



Connected Infrastructure Evolving Perceptions, Planning for the Future

Overview

As urban population rises and both travel demand and options increase, our region demands more advanced approaches to mobility. Connected and automated vehicles are amongst emerging ITS technologies rising to the occasion. Technologies may be rapidly evolving along with mobility choices, but questions remain as to the viability of our infrastructure and management systems to keep pace, and how we can maintain the required skills, tools and expertise of our public works / transportation workforce. For this reason, Prospect Silicon Valley and ITS California teamed together to learn, and share, the state of understanding and preparedness of Intelligent Transportation Systems in California.

On Perceptions - Tech Horizons Workshops

With the support of sponsor Cisco Systems, ProspectSV launched a series of two Tech Horizons workshops to engage local governments on emerging technology in the advanced transportation space, with a special emphasis on connected vehicles and Intelligent Transportation Systems (ITS). Held in September 2015 and January 2016, these two hour workshops focused on educating participants on the increased deployments of connected vehicle technology and ITS. The goal was to achieve a foundational understanding of concepts and initial efforts, and to gather input on interests and challenges faced by local governments.

Positioning for Attendees and Introduction

Introductory comments set the stage: ITS technologies are rapidly maturing and provide the potential for significant transportation benefits including improved safety, lower GHG emissions, and improved mobility. Participants, it was hoped, would leave the workshop with a better foundational education/context on ITS technologies. They would leave with a short list of near-term opportunities as well as insight into longer-term technology trajectory and planning implications.

Interactive portion outcomes

The interactive portion, facilitated by ProspectSV CEO Doug Davenport, had attendees break up into small groups to discuss dimensions of ITS and connected infrastructure deployment: *potential benefits, concerns over technology, the role of government, and challenge to success*. Four questions were asked to the groups (refer to table). Groups were given 5-10 minutes to discuss and share their observations and report on them.

September 2015 Workshop

Attendees

A total of 26 attendees participated in the event including traffic engineers, transportation managers, and city planners. Agencies represented included Caltrans, the cities of Brisbane, Campbell, Dublin, Fremont, Hayward, Los Altos, Menlo Park, Mountain View, Pacifica, San Jose, and Sunnyvale, as well as regional planning organizations such as Metropolitan Transportation Commission (MTC), and the Santa Clara Valley Transportation Authority (VTA).

Program

The program immediately followed ITS-California's (ITS-CA) member meeting held at ProspectSV. The Tech Horizons workshop included opening remarks from ITS-CA chair Josh Peterman, a panel discussion, and interactive session with breakout groups.

Panelists included regional transportation agencies, local cities and private technology software and hardware providers. ProspectSV moderated.

Key points covered in the panel included discussion of specific pilots (e.g. cameras and adaptive timing with Bluetooth in Walnut Creek), dealing with change at the pace of IT, and funding programs being developed federally and regionally.

January 2016 Workshop

Attendees

A total of 34 attendees participated in the event including agency transportation managers, city planners, hardware and software developers, and traffic engineering / ITS consultants.

The program took place at the Alameda County Conference Center in Oakland. The Tech Horizons workshop included opening remarks from Cisco System's Ashok Moghe, who gave a presentation on "The Future of Transportation", a panel discussion, and an interactive session with breakout groups.

As with the first workshop, panelists included regional transportation agencies, local cities and private technology software and hardware providers. ProspectSV moderated.

Key points covered in the panel included discussion of recent public sector advancements in ITS deployment (e.g. Connected Vehicle/Infrastructure pilots, dynamic parking wayfinding, and adaptive traffic signals) as well as plans for the future (the creation of connected corridors, truck platooning, and bus automation). A notable and recurring topic of discussion was the collection, sharing, and privacy of data.

On Preparedness - Public Sector Survey

In October 2016, ProspectSV and ITS California teamed together to launch a survey of traffic management system owners and operators from city, county and state agencies. The survey, delivered via Survey Monkey, covered questions regarding current state of *infrastructure ownership and control, dedicated resources, operational challenges, appetite for new technology, and current or envisioned use of data.*

Participation

In total, 24 responses were received. ITS-CA membership is split relatively evenly between public and private entities; while the responses represented only 15% of ITS California's membership, it was representative of over half of ITS-CA public agency membership.

