ITS Strategic Plan 2015-2019
Outline

- Strategic Planning Process
- ITS Strategic Plan Components and Hierarchy
- ITS Strategic Plan’s Framework
- Strategic Priorities, Vision, and Mission
- Strategic Themes
- ITS Technology Lifecycle and Operational Disciplines
- Program Categories
- Strategic and Operational Plan Elements
The Strategic Planning Process: Reflecting Stakeholder Input

Over **700 stakeholders** representing states and localities from across the country participated in development of the 2015–2019 ITS Strategic Plan.

**WE HAVE HEARD YOU...**

**AUTOMATION** was a recurring topic of interest, being discussed by over **100 stakeholders**.

**285 different organizations** contributed inputs to the ITS Strategic Plan 2015–2019.

**INTEROPERABILITY** as an ITS program focus was raised over **200 times**.

**75%** of stakeholders agreed that technology developers (EMERGING CAPABILITIES, not currently associated with CVs) will have an impact on the future of the CV environment.

**100%** of stakeholders that participated in the surveys indicated they were satisfied with the current level of emphasis on CV research.

**Over 100 inputs** regarding ENTERPRISE DATA were received.

**845 unique ITS Stakeholder responses** were collected.

**55%** of participating stakeholders claimed they are currently ready for and would be receptive to new CV or similar technology, such as what has been described under ACCELERATING DEPLOYMENT.
ITS Strategic Plan Components and Hierarchy

**STRATEGIC PLAN**

The purpose of the ITS Strategic Plan is to lay out the direction and goals of the ITS Program and to provide a framework around which the ITS JPO and other Department of Transportation agencies will conduct research, development, and adoption activities in order to achieve outcomes and goals of the overarching ITS Program. The Plan will be used to inform interested stakeholders about the activities and priorities of the ITS Program.

**OPERATIONAL PLAN FOR JPO**

The purpose of the ITS JPO Operational Plan is to provide a suite of program charters with resource allocations, milestones, responsibilities, and processes that the individual programs will develop. Working within the overarching structure and framework set forth in the Strategic Plan, the Operational Plan will allow the JPO to maintain its focus and momentum along the program categories defined in the Strategic Plan.
ITS Strategic Plan’s Framework

Organizational and Operational Strategies

Performance Management

Technology Tracking

Two Program Priorities

Realizing Connected Vehicle Implementation and Advancing Automation

Five Strategic Themes

Six Program Categories

Strategic Themes and Program Focus Areas

Research

Goals

Development

Goals

Adoption

Goals
Strategic Priorities

- Two Strategic Priorities reflect a sense of where the bulk of transportation research and innovation is heading. These priorities are not exclusive of other technologies or research areas.

  - **Realizing Connected Vehicle Implementation**
    - builds on the substantial progress made in recent years around design, testing, and planning for connected vehicles to be deployed across the nation.

  - **Advancing Automation**
    - shapes the ITS Program around research, development, and adoption of automation related technologies as they emerge.
Vision and Mission

VISION
Transform the Way Society Moves

MISSION
Conduct research, development, and education activities to facilitate the adoption of information and communication technology to enable society to move more safely and efficiently.
Strategic Themes

- **Enable Safer Vehicles and Roadways** by developing better crash avoidance, performance measures, and other notification mechanisms, commercial motor vehicle safety considerations, infrastructure-based, and cooperative safety systems.

- **Enhance Mobility** by exploring methods and management strategies that increase system efficiency and improve individual mobility.

- **Limit Environmental Impacts** by better managing traffic flow, speeds, congestion, and using technology to address other vehicle and roadway operational practices.

- **Promote Innovation** by fostering technological advancement and innovation across the *ITS Program*, continuously pursuing a visionary/exploratory research agenda, and aligning the pace of technology development, adoption, and deployment to meet future transportation needs.

- **Support Transportation Connectivity** through the development of standards and systems architectures, and the application of advanced wireless technologies that enable communications among and between vehicles of all types, the infrastructure, and portable devices.
The Adoption Phase sets the stage for large scale deployment.
Program Categories
Program Categories

- **Connected Vehicles** program category will be primarily focused on adoption and eventual deployment of the system.

