves typical decisions on price setting, anti-trust issues
- o   Public policy governance & values – moral / social values, issues surrounding privacy
- o   International governance – international affairs, national security and defense

The system is complicated because it involves different types of governance, each with its own processes, and all levels need to interact with each other. Each type of governance may be at a different stage of development. Acknowledge that different stakeholders (government versus private sector) move at different paces. Also, different processes provide different types of legitimacy. Start by taking an inventory of the various governance structures currently in operation. Determine what would be needed for the Connected Vehicle program and consider how existing structures may need to evolve. Determine if something completely new would need to be developed.

It was suggested to look at the model of Rulemaking Workshops and Negotiated Regulations (RegNegs) in various case studies. There are several common themes present in various RegNeg examples:

- Best if you commit yourself to a representative process – map everyone at the table
- Identify sub-groups of expertise – this worked well when larger groups were broken into subgroups on technical issues versus policy
- Size of the overall group matters – there are optimal sizes for each particular problem to encourage engagement
- In the environmental context, RegNeg has been highly successful as conveners to provide options to try to frame the decisions within a discussion
- RegNegs can only get the ball moving to identify critical issues, create consensus, or help mitigate disputes. The decisions are not binding on the agency or stakeholders. This has typically been used by the U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) in developing industry standards.

Also look at information governance frameworks when evaluating privacy. Would these frameworks be relevant in a much larger data environment? Governance needs to answer:

- For what purposes is the information collected?
- When collected, is that enough information to deal with that purpose?
- Am I collecting data that is not necessary?
- What do you do when you want make a change in the information being collected?
- How do you resolve disputes? Who is involved in the resolution? What are the remedies?

One suggestion is to examine what the Federal Trade Commission has done regarding privacy. They have created FIPPs – Fair Information Practice Principles – a series of reports, guidelines, and

model codes that represent widely-accepted principles concerning fair information practices. The Department of Homeland Security FIPPs are probably the most modern example.

After mapping the various stakeholders and interests, the next step is to examine the different processes or functions of governance. The functions can help to work towards certain goals, such as trust and interoperability. Mechanisms will need to be developed to perform each function. These processes will then need to be prioritized according to the established mission, goals and principles. Each time a decision is made about one of the processes listed below, the principles should be revisited to see how they measure.

- Identification
- Oversight
- Enforcement
- Certification
- Coordination

The experts highlighted some key points when discussing various processes:

- Do not 'over-develop' standards. In examples related to the health and energy industries too many standards were initially developed which resulted a processes and systems that were too complex to implement.

- Consider the use of 'soft law' where standards are set and then benchmarking is established to determine if people are meeting benchmarks voluntarily.

- Cognitive radio is an example of transitioning certification as a wholly government function to the private sector. Initially the Federal government set standards and certified devices. The certification of technology for interoperability and safety is now done by a commercial sector laboratory, while the government acts in a delegation role by maintaining certification standards. Real-time safety applications for the Connected Vehicle environment will need to be certified but could possibly follow a similar model to cognitive radio.

- It is better to have multiple certifiers. This keeps standards high and encourages competition.

- Certification can be a great enforcement tool, but it can have unintended consequences – it can lock in a certain type of technology and inhibit innovation.

- Consider to what extent enforcement can be privatized if a public good (such as safety) is involved. Look at the health industry as an example – the Federal government has set rules and instituted enforcement according to the rules.

- Funding can be a valuable and powerful governance tool depending on who is transferring funds and what criteria is established for funding transfers. Funding could affect technology development and selection, how the technology is deployed and the governance structure selected. Fully understand your regulatory tools and their potential cost implications. Recognize that there are costs even with self-governance. Consider a cost-benefit analysis or value proposition.

- Consumer protection is important, and the end user must be represented in the processes of governance.

Specifically related to the Connected Vehicle program, the experts provided the following input when discussing governance development:

- Divide portions of the Connected Vehicle program into separate elements. In particular, examine safety requirements separate from mobility requirements. A similar idea was used in the health industry. Developers focused on the key elements for simple information exchange but identified some areas for higher security.