What We've Learned

The Workshops

The workshops generated a great deal of discussion; responses were not quantitative yet we have attempted to present a quantitative summary below. Groups were encouraged to present perspectives on topics that hadn't already been addressed by a previous group. At the completion of both workshops, individual responses were collected and categorized for presentation of the results.

Benefits

Workshop attendees were clear on their top benefit – an improved driving environment, followed by increased accessibility and mobility for non-drivers, economic benefits of improved drivability, and public safety. Other benefits identified included the data that would be generated by ITS and connected vehicle systems, and the perception of reduced greenhouse gas from congestion relief.

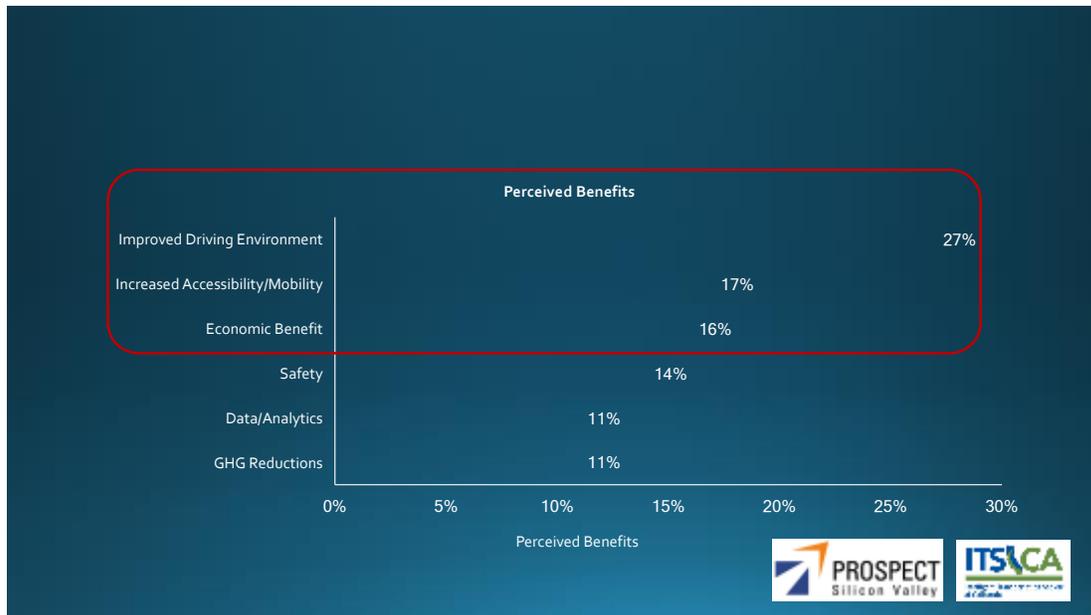
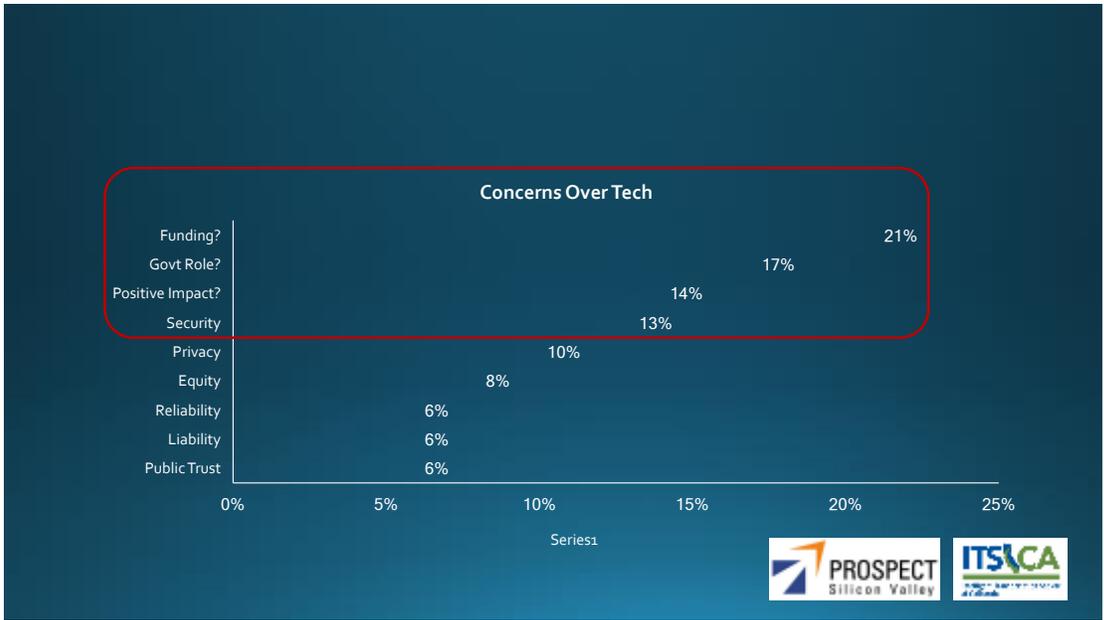


