AUTONOMOUS AND CONNECTED TRANSPORTATION

What We Heard from Arizona Communities
Introduction

Transportation systems are evolving globally. Arizona’s transportation future requires a system that is safe, equitable, effective, reliable, efficient, environmental-friendly and flexible to reflect the values and needs of all communities. How does Arizona develop a modern transportation system and supporting policies that will best meet the needs of urban and rural communities statewide? The implementation of multi-modal transportation for Arizona, including autonomous and connected vehicles (AV/CVs), can help to greatly reduce carbon in the atmosphere, lessen the impact of climate change, improve air quality, manage land use, maintain efficient use of the state’s existing transportation infrastructure and secure the state’s economic future – especially as Arizona continues to grow at a continuous, rapid pace. The fast pace of change in the technology sector means that Arizona must plan ahead to influence how new technologies shapes its communities. Planning for a statewide transportation and mobility system that includes AV/CVs, while incorporating the needs defined by urban and rural communities, requires attention today.
EXECUTIVE SUMMARY

TOWN HALL MEETINGS

The state of Arizona’s leadership in AV/CV testing has inspired emerging technologies to progress. In 2018 and 2019, Arizona Forward’s Transportation Committee made it a priority to bring stakeholders together in a series of town hall meetings across the state to collect feedback from urban and rural communities as it relates to AV/CV vehicles.

The Arizona Forward Transportation Committee hosted three town hall meetings across Arizona from September 2018 to February 2019. The meetings initiated a statewide discussion on how AV/CV vehicles may impact the future of transportation in Arizona communities. Town halls were hosted in Flagstaff, Tucson, and Phoenix. Interested stakeholders in communities of varying sizes attended the meetings. Participants included professionals related to the transportation industry including engineers, law enforcement officers, urban planners, educators, representatives from non-profits, and other municipal leaders.

Three national transportation presenters provided information on the current state of AV/CV development in the following areas: technology, land use, policy and legal implications. Following the presentations, participants took part in a facilitated discussion that focused on how rural and urban communities are preparing for AV/CV integration. Participants were also asked to identify primary opportunities and challenges for their communities based on their professional experience and perspectives.

In addition to the three town halls, Arizona Forward held a session at the Rural Transportation Summit on October 25, 2018, in Lake Havasu City to further gain perspective from additional rural communities in Arizona.

A total of 250 transportation-related professionals were involved in the series of sessions statewide.

WHAT ARE AUTONOMOUS VEHICLES (AVs)?

An AV can move and guide itself without human input, and can perceive its surroundings through a combination of sensors, cameras, radar, and AI. There are different levels of automation, ranging from driver assistance technologies to fully autonomous vehicles.

WHAT ARE CONNECTED VEHICLES (CVs)?

A CV includes devices that communicate bidirectionally with other vehicles, devices, networks and services.

Statewide Town Hall Locations

- **Lake Havasu City** (Rural Transportation Summit) October 2018
- **Flagstaff** September 2018
- **Phoenix** February 2019
- **Tucson** December 2018
THE STATE OF AUTONOMOUS AND CONNECTED TRANSPORTATION

TECHNOLOGY ADVANCEMENTS - TIMELINE

AV/CV technology is rapidly developing. While there are several factors that can play into the rate of adoption of AV/CVs, most experts in the technology and transportation industry agree that a reasonable scenario for deployment in a widespread fashion will occur over the course of the next several decades.

2020s:
Modification of Arizona’s current transportation system will set the stage for CV technology. Public agencies will be starting to deploy infrastructure that can communicate information with vehicles. At the same time, car manufacturers will be incorporating connectivity and other features into their new models of vehicles.

2030s:
It is anticipated that the industry will be setting the stage for AVs. Projections indicate only about a quarter of all passenger vehicles will be operating at a high level of automation at this point. Automated vehicle fleets may be operating in a subscription format. To accommodate the shift toward AVs, transportation agencies may consider deploying designated AV lanes on limited access highways.

2040s:
Experts anticipate full adoption of CV technology by 2040, meaning nearly every vehicle on the road will have the capability to send and receive information. Additionally, the adoption of AV technology is anticipated to grow, and will exist to some degree in roughly half of all vehicles on the road. As a result, additional traffic lanes may be dedicated to AVs.

