CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

INNOVATION TEAM
WHITE PAPER

Procurement and Contracting Lessons Learned from Smart City and Connected Vehicle Initiatives

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The Mobility Authority established the Innovation Team in Fall 2018 to stay informed on emerging mobility and transportation technology and introduce opportunities for these emergent technologies and ideas through projects, programs, partnerships and policies. The purpose of these white papers is to provide a high-level of examination into emerging technologies and their case studies to support decision-making for solutions to the problems we face today and tomorrow.

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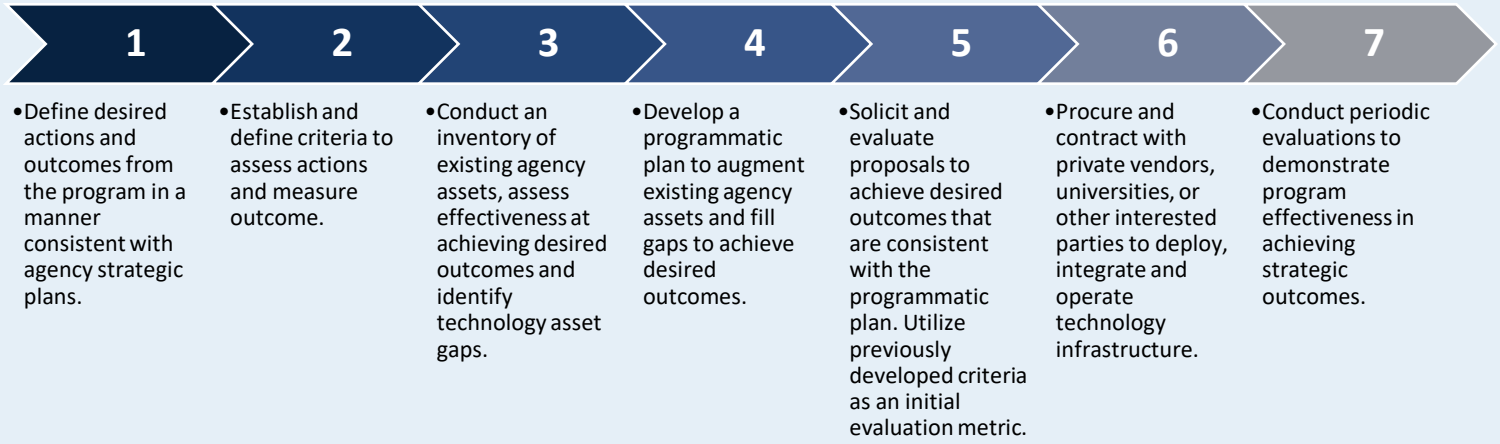
Introduction

The Central Texas Regional Mobility Authority (Mobility Authority) is actively expanding its focus to include innovative transportation services like connected and automated vehicle applications and advanced Intelligent Transportation Systems (ITS). These services are increasingly dependent on quickly-evolving technologies that do not lend themselves well to traditional public sector procurement and management approaches. To that end, the Mobility Authority is researching how peer agencies solicit new ideas, evaluate innovative transportation approaches, procure cutting-edge technology vendors and manage new connected transportation services as part of Smart City and similar innovative transportation programs. The Mobility Authority is interested in developing a framework of best practices that can inform agency decision making as it implements new services in the Austin area.

WSP staff active in similar projects throughout the United States recommend the following general approach to development, implementation and management of these types of programs **(Figure 1).**

Figure 1: Smart City Programs Lessons Learned



This document summarizes lessons learned from Smart City programs initiated throughout the United States with a focus on Stage 6 of the above framework: procurement and contracting approaches. In preparing this technical memorandum, WSP relied on informal discussions with consultants active in various U.S. smart city initiatives as well as a basic literature review including publications from the U.S. Department of Transportation (USDOT). The appendix of this report provides a brief overview of some smart city and connected vehicle (CV) initiatives in other US cities.

The literature and industry scan yielded the following general conclusions (not specific to procurement and contracting) for additional consideration by CTRMA:

- Smart City (and specifically CV applications) represent an almost entirely new service delivery model for public sector transportation agencies. As such, best practices are still under development. Those currently working on such initiatives tend to "hedge" their initial recommendations, noting that the industry is moving fast, and that many have not yet had an opportunity to effectively evaluate their approaches.
- Each agency is unique in terms of the users they service, the infrastructure they operate and the stakeholders they answer to. Every approach to Smart Cities implementation and administration is thus tailored to that agency's unique needs and situational environment. As such, the application of guidance and lessons learned must be done with consideration towards each agency's unique operational and institutional environment.