- **Automation research** will focus on topics related to automated road-vehicle systems and related technologies that transfer some amount of vehicle control from the driver to the vehicle.

- **Emerging Capabilities** will focus on future generations of transportation systems.

- **Enterprise Data** programs will continue existing efforts in operational data capture from stationary sensors, mobile devices, and connected vehicles, and expand into research activities involving the development of mechanisms for housing, sharing, analyzing, transporting, and applying those data for improved safety and mobility across all modes of travel.

- **Interoperability** focuses on how to ensure effective connectivity among devices and systems.

- **Accelerating Deployment** advances the work from adoption to wider scale deployment in coordination with several other DOT agencies.
# Program Categories and Technology Lifestyle

<table>
<thead>
<tr>
<th>Program Categories</th>
<th>Research</th>
<th>Development</th>
<th>Adoption</th>
<th>Transition to Deployment</th>
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**Performance Management**

**Technology Tracking**
ITS Strategic Plan’s Framework
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Program Categories

- **Connected Vehicles** program category will be primarily focused on adoption and eventual deployment of the system.
Program Categories and Technology Lifecycle

- Connected Vehicles
- Automation
- Emerging Capabilities
- Enterprise Data
- Interoperability
- Accelerating Deployment

Transition to Deployment

Performance Management
Technology Tracking
CV Pilot Deployment Program Goals

Spur Early CV Tech Deployment

Wirelessly Connected Vehicles

Limit 35

Safety

Resolve Deployment Issues

Technical

Mobile Devices

Mobility

Institutional

Infrastructure

Environment

Financial
Organizing Principles

- Pilot deployments will be *needs-driven* and have measurable impact
- Successfully deployed technologies are expected to remain as *permanent operational elements*
- There will be *multiple pilot sites*
  - Each site will have different needs, focus and applications
- Each pilot deployment will feature *multiple applications* drawing on the products of USDOT and other connected vehicle research
Proposed Pilot Deployment Elements

- **Multiple** connected vehicle applications must be deployed together
- Pilot deployments should **leverage USDOT-sponsored research**
- Pilot deployments should include the **capture of data from multiple sources**
- At a minimum, **vehicles must represent one source of data**
- **Multiple forms of communications** technologies are desired
  - DSRC desired as one communication technology
  - Integrated or carry-in devices for connected vehicles capable of generating an SAE J2735 Basic Safety Message (BSM)
- Well-defined, focused, quantitative **performance measures**
- **Share pilot deployment data and lessons learned** while protecting privacy and intellectual property
- **Security and credentialing** management system
### Connected Vehicle Applications

#### Applications in various states of maturity

Many will be prototyped and documented by the end of 2014

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<thead>
<tr>
<th>V2I Safety</th>
<th>Environment</th>
<th>Mobility</th>
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<tr>
<td>Red Light Violation Warning</td>
<td>Eco-Approach and Departure at Signalized Intersections</td>
<td>Advanced Traveler Information System</td>
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<td>Curve Speed Warning</td>
<td>Eco-Traffic Signal Timing</td>
<td>Intelligent Traffic Signal System (I-SIG)</td>
</tr>
<tr>
<td>Stop Sign Gap Assist</td>
<td>Eco-Traffic Signal Priority</td>
<td>Signal Priority (transit, freight)</td>
</tr>
<tr>
<td>Spot Weather Impact Warning</td>
<td>Connected Eco-Driving</td>
<td>Mobile Accessible Pedestrian Signal System (PED-SIG)</td>
</tr>
<tr>
<td>Reduced Speed/Work Zone Warning</td>
<td>Wireless Inductive/Resonance Charging</td>
<td>Emergency Vehicle Preemption (PREEMPT)</td>
</tr>
<tr>
<td>Pedestrian in Signalized Crosswalk Warning (Transit)</td>
<td>Eco-Lanes Management</td>
<td>Dynamic Speed Harmonization (SPD-HARM)</td>
</tr>
<tr>
<td></td>
<td>Eco-Speed Harmonization</td>
<td>Queue Warning (Q-WARN)</td>
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<td></td>
<td>Eco-Cooperative Adaptive Cruise Control</td>
<td>Cooperative Adaptive Cruise Control (CACC)</td>
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<td></td>
<td>Eco-Traveler Information</td>
<td>Incident Scene Pre-Arrival Staging</td>
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<td>Eco-Ramp Metering</td>
<td>Guidance for Emergency Responders (RESP-STG)</td>
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<td></td>
<td>Low Emissions Zone Management</td>
<td>Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE)</td>
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<td></td>
<td>AFV Charging / Fueling Information</td>
<td>Emergency Communications and Evacuation (EVAC)</td>
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<tr>
<td></td>
<td>Eco-Smart Parking</td>
<td>Connection Protection (T-CONNECT)</td>
</tr>
<tr>
<td></td>
<td>Dynamic Eco-Routing (light vehicle, transit, freight)</td>
<td>Dynamic Transit Operations (T-DISP)</td>
</tr>
<tr>
<td></td>
<td>Eco-ICM Decision Support System</td>
<td>Dynamic Ridesharing (D-RIDE)</td>
</tr>
</tbody>
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#### Agency Data
- Probe-based Pavement Maintenance
- Probe-enabled Traffic Monitoring
- Vehicle Classification-based Traffic Studies
- CV-enabled Turning Movement & Intersection Analysis
- CV-enabled Origin-Destination Studies
- Work Zone Traveler Information