- The Internet as a whole is not necessarily a good model for Connected Vehicles since the Internet is open and insecure and therefore risky. The DOT standards seem high – making tolerance for failure low. However, the Internet includes many different models (ITF, ICANN, etc.) that contain some useful elements, particularly information management. These models can guide thinking around information flows within an infrastructure by considering questions such as "Where is the information going?" and "Who is using the information?". There are many models for managing complex information systems.

Key Takeaway Points from Discussion of Developing Governance

- There is no one governance structure that will be applicable to the Connected Vehicle program – there needs to be a collection of best practices.

- Narrow goals before exploring processes to support these goals.

- Identify trade-offs early in the process. There are trade-offs when considering goals, principles, and supporting processes. For instance, transparency and efficiency are usually in conflict. Look at the vulnerabilities and risks and decide where flexibility is desired.

- Identify areas where you might have market failures that will impact the governance model. Consider where the Federal government is needed most.

- Consider how much you care about failure. How much tolerance for failure do we have in our system at different levels? Systems that are less tolerant of failure tend to also be less supportive of innovation due to the need for centralized control and limited access. Evaluating failure will determine levels of tolerance and drive the need for control and oversight. Goals need to be carefully spelled out.

Risks and Challenges

In this session, the discussion focused on the risks and challenges associated with developing governance. The objective was to understand lessons learned, risks, and challenges associated with the development process. Below are some of the challenges identified by the experts.

- The state and local agencies are concerned about investment required. Can they afford the increased amount of equipment in the field that this technology will require?

- Identify where there are tensions and contentious issues. What are the leverage points?

- The Europe model appears to be promoting competitiveness.

- The most innovative systems allow for short generational turnover and for obsolescence.

- The privacy issues are less challenging with safety related work than with mobility.

- A certification process can lock in technology and can have unintended consequences.

- There is a risk in dealing with a program that requires large data collection. This increases the privacy issues and adds to the complexity of the task.

- Competing interests – if the primary goal is safety of life, then failure prevention may be more important than innovation when developing a governance structure. A centralized governance structure may be necessary if failure prevention is a high priority.

- Jurisdictional issues between federal/states/local entities – Experts recommend taking an inventory of existing governance structures to evaluate where these issues could pose a problem. Memoranda of understanding may help establish agreements between different entities and can help to identify veto points.

- It is important to understand privacy issues early on, specifically as they relate to FIPPs, as this will support the governance process. It may be useful to develop a privacy/security working group to discuss these types of issues.

- The issue of information management should be addressed. V2I results in large amounts of information being collected by infrastructure, but what are the standards and governance around the use of this data? There could be different models of governance for V2V communications and V2I communications. For what purpose will information be collected and what are the standards around this?

Outcomes, Key Takeaways, and Next Steps

As a conclusion to the roundtable discussion, Mr. Johns presented key takeaway messages from the day and then allowed for any final questions and comments from experts or observers. The key points of the discussion were highlighted as follows:

- The discussion confirmed an important understanding that governance is about managing risks and relationships, but that that is too simple of a definition. The experts helped to dissect the concept of risk and provide equations that map risk to innovation. This will be helpful for thinking about the application development part of the Connected Vehicle program.

- This expanded definition of governance:

    o   Allowed for recognition that governance is a multi-layered, multi-level, and multi-stakeholder process. It was illustrated how to identify different levels and how governance and who is at the table might significantly differ based on these levels.

    o   Provided new ways to think about features and principles that define governance.

    o   Provided guidance on first steps, specifically:

        ▪   Defining the mission and objectives clearly and some consequences for not doing this well.

        ▪   Mapping the governance space to understand who is already in the governance space and what to consider early on, such as where MOUs and agreements between stakeholders may be necessary.