- Overall, public sector agencies lack the technical expertise to truly evaluate vendors and associated technology applications. There is thus a much stronger reliance on private sector contractors and vendors than what is typically encountered for more traditional ITS strategies.
- Cities all have different focus areas, levels of process integration, and thus varying degrees of formality in their processes. Most are not generally well-established or well-defined. While some cities are using dedicated innovation units, others are pursuing Smart City efforts through council-based task forces or are moving ad hoc with whatever departments happen to be involved with city ITS infrastructure.
- Agencies should future proof their current systems and prepare for CV implementation, even in the face of industry uncertainty. As infrastructure is replaced, agencies should ensure that signals and other related ITS infrastructure are "CV-ready" in anticipation of future CV and automated vehicle benefits.
- Agencies should establish a range of needs, identify any general requirements and specifications and then solicit innovative solutions from the private sector and academia.
- Alternative procurement approaches are key to a successful program. Agencies should look to purchase smaller pieces of technology on a progressive basis, likely with private sector cooperation. This way, if a product or service is not meeting its performance goals the agency can terminate quickly without losing significant time and money.
- Most new CV innovations involve software and information technology (IT), but the typical "waterfall" system development model will not suffice as needs will likely have to be identified "on the fly" and must be continually revisited.

Initial Considerations and Pre-Development

A common initial step in the program development process for agencies is to first establish goals and objectives for the program and to articulate desired outcomes. These should align with and expand upon existing strategic goals and objectives as a means of demonstrating the future value and performance of the applications being considered and deployed. CV projects are, at their core, Intelligent Transportation System (ITS) applications and are therefore subject to various federal requirements. As such, interoperability with other local, regional, state and national systems should be a paramount goal if it is not already considered as part of overall strategic planning.

The establishment of goals and objectives informs all subsequent decision making for the agency by helping to establish subsequent evaluation metrics and providing a foundation for the evaluation of future proposals. In its application to the USDOT's Smart City Challenge, the City of Austin identified 33 unique challenges facing the city and 123 Smart-City-based strategies to address these challenges. Strategies are structured to inform the development of evaluation criteria and could therefore serve as a reference point for the Mobility Authority in the development of its own vision and subsequent implementation plan.

Agencies must also understand the range of data available, gaps in data and supporting infrastructure within their existing portfolio. As an additional preliminary step in the deployment of Smart City and, specifically, connected vehicle programs, agencies should therefore conduct a thorough and rigorous assessment of existing assets and capabilities. This information provides a baseline for future Smart City investment and can be used to identify investment needs, identify areas of operation that would benefit from CV functionality and provides a foundation for the assessment of proposals in terms of their technical compatibility and retrofitting requirements.

Agencies are also recommended to carefully consider the impact that funding sources will have on their ability to remain flexible and innovate in achieving desired program outcomes. In general, state and local funding sources are more flexible than federal funding sources. For example, input

received from individuals working on the Smart Columbus initiative indicates that U.S. DOT Smart City Challenge requirements regarding reporting and federal approval of design elements have limited the ability of that program to advance as quickly as desired.

In terms of seeking general guidance on these processes, agencies should start by examining those agencies with whom they share programmatic goals and objectives. This includes other regional partners with whom the agency regularly interacts but can also include peer agencies in other regions and states. Examples of such agency-level initiatives can be found in the appendix.

Given the amount of funding available and the high-profile nature of these types of initiatives, agencies may find themselves with an imperative to explore Smart City and CV applications without clear guidance as to what applications should even be pursued. This may be the case even after the agency has undergone an initial asset inventory, development of goals and objectives and discussions with regional partners. In many cases this may be due to a simple lack of technical expertise and familiarity with the range of applications available. To properly assess incoming vendors, technology partners and associated technology applications and services, agencies must educate themselves first and foremost. Two common approaches are the use of Requests for Information (RFI) and vendor days. An RFI affords an agency the opportunity to gather and synthesize industry input that supports tailoring of subsequent Requests for Proposals (RFP). Vendor days, while less structured, allow vendors to simply present their products and discuss how they might be implemented. Agencies should use both options as an opportunity to ask questions and learn.

Proposal Solicitation, Intake and Vetting

Agencies use a range of methods for assessing connected vehicle proposals, and they differ based on the nature of the agency, its goals and objectives and existing ITS infrastructure. It is therefore difficult to develop an overall process framework as many of occur internally and are not visible to the public. Some agencies, such as LA Metro, have a more open and transparent process. There, proposals are solicited, and those that warrant exploration enter a full and open procurement process. Agency staff are incentivized to champion ideas that move through the process and are deployed. The City of Las Vegas, as part of its ongoing Smart Vegas Initiative, is considering processes that would result in proposals being rejected, accepted for more rigorous vetting or streamlined for expedited implementation. These decisions will likely be informed by alignment of the proposal with strategic goals and priorities, compatibility with existing systems and expected agency resource requirements in terms of funds and time.

Procurement and Contracting

Smart Cities applications are not a commodity item that can be procured using traditional approaches. A “low-cost bidder” approach is likely to result in failure or, at a minimum, disappointment in the services provided. Agencies require new ways to identify and prioritize value; however, they are generally not able to truly evaluate proposers without first becoming smarter themselves. They are thus forced to look to private entities (or other similar agencies) to understand what range of options are available before pursuing. This is why activities such as vendor days and the issuance of RFIs are so critical: they provide agencies with information that can be used for evaluation of proposals.