Table 1. Workshop Results – Perceived Benefits

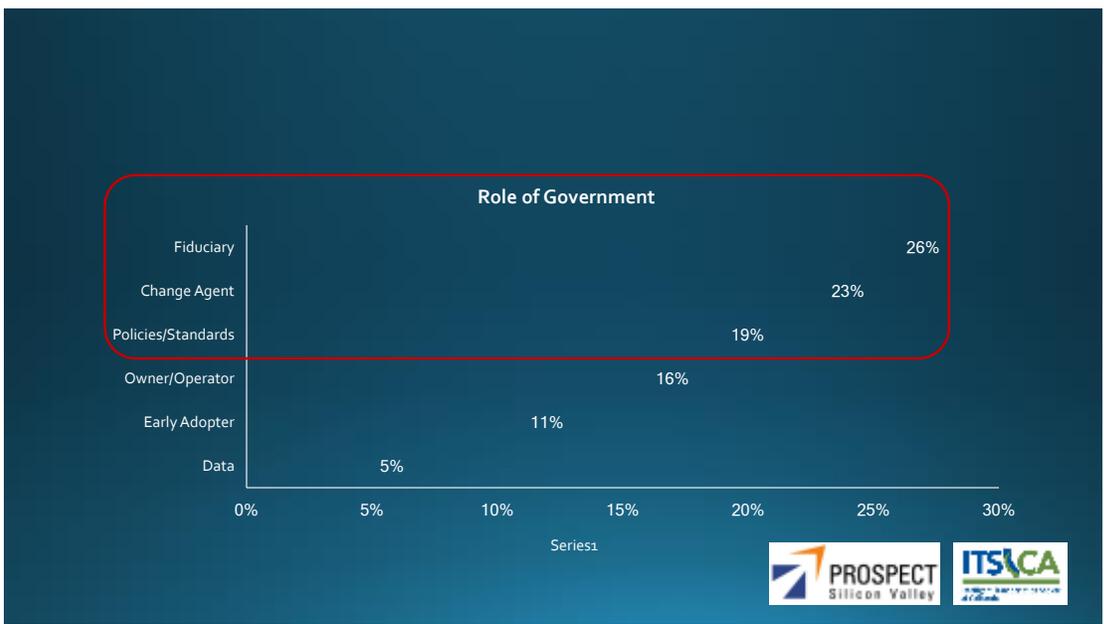
Concerns About ITS Technology

Workshop attendees also presented several concerns, including unclear funding, lack of clarity with regards to role of government in operating ITS infrastructure or managing ITS data, as well as lack of clarity on true quantifiable benefit or assurance of data security. Attendees also raised concerns about personal privacy, equitable benefits across the mobile community, reliability of equipment, potential liabilities arising from ITS-related incidents, and public acceptance of the technology. Considering the responses, we represented the concerns with broad questions including *who pays, who controls, who benefits, and are we ready?*