- o Gave greater nuances to governance regarding:
    - The VETO concept and how power comes from legislative authority, funding, or consensus.
    - Downstream dispute identification.
    - Concept of the governance space and who is playing in it.
    - Ideas for collaboration, especially sub-working groups and coordinating groups to meet mission and objectives.
- There is more than one governance structure involved – multiple governances are needed for managing complex information systems.
- With each industry model discussed, there were several important insights highlighted:
    - o The various ways to consider the holistic and systems engineering approach versus organic and evolutionary concepts.
    - o How to think about flexibility of features to incorporate into the program.
    - o Different ways to consider risk because of the concept of tolerances and identifying what risks can be identified early.
    - o The importance of breaking down the system to think about roles and responsibilities, data flows to understand who has access and what policies there are on data use, and that there are different types of data. All of these categorizations will help define different aspects of governance.
    - o Authority mapping is critical.
    - o Opt-in/opt-out is a useful concept but inadequate to protect collection and use of personal data.
- Examine examples of FIPs, RegNegs and Rulemaking Development Workshop case studies, and mapping used in other industries.
- There are some inherently governmental roles in safety applications – do we define them as wholly system environments or think about other frameworks?

Ms. Briggs then discussed why the roundtable was an important step towards establishing an ongoing process for developing a governance framework for the V2V/V2I Connected Vehicle environment. The experts expressed an interest in remaining engaged in the Connected Vehicle governance process and stated interest for participating in another roundtable where the ITS JPO would present preliminary options for a governance model.

The roundtable then concluded with Ms. Briggs thanking Bob Johns for moderating and Terry Regan for facilitating. She also thanked the experts and observers for their time and input, and then adjourned the meeting.

APPENDIX A. List of Participants and Observers

Moderator
Robert Johns
Director, Volpe National Transportation Systems Center
Research and Innovative Technology Administration, U.S. Department of Transportation

Facilitator
Terry Regan
Community Planner, Volpe National Transportation Systems Center, Research and Innovative
Technology Administration, U.S. Department of Transportation

Presenter
Valerie Briggs
Team Lead, Knowledge Transfer and Policy
Intelligent Transportation Systems Joint Program Office (ITS JPO)
Research and Innovative Technology Administration, U.S. Department of Transportation

Roundtable Experts
Lisa Blomgren Bingham
Professor and Keller-Runden Chair in Public Service
School of Public and Environmental Affairs, Indiana University

Aaron Brauer-Rieke
Plesser Fellow, Center for Democracy and Technology

Hans Klein
Associate Professor, School of Public Policy, Georgia Institute of Technology
Scientific Committee Member, Internet Governance Project

Jon Peha
Professor, Department of Engineering and Public Policy, Department of Electrical and Computer
Engineering, Carnegie Mellon University

Jim Rossi
Harry M. Walborsky Professor and Associate Dean for Research, Florida State University College of
Law

Stefaan Verhulst
Chief of Research, Markle Foundation
Senior Research Fellow, Center for Global Communications Studies, Annenberg School for
Communications, University of Pennsylvania

Roundtable Observers

John Harding
Intelligent Technologies Research
National Highway Transportation Safety Administration (NHTSA)

Tom Schaffnit
President, VII Consortium
Advanced Safety Systems, Honda R&D Americas, Inc.

Barbara Wendling
Member, VII Consortium,
Active Safety, Mercedes-Benz Research & Development North America, Inc.

Shizuka Georgieva
Member, VII Consortium
Toyota Motor North America

Rick McDonough
Division Head, Office of Modal Safety & Security, New York State Department of Transportation, AASHTO

George Webb
County Engineer, Palm Beach County, Florida State Department of Transportation, AASHTO

Greg Larson
Office Chief, Traffic Operations Research, California Department of Transportation, AASHTO

Dr. Richard John
Director Emeritus, Volpe National Transportation Systems Center
Research and Innovative Technology Administration, U.S. Department of Transportation

Anne Aylward
Deputy Associate Administrator for Research, Innovation and Technology, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

Gary Ritter
COI Director, Advanced Transportation Technologies, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

Suzanne Sloan
Industry Analyst, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

Anita Kim
Operations Research Analyst, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