Smart City applications and specifically connected vehicle applications represent a departure from the traditional types of systems that agencies are used to procuring. Writing specifications for such “new to market” products is therefore a significant challenge. For example, CV applications rely on an array of telecommunications technologies, on-board vehicular systems, roadside units as well as

special software. These devices are, in many cases, at an early stage in their development and/or deployment for the applications they are supporting. As such, a procurement process that allows dialogue between vendors and the agency in terms of specification development is key and affords the best opportunity to find the ideal partner. Public agencies should aim for flexible contracts, allowing for emerging technology to be introduced throughout the life of the contract with agreed parameters around continuous innovation and outputs. Agencies should also consider the application of performance-based system specifications as opposed to prescriptive specifications. A USDOT scan of Smart City programs revealed that agencies are generally using one of two approaches **(Figure 2).**

Figure 2: Design, Bid, Build vs. Design, Build

Under the more traditional **"design, bid, build" approach**, the procuring agency has more control over specifications with direct access to the contractors. However, managing and coordinating all the required contractors requires a level of expertise in contract management in addition to expertise on connected vehicle technologies and their applications; which few agency staff have.

Under a **"design – build – (operate-transfer)" DB(OT) approach**, a single contractor team designs the system, procures or purchases the equipment, develops needed software and installs the equipment and usually performs initial operations before transferring the system to the agency. The prime contractor is responsible for subcontract management and is more likely to have responsibility for equipment and software specifications. The contractor may thus have flexibility in achieving system objectives while the procuring agency loses some control and must therefore be willing to accept the performance of the prime contractor in project management.

Procurement and deployment models for large scale CV projects are still under development and there are few lessons learned at this point in their development. Agencies have little to no previous experience in procuring CV systems at a large scale. Many are testing multiple procurement techniques to find an optimal approach. Options include sole source contracts, releasing task orders via the standard procurement process, using firms on an Indefinite Delivery, Indefinite Quantity-like (IDIQs) on-call contract, or directly procuring CV equipment themselves. Agencies should consider whether it is advantageous to keep the proposed project small and sole source its development. This is a common approach for agencies working with universities or other agencies who can procure the required equipment through an intergovernmental contract. In such cases the agency will generally assume responsibility for installation or utilize an existing contract with the state DOT. Using a state DOT contract for system installation, integration and maintenance ensures competition from numerous various firms that are already approved to provide services.

USDOT has noted that procurement approaches for CV projects will largely depen on software and hardware development needs, which can be moderate to substantial due to the ever-increasing role of information communications technologies. Many CV projects include the installation of "networked infrastructure" for connected vehicles and corresponding applications that increase the complexity of software development needs relative to standard infrastructure improvements. These more complex projects are increasingly turning to Agile/Scrum development methodologies for software development as an alternative to the traditional "waterfall" development process **(Figure 3)** or the "Vee" systems engineering process.

Figure 3: Typical "Waterfall" Development Process

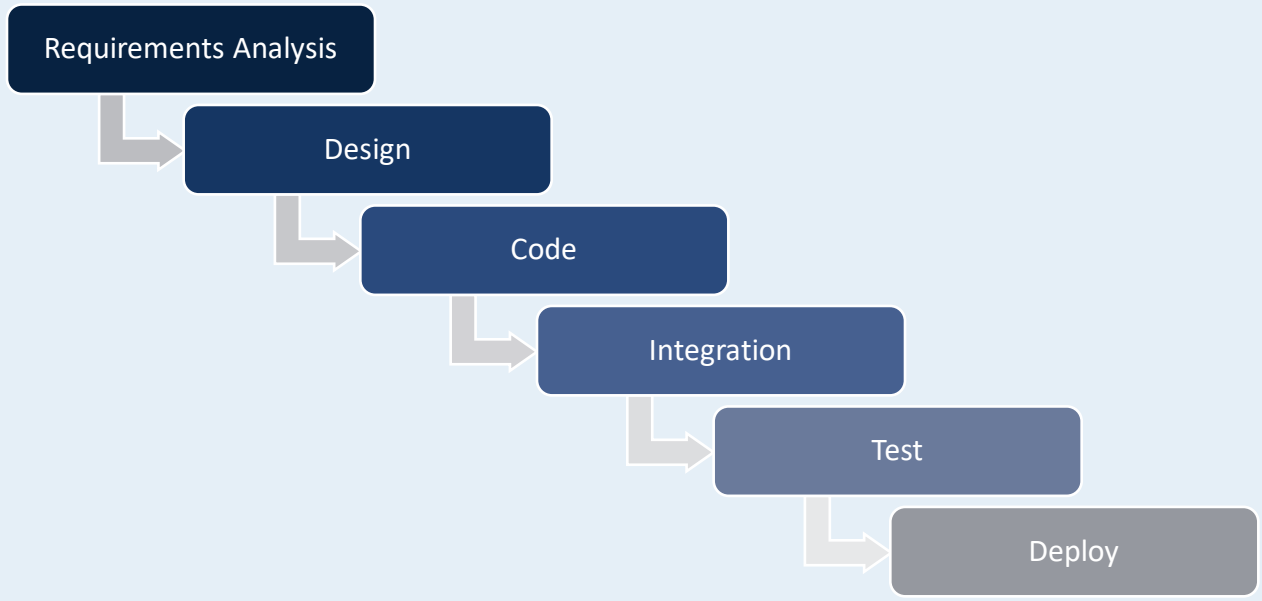
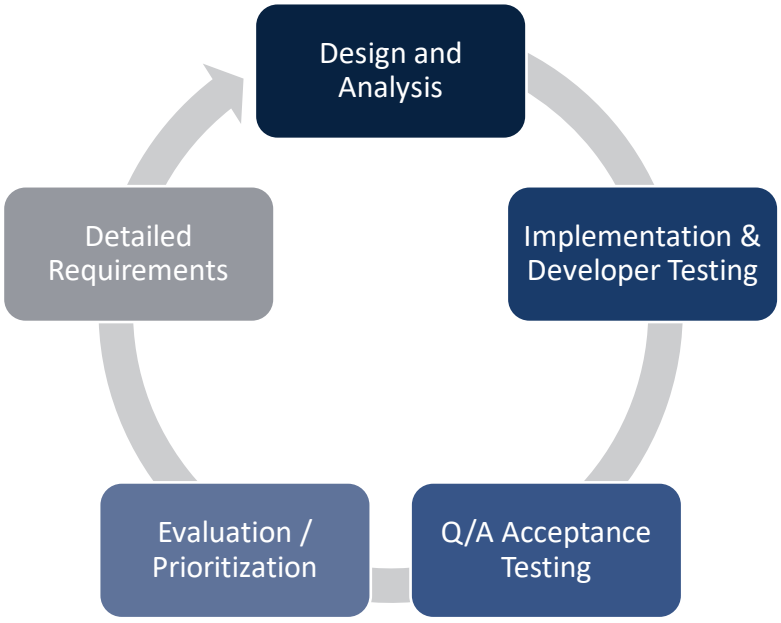