#### Road Weather
- Motorist Advisories and Warnings (MAW)
- Enhanced MDSS
- Vehicle Data Translator (VDT)
- Weather Response Traffic Information (WxTINFO)

#### Smart Roadside
- Wireless Inspection
- Smart Truck Parking

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J.S. Department of Transportation
ITS Joint Program Office
Pilot Deployment Scenario 1: Sunnyside

- **Improve Transit Reliability**
  - Connection Protection
  - Transit Signal Priority

- **Improve Pedestrian Safety**
  - Mobile Accessible Pedestrian Signal System
  - Pedestrian in Signalized Crosswalk Warning
  - Intersection Movement Assist

- **Improve Air Quality**
  - Eco-Approach and Departure at Signalized Intersections
  - Eco-Traffic Signal Timing

- **Synergies among applications increase benefits and reduce costs**
# Pilot Deployment Schedule

<table>
<thead>
<tr>
<th>Schedule Item</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Pre-Deployment Workshop/Webinar Series</td>
<td>Summer-Fall 2014</td>
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<tr>
<td>Solicitation for Wave 1 Pilot Deployment Concepts</td>
<td>Early 2015</td>
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<tr>
<td>Wave 1 Pilot Deployments Award(s)</td>
<td>September 2015</td>
</tr>
<tr>
<td>- Concept Development Phase (6-9 months)</td>
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<tr>
<td>- Design/Build/Test Phase (10-14 months)</td>
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<tr>
<td>- Operate and Maintain Phase (18 months)</td>
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<tr>
<td>Solicitation for Wave 2 Pilot Deployment Concepts</td>
<td>Early 2017</td>
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<tr>
<td>Wave 2 Pilot Deployments Award(s)</td>
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<tr>
<td>Pilot Deployments Complete</td>
<td>September 2020</td>
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</table>
For More Information

www.its.dot.gov/pilots

Kate Hartman
Program Manager, CV Pilots
Kate.Hartman@dot.gov
202-366-2742
ITS Strategic Plan’s Framework

- PERFORMANCE MANAGEMENT
- TECHNOLOGY TRACKING

- TWO PROGRAM PRIORITIES
  - Realizing Connected Vehicle Implementation and Advancing Automation

- FIVE STRATEGIC THEMES

- SIX PROGRAM CATEGORIES

- STRATEGIC THEMES AND PROGRAM FOCUS AREAS
  - RESEARCH
    - Goals
  - DEVELOPMENT
    - Goals
  - ADOPTION
    - Goals
Strategic Priorities

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Program Categories and Technology Lifecycle

- Connected Vehicles
- Automation
- Emerging Capabilities
- Enterprise Data
- Interoperability
- Accelerating Deployment

Program Categories:

- RESEARCH
- DEVELOPMENT
- ADOPTION
- Transition to DEPLOYMENT

Performance Management
Technology Tracking
Automation – U.S. DOT Role

- Facilitate development and deployment of automated transportation systems that enhance safety, mobility, and sustainability
- Identify benefit opportunities in automated vehicle technology
- Invest in research areas that further industry investments and support realization of benefit opportunities
- Establish Federal Motor Vehicle Safety Standards (NHTSA) by level of automation
The U.S. DOT automation program will position industry and public agencies for the wide-scale deployment of partially automated vehicle systems that improve safety, mobility and reduce environmental impacts by the end of the decade.
Proposed Automation Program Goals

1. Develop estimates of the potential benefits and disbenefits of automated vehicles
2. Evaluate and promote enabling technologies
3. Develop prototype applications
4. Identify needed standards and appropriate methods for development
5. Identify technical, policy, institutional, and regulatory barriers to deployment and possible solutions
6. Generate design guidelines for automated vehicles
7. Collaborate with a broad range of public and private stakeholders
Planned Automation Program Framework

- Human-in-the-loop (HITL) Connected Driving Assistance
  - *Develop, test, and demonstrate HITL applications*
  - *Examples include: CACC, Platooning, Merge/Weave Assist, Speed Harmonization, and AERIS Eco-Approach/Departure*

- Conditional Automation Safety Assurance
  - *Foundation research into systems that automate all control functions under certain conditions for limited amounts of time*
  - *Research areas include: human factors, control system reliability, testing procedures, and cybersecurity*

- Limited Driverless Vehicle Operations
  - *Exploratory research into first-mile/last-mile prototypes*
  - *Develop concepts and test/evaluate emerging prototypes*
# Modal Research Areas

<table>
<thead>
<tr>
<th>NHTSA</th>
<th>FHWA</th>
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</table>
| ▪ Human Factors  
▪ Electronic Control Systems  
▪ System Performance  
▪ Testing and Evaluation  
▪ Cybersecurity | ▪ Enabling Technologies  
▪ Application Testing and Evaluation  
▪ Application Human Factors  
▪ Infrastructure Policy |

<table>
<thead>
<tr>
<th>FTA</th>
<th>ITS JPO</th>
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</thead>
</table>
| ▪ Enabling Technologies  
▪ Transit Application Testing and Evaluation | ▪ Benefits Estimation  
▪ General Policy  
▪ Standards  
▪ Program Planning / Outreach |
Program Categories

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Program Categories and Technology Lifecycle

- Connected Vehicles
- Automation
- Emerging Capabilities
- Enterprise Data
- Interoperability
- Accelerating Deployment
CDS Builds on Data Capture & Management Program

Research Data Exchange

Prototype Operational Data Environment

Big Data Analytics Study

Basic Safety Message Emulator

U.S. / Europe / Japan Probe Message Coordination
CDS Responds to DCM Stakeholder Feedback

- **Contending with massive data volume**
  - “Serious questions remain about whether the infrastructure necessary to support…(Connected Vehicle) data transfer will exist to handle the amount of data generated by connected vehicles.”*

- **Agency capability to utilize big data**
  - “There is a huge need for increased technical competency in the public sector.”
  - “The DCM program should focus future research in a way that catalyzes private sector development of tools and techniques for…analyzing, and distributing data.”
  - “…the DCM team may want to incorporate crowd-sourced or social networking data…Using social media data could add significant value to the data currently collected.”

* All quotes are from the draft summary of the March 27, 2014 DCM Program Workshop
CDS Aligns with Evolution of Transportation

Traditional Transportation

Focus on operations
Volume & diversity of data
Diversity of operational objectives
Coordination among modes, jurisdictions and sectors
Speed and complexity of decision-making
Private sector provision of mobility services

Low

High

Connected & Automated Vehicles

Integrated, Dynamic Transportation in a Connected Society

Intelligent Transportation Systems
Proposed Vision for Connected Data Systems

Operationalize scalable data management and delivery methods exploiting the potential of high-volume multi-source data to enhance current operational practices and transform future surface transportation systems management.
CDS Contributes Toward a Connected Society

- **Connected City** = a system of interconnected systems that communicate with and leverage each other to provide synergistic benefits.
  - Use collective “intelligent infrastructure” to sense what’s around them and/or their own status to provide rich situational awareness
  - Utilize **new analytical processes**
  - Engage the connected citizen, allowing and encouraging **fully informed personal mobility** and other choices
  - Utilize solutions across **all transportation modes**, including transit, bicycle, electric vehicles and shared mobility services.
How Connected Cities Differ from Traditional Cities