2050s-2060s:
Following the full adoption of CVs, AVs will become more widespread. Near universal adoption of AVs is expected to occur by 2060. As the percentage of AVs increases, the amount of dedicated space on existing roadways will need to increase to accommodate the transition. However, transportation agencies will likely continue to accommodate manually operated vehicles.
Transportation can shape communities by influencing land use development. Major shifts in transportation can cause changes in how Arizona communities operate, and how AV/CVs are deployed can influence city development and infrastructure needs.

- **Behaviors** AVs may encourage sprawl by reducing the negative aspects of commuting and making people more willing to tolerate longer commutes. If AVs reduce trip time, cost or inconvenience they can also increase single-occupant (and potentially zero-occupant) vehicle trip numbers, distances and shift trips from transit.

- **Accessibility** AVs may improve accessibility in communities by offering a low cost, first mile/last mile solution to transit systems. Furthermore, AVs may provide independent travel options for the disabled, elderly and people who do not or choose not to own cars.

- **E-commerce** As online shopping has become widespread over the past decade, AVs could allow for goods to be delivered faster and at a lower-cost, which may increase demand for ordering online as opposed to shopping at brick-and-mortar stores. This would have sales tax revenue implications to cities, as well as potentially impact the occupancy of retail and commercial spaces.

- **Right-of-way Design** As the use of sidewalks and other areas within the right-of-way are increasingly used for pick-up or drop-off zones, new forms of mobility and areas for delivery pods will require right-of-way, curbside, and sidewalk development policies and codes to clarify, adapt and evolve how users interact safely and efficiently.

- **Infill Opportunities** Parking lots currently require a significant amount of real estate in cities. AVs, when deployed as shared or high-capacity vehicles, could greatly reduce the need for parking, or enable vehicle storage, maintenance and operation functions to occur away from primary land uses. As a result, there may be opportunities for infill development and the potential to convert parking structures into different land uses.

- **Decoupling Land Uses from Land** Automated vehicles may reduce land use. For example, a coffee shop could be located within a vehicle that would allow people to order and drink their coffee while they travel versus going to a physical building.

- **Vehicle Fueling Infrastructure** The ongoing trend toward greater electrification of vehicles and the expected efficiencies in driving patterns with AVs could improve roadway flows and reduce pollution. With no driver to fuel or plug vehicles in, AVs may necessitate new forms of charging stations or infrastructure improvements such as inductive charging, which does not require a direct charge, but is completed from a wireless system.
LEGAL AND POLICY ISSUES

There are many unknowns around the deployment of AV/CVs and the policy and legal impacts they will have on society. To begin to address growing concerns around continued deployment of AVs, the federal government has released guidance on AV policies at the local and state level. In addition to clarifying the role of the federal government in the development of minimum safety standards for AVs, the federal government is continuing to evaluate the best approach to update existing Federal Motor Vehicle Safety Standards. The standards will consider a computer having control over the driving functions of vehicles opposed to a human. In the meantime, companies have been releasing Voluntary Safety Self-Assessment Reports that are not mandatory.

In 2015, Governor Doug Ducey signed Executive Order 2015-09 which enabled self-driving vehicle testing and piloting in the state of Arizona. Since the Executive Order was signed, Arizona has become a hub for driverless vehicle testing. As a follow-up to the original Executive Order, the Governor signed Executive Order 2018-04, which states that all agencies with pertinent regulatory jurisdiction shall take the necessary steps to support the testing and operation of fully autonomous vehicles. This order also established the Institute of Mobility (IAM). With these two Executive Orders, the state of Arizona has a strong political backing for the testing of AVs.
There are several untested policy issues that are associated with AVs. Through continued testing and demonstration projects, data is being gathered to determine how AVs will operate safely and effectively on roads. Some of the legal and policy issues that need to be addressed are:

**Primary Legal and Policy Issues That Need to Be Addressed**

- **Insurance and Liability**: especially if vehicles are deployed in a subscription-type service and in a mixed-use environment with both AVs and traditional operating vehicles.
- **Licensing**: in Level 4 and Level 5 vehicles, one arguably should not need a driver’s license, providing more flexibility for those with disabilities that may not be able to get a driver’s license today.
- **Data and Privacy**: address concerns and potential risks associated with protection of personally identifiable information.
- **Infrastructure Considerations**: for funding both urban and rural areas.
- **Law Enforcement**: rules for interaction and collection of crash data.