Figure 4: Basic Scrum Process

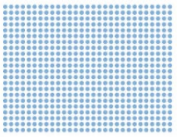
Figure 4 and **Figure 5** show a basic example of a Scrum process that blends all development activities into successive iterations of the deployment process. Each successive iteration is adapted based on the lessons learned from the previous iteration.

Figure 5: Iteration Detail



Regardless of the approach pursued, most agencies use a consultant for some aspect of systems development, installation and systems integration. Agencies currently outsource a significant amount systems integration work for CV systems given staffing limitations and a lack of public sector experience with CV technologies. In general, a systems manager will assist with project planning and preparation of procurement specifications and may oversee the work of other contractors involved with system installation and integration. New devices must be compatible with existing legacy equipment, and multiple integrators may be needed if separate contractors perform system integration tasks for in-vehicle devices.

Example: Colorado Department of Transportation I-70 Connected Vehicles



The Colorado Department of Transportation (CDOT) is partnering with Panasonic to develop a statewide connected vehicle data ecosystem that includes the deployment of vehicle to infrastructure (V2X) technology on 90 miles of the I-70 Mountain Corridor. CDOT will own the V2X data and hardware (including onboard and roadside units). CDOT will have access to Panasonic's intellectual property for turning data into "actionable information" through a lifetime license agreement that includes equipment upgrades in perpetuity. This arrangement does not rely on open source software development and coding, in contrast to other Smart City approaches, although data will still be available through Application Programming Interfaces (APIs) to other interested parties. Panasonic is able to develop and sell these products to other customers.

CDOT and Panasonic use a modified time and materials agreement that allows a limited design build-operate-transfer (DBOT) mechanism with a "CV as a Service" model. Panasonic performs all installation and operation of CV equipment and is developing the real-time CDOT-Panasonic V2X Ecosystem. CDOT will have access to the real-time data from the ecosystem for traffic operations, situational awareness, maintenance and winter operations. CDOT plans to transmit safety messages and other CV-related information to equipped vehicles or vehicles with aftermarket CV devices, an offering that will be available to other interested DOTs or similar agencies. While Panasonic is installing and maintaining the equipment for the duration of the contract, CDOT will own the equipment and plans to own, operate and maintain all future CV equipment and systems in the state. Following the conclusion of the contract, Panasonic will only operate and maintain the subscription element of the data ecosystem.

CDOT is using a number of state and federal funding sources for the $71.8 million project including state Transportation Systems Management & Operations (TSM&O) funding, Federal Highway Administration (FHWA), Intelligent Transportation Systems - Joint Program Office (ITS-JPO), and FAST Act funding resources. CDOT followed all state and federal procurement requirements for this project and began the process by developing a Request for Invitation followed by an Invitation for Bid in response to a list of Functional and Non-Functional System requirements. While only one company responded with a technical and cost proposal, CDOT awarded the contract to Panasonic.