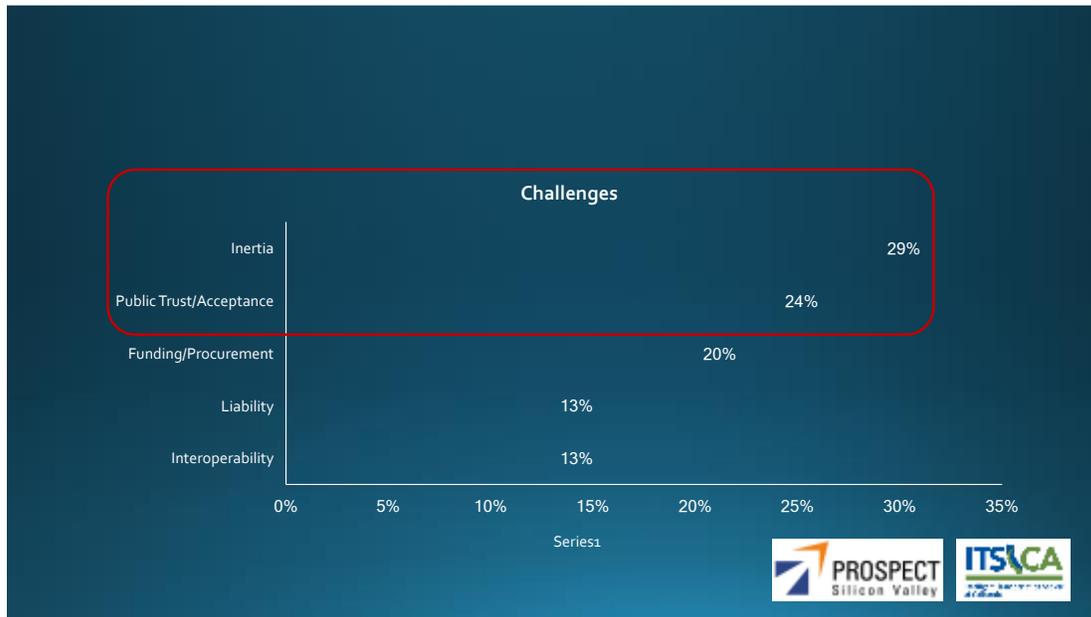
Role of Government in ITS Scaling

Within the realm of ITS, connected vehicle technologies are relatively new and create a new dynamic between government, technology providers, the mobile public, and potential intermediaries such as data service providers, application developers, commercial services, and the vehicle companies. This is an important dynamic to understand, and one that is not entirely clear today. Our workshop attendees discussed the role that Local Governments and Agencies might play. For those attending, the primary ideas were that of Fiduciary Agent (assuring equitable access and use of funding for ITS deployment), Change Agent (assuring public and private interests are understood and served as the technology is acquired and deployed), and Policy & Standard Agent (a traditional role with respect to government assets). Interestingly, the government's role as owner and operator of connected infrastructure was not as clear, nor was its role as an early adopter of the technology. And its role with respect to data, as important as it is to the function of ITS, was even less clear.



Greatest Challenges to Progress

We wanted to know what our workshop attendees felt were the biggest challenges they'd face when considering connected infrastructure and other emerging ITS technologies for their city or agency. Their responses pointed to both internal and external hurdles. Internally, the inertia of their organization and changing leadership were their primary worry, followed by acceptance and trust by the public they serve. Coupled with uncertainty around funding sources and procurement questions around their role, these concerns significantly exceeded their perceptions of potential liability or functionality of the system within or between cities.



On Preparedness – ITS California Member Survey

ITS-CA published a survey of its public agency members asking a variety of questions regarding connected vehicles, infrastructure, training, funding, etc. The survey questions asked about:

- Number of signalized intersections, and who operates / maintains them
- Opinions on adequacy of staffing and training resources, and funding
- Prioritization of operational challenges
- Comparison of ITS vs. other City operational priorities
- Understanding and implantation of Connected Vehicle technologies
- Plans for developing and implementing other ITS programs

Raw data is available to those requesting it, but we have categorized and summarized the responses as follows.