<table>
<thead>
<tr>
<th>Characteristics of Connected Cities</th>
<th>Enabled Capabilities</th>
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<tbody>
<tr>
<td>Use collective “intelligent infrastructure” to sense what’s around them and/or their own status</td>
<td>Provides operators rich situational awareness and basis for making more timely, effective and coordinated tactical and strategic decisions</td>
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<tr>
<td>Utilize new analytical processes</td>
<td>Engage the connected citizen, allowing and encouraging fully informed personal mobility and other choices</td>
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<tr>
<td>Connected vehicles and connected travelers send and receive information</td>
<td>Cities have far greater opportunities for responsive and efficient mobility solutions</td>
</tr>
<tr>
<td>Utilize solutions across all transportation modes, including transit, bicycle, electric vehicles and shared mobility services.</td>
<td>Provide for sustainable mobility</td>
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Example Research Questions

- How can **big data tools and techniques** be applied within real-world transportation system management strategies such as Integrated Corridor Management (ICM) and Active Transportation and Demand Management (ATDM)?

- How can data from travelers and citizens and other **new sources** be integrated to provide valuable data and information for transportation operations?

- How can the **volume of data** from connected vehicles and travelers be made manageable without sacrificing value?
Proposed Data CDS Program Research Tracks

1. **Develop/Foster Big Data Analytics and Visualization Methods**
   - Data discovery, data integration, data exploitation

2. **New Data Sources and Partnerships Field Test(s)**
   - Crowdsourced data from travelers and data for and from emerging mobility service providers/partners

3. **Conduct a Dynamic Interrogative Data Capture (DIDC) Field Test**
   - Dynamic optimization of how much data to keep and transmit

4. **Develop and Deploy a Connected Data Operational System (CDOS)**
   - Data collector / integrator / distributor to pave the way for deployment
For More Information

Dale Thompson
Program Manager,
Connected Data Systems
ITS Joint Program Office
USDOT
Dale.Tompson@dot.gov

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ITS Strategic Plan’s Framework

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- TECHNOLOGY TRACKING

TWO PROGRAM PRIORITIES
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Program Categories

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- **Interoperability research** will focus on topics related to establishing common ways of documenting implementations and common ways of approaching implementations.

- **Emerging Technologies** will focus on identifying existing technologies in other industry areas that might be brought into the Connected Vehicle program to speed adoption.
Program Categories and Technology Lifecycle

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PERFORMANCE MANAGEMENT

TECHNOLOGY TRACKING
Interoperability – U.S. DOT Role

- Facilitate development and deployment of an architecture for connected vehicle systems as part of the Internet of Things
- Develop a common graphical language for documenting connected intelligent transportation systems
- Create common data exchange processes and tools to implement them to assist practitioners
- Provide tools, training, and resources to promote system understanding and assist common, interoperable deployments
Proposed Vision for Interoperability

Graphical Language

Designs and Tools

Training, Resources
Common Architecture, Graphical Language

Things

People
Design, Tools

- Architecture
- Concept of Operation
- Design Elements
  - Objects
  - Information Flows
ITS Professional Capacity Building Program Resources

- Online learning:
  - ITS Standards – 36 modules
  - ITS Transit Standards – coming soon
  - New eLearning Courses from Consortium for ITS Education (CITE):
    - Telecommunications and Networking Fundamentals
    - Network Design and Deployment Considerations for ITS Managers
  - Professional Certificate programs:
    - ITS Project Management
    - Traffic Engineering and Operations
    - ITS Systems
    - Road Weather Management
- Problem-based learning:
  - ePrimer
  - ITS Case Studies
    - Adaptive Signal Control
    - National Architecture
  - Talking Transportation Technology Webinar program, with searchable T3 archive
  - In-person workshops at ITS America state chapter meetings
    - Connected Vehicle 101
    - ICM, Procurement, Improving Safety

www.pcb.its.dot.gov
For More Information

www.its.dot.gov

Walton Fehr
Program Manager, Systems Engineering
ITS Joint Program Office
USDOT
walton.fehr@dot.gov