CDOT has a time and materials master task order contract with Panasonic. Specific task orders are issued for the detailed work on each phase of the contract. This arrangement provides flexibility and latitude for Panasonic in meeting its requirements including installation of On-Board Units (OBUs) on fleet vehicles, Roadside Units (RSUs) on the I-70 Corridor, and other communications and sensor upgrades. The agreement requires the CV environment be interoperable with multiple Original Equipment Manufacturers, Tier 1 equipment suppliers, CDOT's state-wide ITS architecture and other local, state and national systems. The procurement approach built off previous CDOT experience with CV systems, but these were not sufficient for the software and technology development requirements of the current effort. Since CV systems evolve quickly, initial contract and software requirements can become quickly outdated. CDOT's master contract with Panasonic is therefore flexible, and the two partners utilize agile contracting methods to afford Panasonic the opportunity to seek skillsets, project partners and technologies that maximize resources.

CDOT has noted that large technology and software firms have limited experience with State DOTs and recommends that agencies seeking to implement CV systems use the "CV as a service" model as it allows the DOTs to focus on their primary objectives of increasing safety and efficiency while provide private partners the flexibility to build and operate the CV system. Furthermore, the agency is not required to manage multiple contracts and removes the burden of maintaining or changing software platforms and associated software applications.

APPENDIX: Smart City Initatives in the U.S.

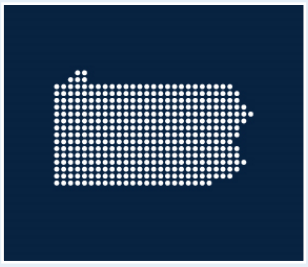
U.S. DOT Smart City Challenge

The United States Department of Transportation (USDOT) launched the Smart City Challenge in December of 2015 that committed up to $40 million in funds (plus an additional $10 million from Paul G. Allen's Vulcan Inc.) to engage mid-sized U.S. cities in the development of and implementation of ideas for an integrated, first-of-its-kind smart transportation system. A total of 78 cities (including Austin) submitted applications to the Smart City Challenge program, and in March of 2016, seven finalist cities were announced: Austin, Columbus, Denver, Kansas City, Pittsburgh, Portland and San Francisco. USDOT announced in June of 2016 that the City of Columbus was the winner of the Smart City Challenge due to its "impressive, holistic vision for how technology can help all of the city's residents to move more easily and to access opportunity." Columbus intends to deploy electric self-driving shuttles linking a new bus rapid transit center to a retail district and use data analytics and new transportation options to improve health care access in a neighborhood with an exceptionally high infant mortality rate. As part of the application process the city committed $90 million in funding outside of the award amount.

In October 2016 USDOT announced an additional $65 million in grants to support "community-driven advanced technology transportation projects." A total of 19 technology-driven projects in local areas were selected including support for four of the Smart City Challenge finalists **(Figure 6).**

Figure 6: Smart City Challenge Finalists

Pittsburgh

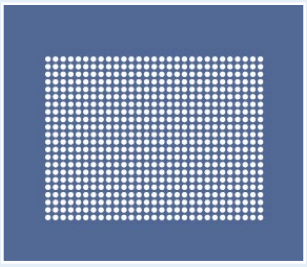


Received nearly **$11 million** to deploy smart traffic signal technology along major travel corridors.

San Francisco

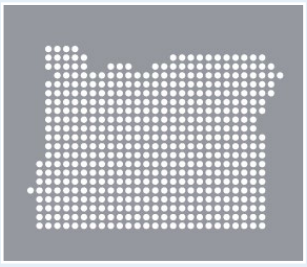
Received nearly **$11 million** to implement connected vehicle technologies that enable signal systems to detect red-light-violating vehicles and adjust timing, and personal wireless devices to prioritize pedestrian travel and safety at intersections. This includes a pilot of a shared, electric, autonomous shuttle.

Denver



Received **$6 million** to upgrade its traffic management center, build a connected vehicle network, and install automated pedestrian detection at difficult crosswalks.

Portland



Transit agency, TriMet, will receive funds to integrate shared-use mobility options into its existing trip planning app, allowing users to plan efficient trips even without nearby transit access.

Following the initial award and implementation of the Columbus program, USDOT issued a report entitled "Addressing the Challenges of Today and Tomorrow" that summarized lessons learned throughout the Smart City Challenge process in **Figure 7.**

