



Effects on ITS Planning and Development in a Connected Vehicle Environment



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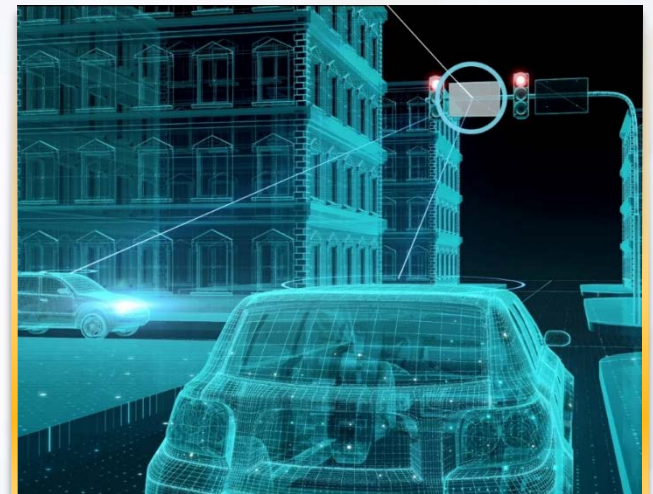


Welcome!

- › Today's presentation is brought to you by the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA).
- › We'll cover key findings from a recent Transportation Management Center Pooled Fund Study on the potential impacts of Connected Vehicles (CV) on Intelligent Transportation Systems (ITS) planning.
- › The full study is documented in the final report "Effects on ITS Planning and Deployment in a Connected Vehicle Environment" (FHWA-HOP-18-014).

Background

- › CV technology may gradually change or eliminate many current functions of ITS.
- › CV technology may also change the knowledge and skills transportation agencies need for ITS planning and deployment.
- › With CVs on the near horizon, agencies may have increasing demands for technology-savvy staff to develop new approaches to and make decisions on ITS planning, procurement, and management.



Source: Getty Images.

Background (continued)

- » To help prepare for these possibilities, the Transportation Management Center Pooled Fund Study researched the potential impacts of CV on ITS in terms of:
 1. Current services and trends.
 2. Opportunities offered by CV.
 3. CV Impacts on ITS planning and deployment.
 4. CV Impacts on ITS data.
 5. CV Impacts on ITS operations.
 6. Changes in roles and responsibilities.
 7. Challenges and uncertainties.

Note

In researching and discussing CV, this project considered non-automated CVs as well as automated vehicles with CV technology.

Today's Presentation

» Presenters:

- Dan Krechmer, Principal, Cambridge Systematics.
- Bob Rausch, Vice President, TransCore.

» Topics:

1. Project Overview.
2. Key Findings.
3. Recommendations.
4. Q&A Opportunity.

Project Overview

Purpose

- » Purpose: To provide insights and suggestions to transportation agencies as they consider:
 - How CV could be incorporated into ITS planning and deployment.
 - The potential need for new or enhanced tools to support ITS in a CV environment.
 - The roles and responsibilities of ITS stakeholders.
 - The skills and capabilities that may be needed to support ITS in a CV environment.

Audience

TRANSPORTATION AGENCIES

State, regional, and local transportation agencies, especially ITS, operations, and planning staff.

TRANSPORTATION AGENCY PARTNERS

Transportation agency ITS, operations, and planning partners.

CONTRACTORS

Contractors supporting transportation agency ITS planning and operations.

Categories of ITS Studied

- » The project studied the potential impacts of CV on 10 categories of ITS in total: seven categories of core ITS services and three categories of peripheral ITS services.
- » Categories of core ITS services:
 1. Traveler information.
 2. Freeway management
 3. Arterial management.
 4. Archived data management.
 5. Public transportation.
 6. Emergency management strategies.
 7. Construction and maintenance management.
- » Categories of peripheral ITS services:
 8. Other traffic management strategies.
 9. Vehicle safety.
 10. Connected vehicle technology.