Valarie Kniss
General Engineer, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

Julie Nixon
Operations Research Analyst, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

Matt Cuddy
Community Planner, Volpe National Transportation Systems Center, Research and Innovative Technology Administration, U.S. Department of Transportation

APPENDIX B. Agenda for the Day

9:30 AM   Welcome by Mr. Robert Johns, Director, Volpe Center
- Goals: Learning about Governance
- Role of Observers
- Introduction of Mr. Terry Regan as Facilitator
- Introduction of Ms. Valerie Briggs, Sponsor of the Governance Roundtable

9:40 AM   Overview of the ITS Program Needs

- Needs: Understanding options for the research path the U.S. DOT is embarking on
- Introduction to Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) concepts
- Business propositions:
  - Transformations in Safety for Public Sector
  - Additional benefits in Mobility and Environment
  - New markets

10:00 AM   Introductions of Experts and Observers
- Introduction of Experts:
  - What is your role and what are your experiences with defining governance structures?
  - What have been the outcomes of your work?
- Introduction of Observers

11:00 AM   *Break*

11:15 AM   Concept of Governance and Existing Models
- In what industries or areas are existing governance models applicable?
- What best practices can be drawn from prior experiences?

12:15 PM   *Lunch*

1:15 PM   Developing Governance
- Can we collectively develop a clear definition of governance in context of the V2V/V2I system and technologies?
- How does one conduct /perform analysis to understand what governance is needed?
- What should be avoided during the process of establishing governance for V2V/V2I?

- How does one consider the balance between public sector and private sector roles and responsibilities? What are the trade-offs?
- How does governance change/shift with the use of tools such as certification, standards, policies on access/control, or enforcement?

2:15 PM   *Break*

2:30 PM   **Risks and Challenges**
- Which types of risks can be addressed early? Which are unpredictable?
- How have the risks and pitfalls been mitigated best in your experience?

3:30 PM   **Outcomes, Key Takeaways, Summary, Next Steps**

4:00 PM   **Adjournment**

APPENDIX C. Presentation Slides – Overview of ITS Program and Connected Vehicle Research

Overview of ITS Program and Connected Vehicle Research

Valerie Briggs
Team Lead, Knowledge Transfer and Policy
Intelligent Transportation Joint Program Office (ITS JPO)

Governance Roundtable
June 20, 2011
Volpe National Transportation Systems Center
Cambridge, MA

What is the ITS Program?

- **Federal (US DOT) ITS Program:** focuses on intelligent vehicles, intelligent infrastructure and the creation of an intelligent transportation system through integration with and between these two components

- **Intelligent Transportation Systems Joint Program Office (ITS JPO):** is an element of the US DOT Research and Innovative Technology Administration (RITA) and is charged with implementing the ITS Program by conducting research in technical and policy areas and fostering the development and evolution of ITS.
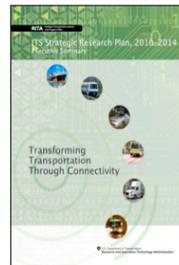
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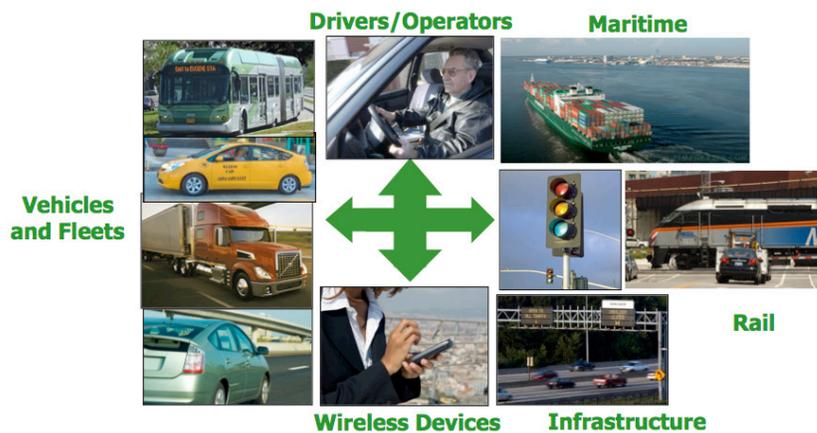
ITS Strategic Research Plan 2010-2014