Figure 7: Objectives Most Commonly Cited by Proposers

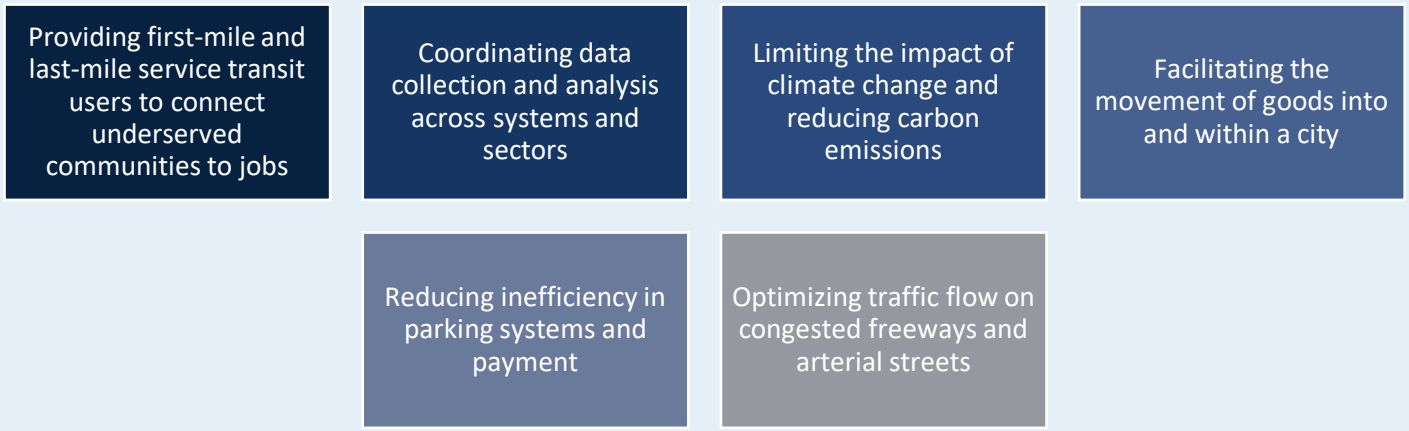


Figure 8: Strategies Submitted by Proposing Cities

How we move	How we move things	How we adapt	How we move better	How we grow opportunity
•Cities proposed projects to test the use of automated shared use vehicles to help travelers connect to their destinations.	•Cities envisioned improving urban freight delivery by implementing smarter curb space management (through sensors, dynamic reservations and other technologies) to speed loading and unloading.	•Cities proposed using inductive wireless charging to charge electric vehicles, buses or shuttles.	•Cities proposed implementing Dedicated Short Range Communication (DSRC) to connect vehicles to infrastructure and each other.	•Cities proposed implementing Dedicated Short Range Communication (DSRC) to connect vehicles to infrastructure and each other.

A recent review of USDOT Smart City Challenge finalist applications by WSP staff as part of a research effort for the City of Las Vegas resulted in the following additional observations:

- All applications included a robust data analysis foundation, either built from the ground up (Columbus, Denver, Kansas City, Portland) or leveraged from an existing, expanded system (Pittsburgh, San Francisco);
- All applications included open source data as essential to integrating public and third-party involvement;
- All applications (sans Portland) included an integrated payment platform to accommodate multimodal trips on one common program. Portland's was built upon an existing payment platform with a mention of integrating future multimodal uses;
- Avoiding proprietary solutions was clearly called out in both Austin and Denver's applications;
- All applications included basic electric vehicle (EV) programs (except for Pittsburgh) made up of vehicle purchases and associated infrastructure components. Pittsburgh's included an "Electric Avenue" component highlighting EV infrastructure integration on a city-owned lot;
- Leveraging existing infrastructure (i.e. streetlight poles, municipal fiber, Traffic Management Centers, etc.) to expand smart city offerings was a common theme;

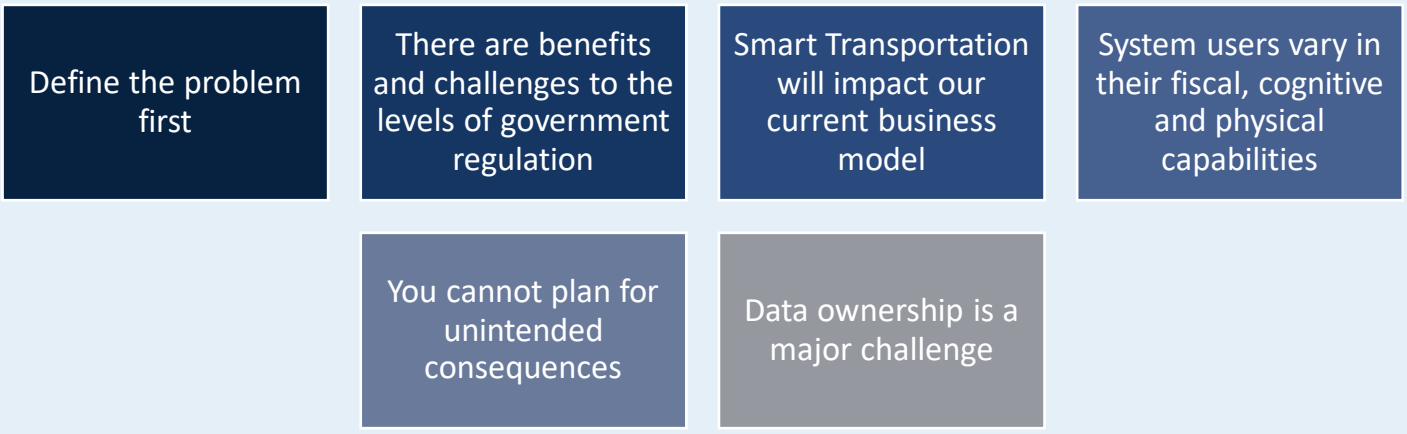
- Automated Vehicle (AV) deployment plans vary wildly with different goals, objectives, deployment characteristics, and vehicles;
- Having a variety of public and private partners is critical;
- Academic and other public partners can provide technical expertise related to public data aggregation efforts;
- Socioeconomic considerations included in the applications were focused around the Obama Administration's Ladders of Opportunity initiative;
- CV deployments range from 500 to 3,000 vehicles (and associated RSUs). They mainly focused on safety (collision avoidance) and mobility (ITS) improvements;
- All cities used dedicated short-range communication (DSRC) technology for CV communication. Some also used a cellular backup for resiliency;
- Pittsburgh and Kansas City applications included smart streetlight LED retrofitting and utilizing the streetlight poles to "sensorize" them;
- Columbus made a great case for leveraging existing partnerships, initiatives and infrastructure investments in their application.

