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John Evans

GOALS

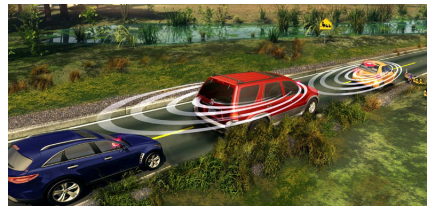
The goals of the Technology Scan and Assessment are to:

- Educate and enrich discussion about technology options among members of the engineering community interested in connected vehicle research
- Encourage the ITS community to evaluate technology opportunities several years ahead, rather than basing assumptions on past developments or potential misconceptions regarding future trends
- Establish, or otherwise validate or revise, key assumptions in ITS JPO research and development programs regarding scalability, security, or safety of particular technologies
- Inventory new technology-enabled systems that may need to interface with future connected vehicle core systems utilizing Vehicle-to-Vehicle/ Vehicle-to-Infrastructure technology

Technology Scan and Assessment

INTRODUCTION

Technology Scan and Assessment identifies, analyzes, and presents technology options that might enable successful connected vehicle deployments. The activity is part of a multimodal research program, referred to as the *connected vehicle* research program, led by the ITS Joint Program Office (JPO) within the U.S. Department of Transportation's (U.S. DOT) Research and Innovative Technology Administration (RITA). This research is focused on leveraging the potentially transformative capabilities of wireless technology to enhance the safety, mobility, and environmental sustainability of surface transportation systems.



ITSJPO

The mission of the **Technology Scan and Assessment** program is to identify critical technologies or technical trends that may enable successful deployment of ITS technologies. The *Technology Scan* focuses on long range, global, and cross-cutting technologies. The *Technology Assessment* is specific to the U.S DOT's plans for connected vehicle research, and highlights particular global

technical risks such as security, or uncertainties such as "game-changing" scenarios where a potential technological breakthrough, or social or economic changes that may tilt the playing field to favor one technology over another.

The Technology Scan and Assessment is designed to identify and explore issues regarding trends outside of transportation that may potentially impact state-of-the-art ITS deployment over the next decade.

IDENTIFYING CRITICAL TECHNOLOGIES

The Technology Scan and Assessment program is designed to: (1) identify new or converging technologies that may influence specific trade-offs that occur along the path of research and development, prototyping, testing, and model deployments; and (2) facilitate discussion among the engineering community and decision makers to enable continued progress in technical research. The research plan is to:

- Cover technologies over three time horizons - *science* base (10 to 30 years perspective), *emerging* technologies (5 to 10 years), and *pacing* technologies (3 to 5 years applied on trial basis) in the information technology, telecommunications, transportation, and energy sectors.
- Focus on technologies centered on efficient data and information flow, from acquisition (sensors) and dissemination (wireless) to processing (computing) and management (decision support) systems.

EVALUATING TECHNOLOGY EVOLUTION

Technology Scan and Assessment also seeks to:

- Evaluate a given technology's technical merit and evolution, but also search for constraints or compromises that may reduce capability, affordability, adaptability, economies of scale and scope, or market demand.
- Examine, across several technologies, competitive and complementary elements and nascent development of industry value chains that can encourage a given technology's widespread application.



- Identify centers of research excellence in the government, academia, and industry, and engage domain subject matter experts to speculate on a given technology's potency, desirability, and timing.

TECHNOLOGY SCAN AND ASSESSMENT RESEARCH OUTCOMES

Through the structured, comprehensive research and analysis framework cited above, the *Technology Scan* has provided perspective on a number of long range technology trends:

- Navigation, ranging, and computer vision-based object detection sensors, along with innovations such as sensor fusion and processing algorithms, will likely exploit a wealth of information that may support future *connected vehicle* collision avoidance or mobility applications.
- Computer vision has been long used in highway infrastructure, but may be as common as GPS as a data acquisition platform on vehicles.
- Fourth Generation (4G) wireless networks will likely become “application-aware,” intelligently supporting critical “off-board” or “cloud-based” ITS applications such as automated collision notification.
- Future advanced 4G systems may be able to establish and manage communication sessions that hop between many wireless nodes (e.g., 4G, WiFi, DSRC) in a coordinated fashion, a concept known as heterogeneous or “vertical” roaming, operating based on application needs such as coverage availability and cost.
- Telematics (or more broadly, machine-to-machine applications) architecture may evolve to allow resources to be pooled, allowing any sensor to be securely addressable and accessible to any ITS application service.

- The *Technology Assessment* highlights particular risks or uncertainties that are broadly understood to impact a number of sectors, not just transportation. Assessment topics will discuss:
 - *Security*: Global innovations in computing and design of secure systems, as well as risk management –addressing unique challenges in securing safety-critical systems fashion.
 - *Energy*: Global innovation in the development of utility “smart grid” and electric vehicle powertrains and support systems, and how they may leverage to improve vehicle safety, mobility and environmental sustainability.

To learn more about this research, contact:

Tim Schmidt
 Chief Technology Officer
 Office of the Secretary of Transportation
 202-366-9201
 Tim.Schmidt@dot.gov

Walton Fehr
 Program Manager, Systems Engineering
 ITS Joint Program Office
 Research and Innovative Technology Administration
 (202) 366-0278
 walton.fehr@dot.gov

More information can be found at www.its.dot.gov

The U.S. Government's role

The U.S. DOT's Research and Innovative Technology Administration's (RITA) Intelligent Transportation Systems (ITS) Joint Program Office fosters the development and future deployment of these connected vehicle technologies. But Connected Vehicle research involves all agencies within U.S. DOT including NHTSA, the Federal Highway Administration (FHWA), the Federal Motor Carrier Safety Administration (FMCSA), Federal Transit Administration and the Federal Railroad Administration.

U.S. DOT and its public and private partners are working to address the technical, safety and policy challenges and are helping to create the standards and the wireless architecture that will be the backbone of the system.

Connected vehicle research will leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter and greener. If successful, connected vehicles will ultimately enhance the mobility and quality of life of all Americans, while helping to reduce the environmental impact of surface transportation.

For more information about this initiative, please contact

Mike Pina
 Program Manager
 Communications and Outreach
 Research and Innovative Technology Administration
 ITS Joint Program Office
 (202) 366-3700
 mike.pina@dot.gov