Vision

Research and facilitate a national, **multimodal surface transportation system** that features a connected transportation environment around **vehicles of all types**, infrastructure, and portable devices to serve the public good by leveraging technology to enhance safety, mobility, and environmental performance.
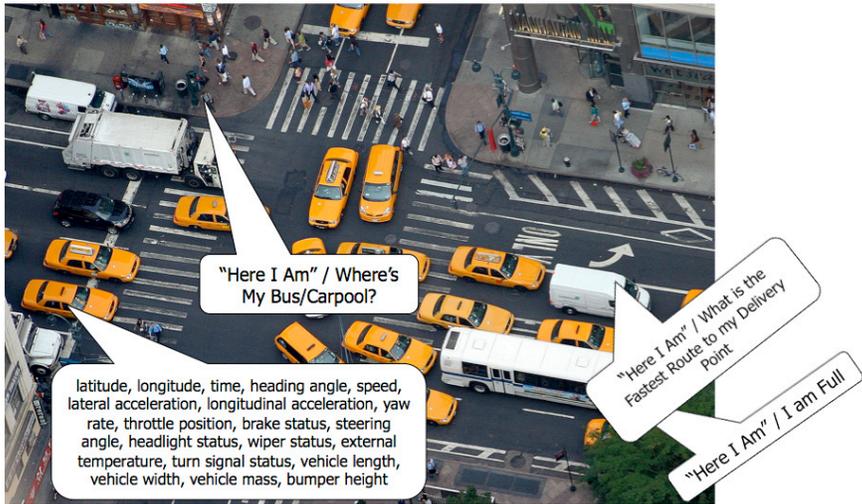
Plan developed with participation from multi-modal administrations and stakeholders.

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ITS Research = Multimodal and Connected

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A World With Connected Vehicles and Travelers

"Here I Am" / Where's My Bus/Carpool?

latitude, longitude, time, heading angle, speed, lateral acceleration, longitudinal acceleration, yaw rate, throttle position, brake status, steering angle, headlight status, wiper status, external temperature, turn signal status, vehicle length, vehicle width, vehicle mass, bumper height

"Here I Am" / What is the Fastest Route to my Delivery Point

"Here I Am" / I am Full

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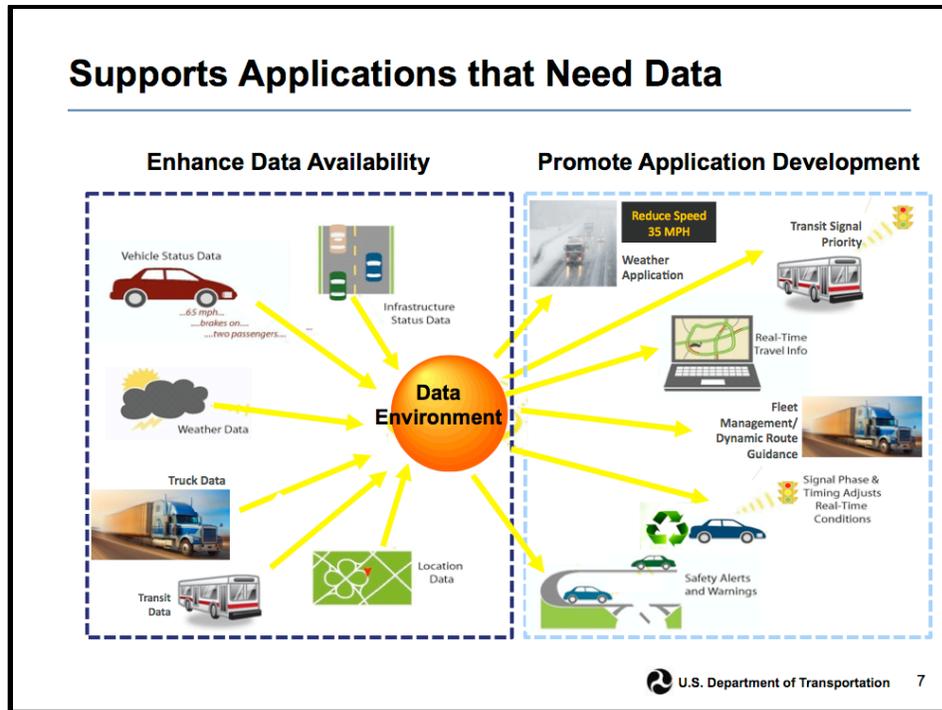
Opportunities for Higher Safety