In January of 2017 FHWA convened a National Transportation Policy Symposium entitled "Access to Smart City Transportation" in Washington, DC. Symposium attendees included national thought leaders and public and private sector transportation practitioners who discussed policy gaps and options for creating smart transportation systems that "enhance economic opportunity, mobility, and safety for all users." Discussion at the symposium resulted in the following challenges facing the implementation of Smart City Transportation applications from an access perspective:

- "Addressing the "digital divide"; the existing disparities in the availability of internet and wireless communication infrastructure that serve as a foundation for Smart Cities."
- "Developing intermodal technologies, algorithms and associated integrated data which support efficient and comfortable active, transit and rail modes as well as vehicle options for travel and movement of freight."
- "Securing smart transportation network resources, including required data and data capacity throughout the U.S.; this may be particularly challenging where population is sparse, local resources strained or where neighborhoods are already underserved."
- "Ensuring adequate provision of mobility services for at risk populations such as the elderly, people with disabilities and people in low income neighborhoods."
- "Safeguarding the availability of smart transportation access technologies including affordable smart devices, services and data plans for individuals and businesses. Especially for the unbanked, ensure the availability of flexible payment options."

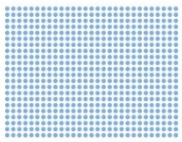
Furthermore, several policy themes emerged in terms of addressing these challenges:

Figure 9: Policy Themes for Addressing Challenges



- "**Define the problem first.** To address policy gaps and questions of ownership, operations, and management, adopt a big picture frame for talking about what problem will be solved with Smart Technology. The frame in the U.S. is taking shape around economic growth and social mobility."
- "**There are benefits and challenges to the levels of government regulation.** The role of the Federal government in regulating development of Smart City Transportation can be small or large. There is a federal role in setting standards and protocols to assure interoperability. A "light touch" regulatory role allows innovation while there is a need for policy and regulation to assure safety as well as equity."
- "**Smart Transportation will impact our current business model**." The public ownership model of transportation is being rethought. We may need to leverage public-private ownership models to build this new digital infrastructure. However, the private sector wants to make the highest return on its investments. Government must carefully negotiate agreements to make sure equity is addressed and potentially use resources to fill the gap. Procurement reform may be needed for governments and businesses to work together more productively."
- "**System users vary in their fiscal, cognitive and physical capabilities**." We must be realistic about the range of technical and financial abilities of users and how limited abilities can be accommodated (for example, lack of smart phone ownership)."
- "**You cannot plan for unintended consequences**; there will be some risk in innovation. However, you can reduce public fears by addressing their concerns. Listening to the voice of the local community is the key to getting this right."
- "**Data ownership is a major challenge**. There are a small set of large companies aggregating and monetizing traveler information data. There is a potential for creating a data monopoly. We want to enable small businesses to enter this market and allow for open data and data sharing for managing and operating the system for the public good."

Denver, Colorado



Current Denver priorities include:

- The development of an initial iteration of their Enterprise Data Management (EDM) Ecosystem, focusing on 14 various use cases across the city. The city is eyeing future expansion efforts once the initial architecture efforts are complete in early 2018;
- A $12M Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Program grant from FHWA to focus on connected vehicle, connected freight and pedestrian safety projects across the city; and
- The city has identified $19M ($12M is dedicated to ATCMTD) for various Smart City projects. Most of the funding is focused on vendor-sponsored projects. Not all the money has been spoken for.
    - The city is currently in the process of splitting transportation and mobility projects from the Public Works Department with the eventual development of a City Department of Transportation. The city has not made a final decision on whether Smart City projects will be run out of the Technology Services (TS), Public Works or future Transportation Departments. The city has designated two staff members to essentially bridge the TS and Public Works Departments to ensure no disconnects develop;
    - The city has not developed any new procurement mechanism or processes but is open to unsolicited proposals from vendors and other technology providers; and
    - The city is leveraging the new Panasonic campus near Denver International Airport and six intersections around the Webb Building downtown to test dedicated short-range communication (DSRC) technology and smart lighting technology