10 categories
of ITS

Research Methodology

- ») For each category of ITS, the project researched the possible effects of CV by looking for the following general types of potential impacts:
 - Enhancing ITS services in the short term.
 - Replacing ITS services or providing new services in the long-term.
 - Providing new and more data.
 - Strengthening the linkage between ITS operations and planning by involving more stakeholders.
 - Changing the roles of transportation agencies and staff with regard to ITS.

Research Methodology (continued)

- ›) These potential impacts of CV on ITS planning were researched via:
 - Literature review.
 - Outreach to the Transportation Management Center Pooled Fund Study committee members.

Key Findings

Key Findings by Category of Impacts

- » The following slides summarize key, potential impacts of CV on ITS planning, organized by the 7 categories of impacts used in the final report.
 1. Current services and trends.
 2. Opportunities offered by CV.
 3. CV Impacts on ITS planning and deployment.
 4. CV Impacts on ITS data.
 5. CV Impacts on ITS operations.
 6. Changes in roles and responsibilities.
 7. Challenges and uncertainties.



7 categories of
CV impacts

Key Findings by Category of Impact (continued)

- › This means that, for each category of impact, the key findings highlight commonalities across all 10 categories of ITS that were studied.
- › A break-down of impacts for each category of ITS (e.g., freeway management or public transportation) is documented in the final report.

1. Current Services and Trends

- › Increased interest in data sharing frameworks and private information sources.
- › Applications and lessons learned from initial CV pilots and deployments.
- › Research on the ways CV could improve traffic management strategies through **better information dissemination**.

Ex.

Tailored traveler information sent directly to vehicles.

- › Research on how CV could improve traffic management strategies to be **more dynamic**, and feasible at a potentially **lower cost**.

Ex.

Signal Phase and Timing (SPaT) applications such as Transit Signal Priority (TSP).

2. Opportunities Offered by CV

- › Potential enhancement of traffic management strategies related to **recurring** congestion from enhanced data and vehicle-to-infrastructure (V2I) communication.
- › Potential enhancement of traffic management strategies related to **nonrecurring** congestion from enhanced data and V2I communication.

Ex.

Integrated Corridor Management (ICM).

2. Opportunities Offered by CV (continued)

- › Improved traffic and roadway condition data at a potentially lower cost.

Ex.

Road weather information systems and asset management.

- › Possible safety improvements.

Ex.

Non-motorized users with CV-enabled smart phones, and emergency management.

3. CV Impacts on ITS Planning and Deployment

- › CV technology potentially supplementing and/or replacing ITS services.

Ex.

511, Highway Advisory Radio (HAR), and eventually Dynamic Message Signs (DMS) becoming obsolete.

- › Possible reduction of certain expenses and reallocation those resources.

Ex.

Traffic Incident Management and crash-related expenses, transit vehicle tracking and dispatch.

3. CV Impacts on ITS Planning and Deployment (continued)

- › Possible increased role for the private sector, increased importance on public-private partnerships.
- › CV technology offers the potential to automate real-time operations and improve adaptive control systems.

Ex.

Signal operations and re-timing.

4. CV Impacts on Data

- › Agencies will likely continue collecting data but become less involved in disseminating information.
- › Data ownership, security, and privacy are expected to be key challenges.
- › Agencies may choose to establish mechanisms and standards for collecting, analyzing, and storing CV data streams from many sources.

Case study: The USDOT CV Pilot Deployment Program in Wyoming.

5. CV Impacts on Operations

- › With enhanced CV data and communications, CV could create greater opportunities for ITS applications such as active traffic management.

Ex.

Real-time signal priority, ability to broadcast tailored traveler information.

- › CV could facilitate a shift from reactive to proactive traffic management.
- › CV data may improve the effectiveness of after-action reviews.
- › CV may improve safety by reducing crashes.

Ex.

Reduced crash rates should help service patrols stretch their resources further.