- **Greater awareness**
  - Vehicles can hear nearby vehicles and know roadway conditions that are not visible
- **Crash reduction through:**
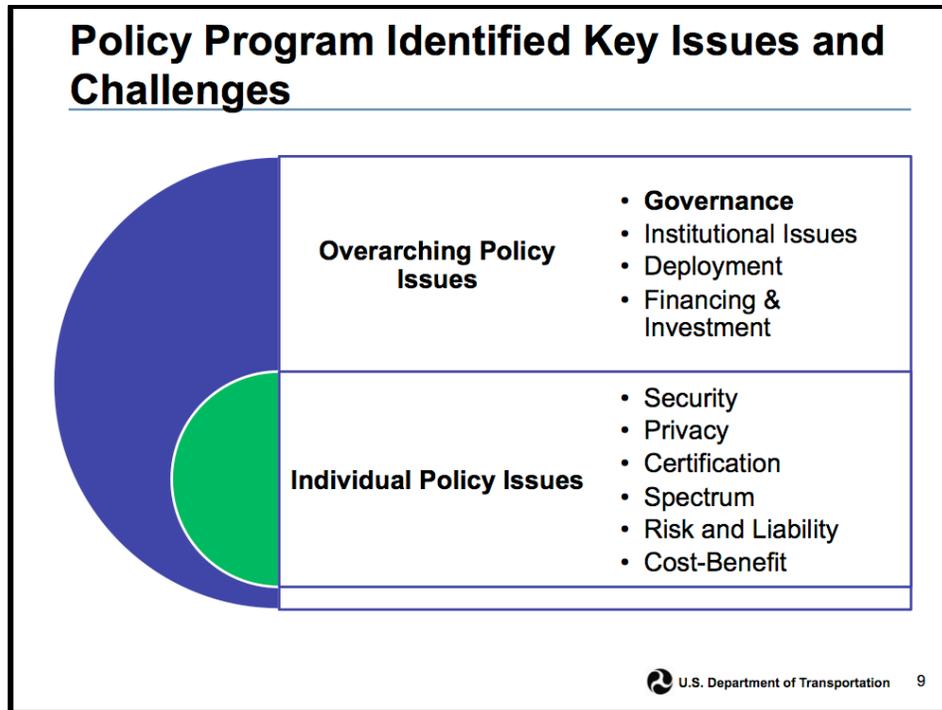 - Driver advisories
  - Driver warnings

Work Zone Notification

Intersection Collision Avoidance

V2V+V2I may have the potential to address 80% of the vehicle target crashes involving unimpaired drivers*

*National Highway Traffic Safety Administration, October 2010, DOT HS 811 381

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Policy Program Identified Key Issues and Challenges

Overarching Policy Issues

- **Governance**
- Institutional Issues
- Deployment
- Financing & Investment

Individual Policy Issues

- Security
- Privacy
- Certification
- Spectrum
- Risk and Liability
- Cost-Benefit