One of the most talked about legal issues related to AVs and CVs is data collection and privacy. With AVs, there is the potential that significant personal identifiable information may be collected, including geolocation data, private conversations, health information and biometric information. A looming policy and legal question is whether users of AVs will own the data that is collected by an AV that is not needed for operational purposes, and whether riders will be able to opt-out of the collection of such data while still being able to ride in an AV.

Currently, municipalities and states are assessing how to mitigate these risks while continuing to promote testing and deployment of AVs in communities. The importance of having a vision for the operation of AVs within a state or community is emphasized as well as taking a proactive approach to updating policies and laws with an eye toward risk mitigation and the safety of citizens. This is a critical point to ensure consumer trust around AVs.

**One of the most talked about legal issues related to AVs and CVs is data collection and privacy.**
TOWN HALL DISCUSSIONS

ARE AUTONOMOUS AND CONNECTED VEHICLES PART OF YOUR VISION FOR THE FUTURE?

Communities across Arizona agree that AVs and CVs will be a part of the state’s future; however, depending on the size of the community, the predicted timeline for the deployment varied.

Flagstaff participants do not expect their community to be an early adopter. Townhall participants expected larger cities such as Phoenix to deploy AVs as the first adopters. However, as the discussion progressed, participants realized that Flagstaff and the large student population at Northern Arizona University may make their community a good candidate for a pilot program. Although Flagstaff was receptive to the concept, funding for pilot programs was identified as a major hurdle.

The participants in Tucson referenced the significant investment currently underway in the Tucson region and indicated they anticipate AVs and CVs to be integrated into their community in the near future. Tucson feels they have several attributes that create opportunities for AV/CV applications and are focused on which of those offer the best fit for the technology. Tucson’s application to the U.S. Department of Transportation (USDOT) Smart Cities demonstration program attempted to revolutionize transportation by allowing cities to use innovative technologies to address their most pressing mobility problems. Because the Smart Cities program specifically sought out medium-sized cities to apply for the program, the town hall participants saw Tucson as a good candidate for earlier deployment of AVs and CVs. While Tucson did not receive the Smart Cities grant, the application process acted as a catalyst for long-range planning for the implementation of AV/CVs in their future. An example of an outcome noted by participants is the consideration of implementing an autonomous streetcar in the Tucson area. These attributes will provide a foundation for the development of a prioritized plan going forward.

In the Phoenix metropolitan area, AV/CVs have already been deployed through testing by companies like Waymo, Uber and General Motors. With the upcoming initiative to extend the Proposition 400 sales tax that funds regional transportation projects within Maricopa County, the participants saw the opportunity to invest tax dollars into optimizing infrastructure for an autonomous and connected future. Participants noted the efforts made by the Arizona Commerce Authority (ACA). The ACA submitted an Automated Driving System (ADS) grant application to USDOT in partnership with municipalities across the Phoenix metropolitan area. The grant’s purpose is to explore several AV/CV use cases within the region. Although Arizona was not awarded the grant, ACA developed concepts and strategies to benefit Arizona from the process.

Tucson feels they have several attributes that create AV/CV opportunities and in the Phoenix metropolitan area AV/CVs have already been deployed through testing. Flagstaff does not expect their community to be early adopters.
MOBILITY AND EQUITY

Communities across Arizona agree that AVs could provide opportunities and challenges for mobility and equity. Participants noted that from a mobility standpoint, AVs have the potential to provide a new form of transportation for people who are unable to drive due to age or disability. Additionally, AV/CVs could support transit. For example, AV/CVs could help solve first mile/last mile challenges by getting people to and from transit stops. Autonomous buses or rail vehicles could also be deployed to decrease the cost of operating transit services.