Pittsburgh, Pennsylvania

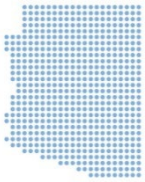
- SmartPGH is the city's Smart City program, building off the momentum from the Smart City Challenge. SmartPGH is now being used as the tool to push those infrastructure investments included in the application.
- SmartPGH was awarded $11M through the ATCMTD Program to deploy "smart spine" corridors that layer environmental, communications, energy and transportation infrastructure technologies to improve connections between isolated neighborhoods and major employment, education and healthcare centers;
- Smart City priority projects include:
    - Smart Spine" corridors;
    - Smart streetlights including the conversion of more than 40,000 lights to LED bulbs and sensorization efforts;
    - Demonstrating autonomous shuttle vehicles;
    - Developing a data utility to offer a platform and process framework to collectively make decisions, recognize economies of scale and create standards of interoperability about the transmission of data; and
    - Deploying electric vehicles to reduce greenhouse gas emissions.
- Pittsburgh has been focused on social aspects around Smart City projects including developing options and pilot programs for those with unique transportation needs, workforce development and engaging residents to identify public priorities for future projects;
- The city and Carnegie Mellon University (CMU) have partnered to allow CMU to test new technology around Pittsburgh without undergoing a lengthy approval process, similar to how the city is able to send maintenance crews out to do small tasks without first seeking funding. The city has also partnered with Uber to deploy autonomous vehicles on city streets for public use;
- The city has already deployed a snowplow tracker app to show residents if a plow has been on their street or current location. Future iterations of that app will include details on what treatments were used and if the plow blade was up or down when it came down the street; and
- ONEPGH was developed as an offshoot of the SmartPGH program to focus on city resiliency efforts, including:
    - Sustainability efforts;
    - Zero waste strategies;
    - Watershed resilience; and
    - Climate Action Plan development efforts.

San Antonio, Texas

- City officials have formed a standing committee to address technology and innovation to take on Smart City goals, strategy and growing the cyber-security industry, digital inclusion initiatives, open data and expanding municipal broadband access all under one roof. The committee will be the center of the City's Smart City Program and it is tasked with breaking down silos within city government and developing a unified policy vision;
- CPS Energy (local energy provider) has unused broadband capacity, and the city is looking to connect municipal institutions leveraging that infrastructure;
- City priorities include increasing internet access for low-income households (San Antonio is one of the most socioeconomically segregated cities in the country);
- The city held a Smart Cities Readiness Workshop to discuss and develop a roadmap to guide San Antonio's Smart City projects. Key action areas prioritized by the workshop included:
    - Smart transportation (connected/automated vehicles, shared mobility);
    - E-Government and open data;
    - Smart water;
    - Smart energy;
    - Workforce development and digital inclusion; and
    - Sustainability.

- San Antonio has budgeted approximately $8M for Smart City projects currently underway, including efforts to:
    - Reduce traffic congestion;
    - Improve pedestrian safety;
    - Wi-Fi access;
    - LED lighting;
    - Improving emergency response through drones in fire operations; and
    - Enhancing customer service through 311 and Parks Department mobile apps and community kiosks.

Florence, Arizona



- Florence is working to identify, prioritize and fund Smart City projects, potentially through a road mapping exercise. Their focus areas currently include:
    - Smart water;
    - Smart energy (retrofitting existing city buildings and ensuring new facilities are energy efficient);
    - Intelligent Transportation Systems (ITS); and
    - Smart parking networks.
- Internal city processes are still under development. The city is working internally to identify staff and/or department(s) that Smart City projects would be localized in;
- Funding for future Smart City projects would come from city budgets. The city is open to other financing mechanisms including public-private partnerships, energy savings contracts, and other procurement mechanisms.

Tucson, Arizona

- Pima Association of Governments (PAG) is convening a Smart City council to work on identifying and prioritizing Smart City projects. The council would be made up of various elected officials and city staff members from across the Tucson metropolitan area;
- No formal processes have been adopted yet. PAG will lead regional Smart City efforts;
- No funding has been identified. The process is in the very preliminary phases.

Olathe, Kansas

- Olathe is looking to deploy pilot projects across the city but focusing on downtown to leverage other infrastructure investments (i.e. new county courthouse, roadway improvements, etc.);
- Olathe has partnered with Innovation Pavilion to investigate potential Smart City projects;
- The city is considering developing a Smart City Program Roadmap to identify and prioritize projects, including:
    - Taxi Voucher/Shared Use Mobility pilot program to connect seniors and other disadvantaged residents with essential services such as medical care;
    - Sensorizing Civil Defense (tornado siren) poles to monitor air quality, gunshots, traffic counts, CCTV, etc.;
    - Connected vehicle pilot program looking at first responders, transit services, or freight priority efforts; and
    - Energy efficiency efforts in civic buildings, potentially including renewable energy development and micro- or smart-grids.
- The city is working internally to develop a formalized structure for project prioritization and decision-making capabilities, more than likely focusing between the City Manager and Mayor's offices;
- Current processes have not been formalized but are in development. The city is focusing on how to best balance city, county and public priorities; and
- The city has applied for the Mobility-on-Demand Sandbox grant program through FHWA to fund its taxi voucher program. Notice of award is forthcoming.