6. *Changes in Roles and Responsibilities*

- › Agencies may choose to provide direction for ITS applications, planning, and management—and work with the private sector to set standards for sharing data and systems.
- › Public-private partnerships may become increasingly important.
- › In certain areas, public sector agencies are expected to continue to have a leading role.

Ex.

Transit, emergency management, and work zone management.

7. Challenges and Uncertainties

- » The timing of CV market penetration is uncertain, which impacts, if, how, and when to phase out legacy ITS services.

Ex.

DMS and emergency management systems.

- » Agencies may choose to upgrade current systems—in particular data management and security systems—resulting in potentially significant infrastructure and personnel investments.
- » CV is expected to improve safety, there are questions on how information can be disseminated to drivers and non-motorized users without increasing distraction.

7. Challenges and Uncertainties (continued)

- › Challenges related to jurisdictional boundaries, roadway and transit operator coordination, different management philosophies, and different equipment/systems.

Ex.

Arterial management and public transportation.

- › Questions over CV data ownership.
- › The addition of CV technology to construction/maintenance contracts could add cost to construction and maintenance activities.

Case Studies and Agency Examples

- ») In the report, relevant case studies on agency examples in incorporating connected vehicle technology into ITS planning, programming, deployment and operations are presented.

Traveler Information: Benefit/cost to utilize CV technology to provide a virtual DMS system.

Public Transportation: CV technology can potentially introduce a more integrated means to request and grant transit signal priority (TSP).

Arterial Management: Installing CV technology on arterial infrastructure and integrating it into traffic signal control can enhance the safety of pedestrians and cyclists.

Overall Findings—Potential Impacts of CV on ITS

- » Overall findings across all categories of impacts and categories of ITS include:

Reduction of costs (e.g., crashes).

CV technology supplementing and/or replacing ITS services.

Enhancement of ITS strategies related to recurring congestion.

Enhancement of ITS strategies related to nonrecurring congestion.

Overall Findings—Potential Impacts of CV on ITS (continued)

Migration of traveler information dissemination and data from public to private.

Increased importance on public-private partnerships.

CV data ownership, security, and privacy questions as priority issues.

Timing of CV penetration will dictate if/how/when to phase out legacy ITS.

Improved traffic and roadway condition data at a potentially lower cost.

Recommendations

Short Term Recommendations

CV IN ITS ARCHITECTURES

- Agencies may choose to incorporate any planned CV technology into their ITS Architectures and Strategic plans. This may include how modifications to their central systems, data collection, data archiving, and performance measures will occur.

LEGAL FRAMEWORK

- Agencies may choose to identify existing regulatory and/or legal hurdles to CV investment and testing.

PARTNERSHIPS FOR INTEROPERABILITY

- Innovations in CV may be accompanied with partnerships with neighboring and overlapping agencies/jurisdictions to support seamless interoperability.

Medium Term Recommendations

SECURITY POLICIES

- To ensure the safety and security of CV systems and networks, agencies may choose to adopt strict security policies and procedures for all systems and users of the CV systems and networks.

ADAPTING INSTITUTIONS TO CV

- Agencies may choose to adapt their organizations (roles, responsibilities, structures) and processes (budgeting) in order to program more effective CV systems and applications.

MONITORING AND PERFORMANCE

- Agencies may choose to develop data monitoring and feedback mechanisms to understand the impacts of existing CV deployments. As CV systems mature, agencies will likely gain knowledge on Return on Investment (ROI) and performance impacts.

Long Term Recommendations

COMMUNICATIONS INFRASTRUCTURE

- Agencies may choose to develop a communications master plan/architecture to support their traffic management systems and the CV backhaul, as CV will likely place an added burden on communications systems.

TECHNOLOGY REFRESHMENT

- The concept of “technology refreshment” will likely become more significant, the implementation of CV may call for large scale upgrades and/or equipment replacement as the technology rapidly evolves.

CAPACITY TO REPAIR

- Agencies may choose to make major additions to their repair facilities to be able to assess the operation of the new technology.

Q&A

Thank you!

To download the full report, please visit:
[Web address will be entered here]

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