Ownership/Controllership - Respondents predominantly (roughly 70%) own and operate their traffic signal and ITS facilities. In other jurisdictions, this infrastructure was owned/operated completed or mostly by another agency -- likely Caltrans or the County in most SF Bay Area cities.

Relative to signal and ITS infrastructure, less agencies own and operate their street lighting - respondents were roughly split on whether they, or someone else, owned and operated street lights. It is likely that PG&E owns and/or operates street lights if agencies do not do so themselves.



Dedicated Resources - Several questions were asked to gauge agencies' assessment of resources needed for deploying ITS. The survey results revealed the following:

- Most cities felt like they did not have adequate staffing levels or equipment needed in order to properly maintain their ITS infrastructure
- Similarly, most cities felt they lacked proper funding to assess and replace ageing infrastructure at their end-of-life
- Roughly half of the agencies struggle with prioritization of ITS investments; others felt that their prioritization processes were adequate.
- Agencies felt they had adequate resources for training on, and operating, ITS infrastructure
- Agencies also felt that they had a good handle on how to manage congestion within their cities.

Operational Challenges - Survey questions also asked participants what their most pressing operational challenges were. In descending order of most to least pressing, the responses were as follows:

- Managing congestion
- Addressing collisions or risk of collisions
- Making streets accessible and safe for vulnerable users
- Managing parking

This information is valuable when considering how to prioritize investments in traditional as well as emerging ITS and connected vehicle technologies. They should address agencies most pressing operational challenges; in this case then should help alleviate congestion and improve safety.

Appetite for New Technology - Questions were then asked about connected vehicle technologies specifically. Those surveyed were asked whether they felt they understood the technologies and saw any value, and whether they were planning to implement connected infrastructure.

Generally speaking (see below), half of the respondents understood the technology [and](#) saw value in its implementation. The other half saw little or no value, or didn't understand the technology. One could argue that there is still work to be done, therefore, on education and on demonstrating value of these investments.



Roughly two thirds of those surveyed had no plans for implementing connected infrastructure, though a few agencies had started looking into its use. The other respondents had developed plans for implementation.

Use of Data - Finally, a question was posed regarding agency plans for capturing and broadcasting data such as traffic signal phase and timing (SPaT) data at intersections. There may have been some confusion as to the meaning or interpretation of the question, as only seven of those who took the survey responded to this question. Of those, two were already broadcasting SPaT data. One captured but did not broadcast SPaT data, and another planned to capture and broadcast the data. The other three had no plans to do so.

Where to go from Here?

The results of the survey could be interpreted as a call to action for regional and state agencies as well as USDOT. With increasing complexity of ITS and connected vehicle infrastructure, the lack of maintenance capabilities needs to be addressed. Further, we see a need for increased education on connected infrastructure and its benefits. And there is an obvious consistency gap in understanding how emerging technology will evolve and how asset owners may anticipate change.

ITS-CA and ProspectSV recognize important roles in bringing ITS and connected vehicle technology to our roadway systems.

- ITS-CA emphasizes *education*, connecting to agencies, consultants and vendors to tell stories and spread knowledge as the benefits of ITS, as well as to educate cities, regional and state agencies, and federal partners on the needs at the local operational level to move ITS forward.
- ProspectSV emphasizes *ecosystem*, bringing vendors, asset owners, emerging technology startups, and the engineering community together to public- and private-sector funded pilot efforts, to advance applications that address safety, congestion, environmental impact and driver needs.

ITS-CA and ProspectSV will collaborate on bringing ITS solutions and applications to the fore, with the partnership of agencies and cities who embrace them. Examples of ways we will work together include:

- Forming an ITS Industry Working Group, coordinated by ProspectSV, to highlight the evolution of new ITS Solutions and challenges to scaling them.
- Forming an ITS Demonstration program to assist Industry in proving and applying emerging ITS solutions in partnership with the public sector. We will strive to connect lab-scale and field-scale resources with public sector stakeholders, and educate a wide group of asset owners about the potential for ITS solutions to address major safety, congestion, and other traffic management challenges.
- Engaging funding agencies and investment in ITS infrastructure and applications.