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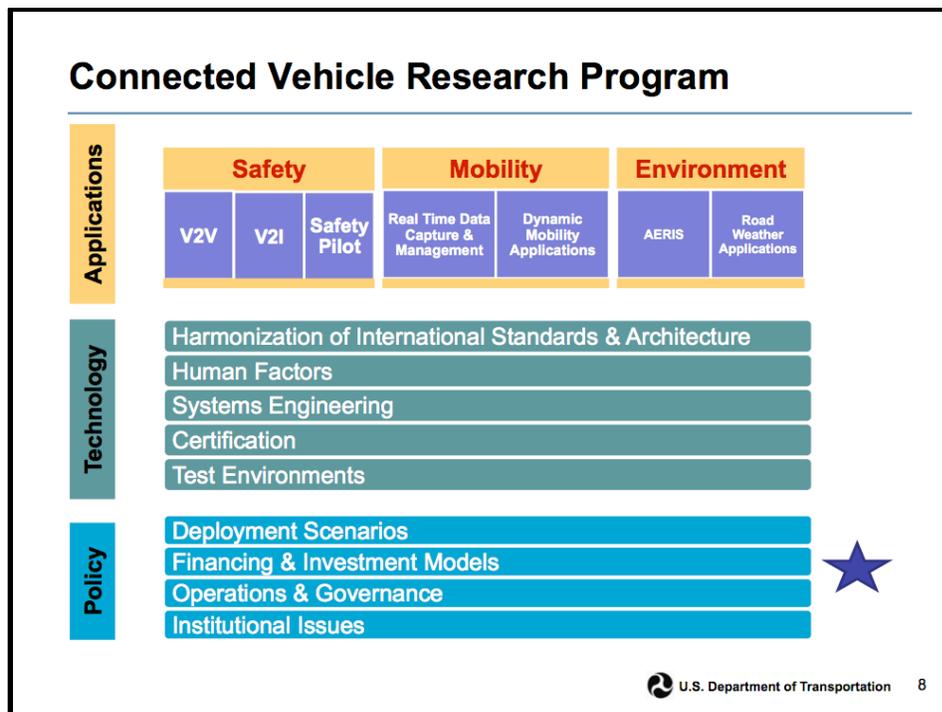
Need Understanding of Governance

- Impacts and influences other key policy areas
- It is critical to begin developing options for addressing the following issues:
  - Who should have authority/oversight?
  - What is the role of the public vs. private sectors?
  - What parts of the system should/must be governed?
  - Who will fund what parts and how does this relate to governance?
  - Who will provide enforcement of operating rules?
- Goal today is to begin exploring and learning about governance

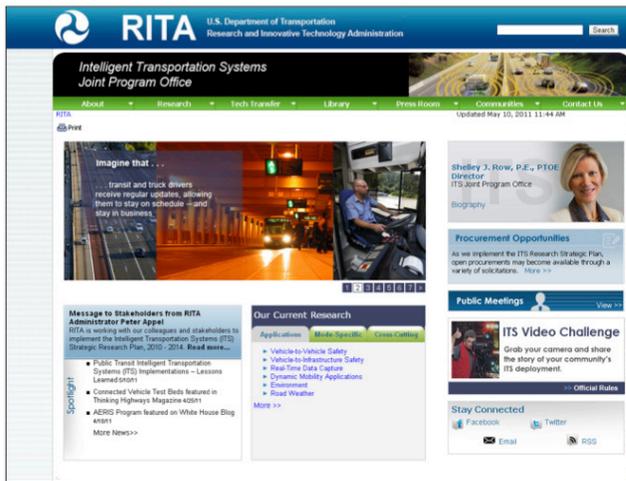U.S. Department of Transportation   10

Major Program Activities and Milestones

- Safety Workshop (Chicago, IL): August 2011

- Safety Pilot (multiple locations): July 2012 – July 2013
  - Driver Clinics (6 locations in U.S.)
  - Model Deployment

- NHTSA Agency Decision about technology in vehicles: 2013

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Program Partners

- 6 U.S. DOT Agencies and Office of the Secretary
- 9 automobile companies
- State and local transportation agencies
- Forming stakeholder groups in trucking and transit

- Many other stakeholders: telecom, entrepreneurs, finance, energy (Smart Grid, electric vehicles), environment, cybersecurity (NIST), privacy, legal, public safety, special interest groups, etc.

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