While there are several opportunities for AVs and CVs to improve mobility within Arizona, participants at town halls statewide, expressed concerns about equity. The cost per ride or cost to own an AV could be so high that it is unavailable to people below a certain income. As a result, the improvement in mobility may not be as impactful, since mobility-challenged populations may not be able to afford the cost of a ride. For example, Tucson participants noted that there are already companies who are creating a fare system where people can pay a flat rate for transportation and gain access to all transit, ride sharing and bike or scooter sharing options within their city. However, the cost for the flat rate pass per month is more than $500, which is too high for certain populations. Ultimately, affordability will be the key to the equitable deployment of AVs in Arizona.

What Participants Said

- New technologies have the potential to increase mobility for many
- Will affordability be a barrier for those who could benefit most from AV?
- What should be considered to promote equitable deployment of AV?
- New first/last mile transit opportunities
To address the equity concerns, participants statewide indicated that the public sector should be involved in conversations about AV services. In the future, cities could gain a better understanding about how autonomous and connected vehicles can be used to address social issues and what policies need to be modified or implemented to ensure new transportation technologies are deployed in an equitable manner. Participants also discussed the importance of continued investment in public transportation.

Participants in Flagstaff thought that AV/CVs offer many opportunities for Northern Arizona University. There could be autonomous micro-transit connections between the student housing areas and the main campus, or AVs could be used during special events such as sports or graduation. Both the rural transportation participants and Flagstaff participants expressed concerns about tying the technology to the more remote areas of their communities.

Ultimately, affordability will be the key to equitable deployment of AVs in Arizona... participants statewide indicated that the public sector should be involved in conversations about AV services.

SAFETY AND SECURITY

Participants statewide had concerns with the safety and security of AV/CVs. From a security standpoint, privacy and cybersecurity were a major concern. Participants noted that technology companies are appearing to make cybersecurity a priority. Tucson participants noted that cybersecurity was a focus in a Senate Bill that designated the National Protection and Programs Directorate as the Cybersecurity and Infrastructure Security Agency. Participants also noted that the cybersecurity industry has a shortfall in skilled professionals, which heightened their concern that there may not be enough resources available to allocate to AVs. Participants statewide were concerned in general about the privacy of data collected by the AV/CV systems.

From a safety standpoint, all participants noted that the general population has the overall perception that safety is lacking in AVs. Experts often state that widespread use of AVs will reduce accidents by minimizing human error. Media attention during AV testing has made the public question whether fatalities or serious crashes will increase, particularly as AVs and non-AVs operate in tandem. Participants statewide commented that there is a lack of policies related to safety and infrastructure modifications that address safety. Some recommendations concluded that AV pilot programs should take place in a more controlled environment, and that the development of communication tools and best practices are needed to assist communities with responding to the negative impacts of AVs.

What Participants Said

› Should we be concerned about data privacy and cybersecurity?
› What are the public perceptions about safety?
› New technologies raise questions for law enforcement
› Liability issues must be resolved
Safety standards with AVs are constantly advancing. However, Tucson participants questioned whether the public would accept any AV accidents, regardless if there is a decrease in crash rates compared to human operated vehicles. Assuming AVs are electrically powered, Phoenix participants also had concerns about the combination of electric and autonomous systems contributing to a higher risk of collisions.

Participants statewide discussed the challenges related to law enforcement and other legal aspects. They questioned whether artificial intelligence will provide AVs with accurate instructions in atypical situations, such as when humans are directing traffic or when a traffic signal goes out. How quickly can an AV react to an abrupt traffic pattern change in the middle of a vehicular crash situation? Flagstaff participants noted that AV/CVs could potentially reduce drunk-driving incidents significantly as impaired drivers will not be behind the wheel. At the same time, the group raised questions about how human impairment will be treated in a fully automated vehicle.

Who will be liable for accidents? What if AVs are used for illegal purposes? How will law enforcement catch illegal acts in an AV? These questions were some common concerns mentioned statewide. Flagstaff noted that these challenges would be particularly difficult during the transition from the current system of human operated vehicles to AVs. Rural Transportation Summit participants in Lake Havasu city noted that Arizona’s current policies treat AVs similar to non-AVs, and the responsibility lies with the owner either way.

**PRIMARY SAFETY CONCERNS**

- Lack of cyber security guidelines and resources available
- Perception of increase of fatalities versus a decrease
- Lack of policies in place
- Lack of infrastructure
- Electric and AV technology combined
- AI response time to natural road occurrences
- Assignment of liability for accidents
- How will illegal acts be handled
INFRASTRUCTURE NEEDS AND MAINTENANCE

At each town hall, participants discussed the anticipated impacts to infrastructure and noted that there are many unknowns. There is uncertainty about congestion, what future parking requirements will be and whether there will be a standard operating system for all communities.

In Flagstaff, concern was expressed about the ability of municipalities to find staff and the necessary budget to engage in the collaboration required to address long-range planning. Flagstaff was interested in exploring public-private partnership opportunities to address this concern.

Rural Transportation Summit participants were concerned about their unique systems, and the impacts snow and the lack of defined road edges will have on operability for AVs.

In Tucson, participants focused on corridor planning and recommended building smarter technology rather than larger roads. Both Tucson and Phoenix participants were concerned about the impacts on the movement of freight.

Phoenix participants spent the most time discussing current infrastructure system concerns. Participants pointed out that AV/CVs will require different infrastructure components than cities are building today. Participants also noted that a mobility-on-demand deployment of AV technology will require pick-up and drop-off zones instead of parking spaces. To adapt to that anticipated need, Phoenix mention that surrounding municipalities have already started designing rideshare points at airports and special events.

Phoenix participants initiated a discussion regarding electric charging stations and the need for stations to become more widespread across communities. They also noted that it is currently a challenge to maintain pavement markings and signage, and AVs and CVs will only increase the challenge. Phoenix participants suggested that in order to accommodate the widespread use of AVs, roadways should be treated like a utility where anyone using the roadway would be responsible for a use fee.

To enable smart vehicles, the fifth generation of mobile wireless systems (5G) technology will be paramount to enable high-tech features, lessen latency in communication and standardize interoperability. Availability of a 5G infrastructure for Arizona communities is a critical step to shift from a traditional system to a technology-driven transportation system.

STATEWIDE INFRASTRUCTURE CONCERNS

**Rural Communities:**
Accommodation for Snow and Lack of Defined Road Edges

**Phoenix:**
Plan for Different Infrastructure Than What Cities Are Building Today

**Flagstaff:**
Build Public-Private Partnerships to Address Unknowns

**Tucson:**
Corridor Planning and Building Smarter Technology Versus Larger Roads
HUMAN IMPACT

Arizona is an auto-centric culture. Personalities and the unique styles of individuals are reflected in their vehicle choices. Many Arizonans enjoy driving and may not want to give up control of being behind the wheel and the status associated with the vehicle they own.

In Phoenix, participants suggested that there is a portion of the population that will appreciate not having to drive, and AV/CV transportation may increase the social aspect of mobility. Phoenix participants also mentioned that the vision for the future varies by location, age and environment. As with typical human behavior, there is an underlying fear of change. Phoenix participants acknowledge that changes in technology will impact society, and there will be continued, robust discussions regarding the potential positive and negative social impacts of AVs. Further, the group stated that input from professionals in areas such as sociology or psychology would be a valuable addition to the AV/CV discussion. Professionals in behavioral-type fields can provide a different perspective regarding how Arizonans may respond to major culture shifts, and the importance of being cognizant of a variety of moral and individual perspectives.

Flagstaff participants express that the rights of individuals to choose between AVs and non-AVs should be maintained. It was Flagstaff’s opinion that some Arizonans will not be comfortable with driverless vehicles regardless of technological advancements.

What Participants Said

- American identity with the car may affect acceptance of new technologies
- Fear of change
- Rights of the individual to choose
POLICY AND POLITICS

Statewide, participants acknowledged that changing existing policies and regulations at the state and local level is a potential major hurdle. All participants recognized that partnerships between governmental agencies and the private sector as well as inter-agency coordination will be essential. Participants feel local agencies should understand which rules and regulations may prevent the advancement and implementation of AV/CVs. Phoenix pointed out that extensive dialog between public and private entities to sort out these considerations is key.

Tucson participants expressed concerns that the lack of coordination between public and private sectors sends a message: “this is what is happening, deal with it.” Tucson participants also acknowledged that there are competing interests with smaller towns and rural areas. Small towns and rural communities feel they are trying to catch up with building infrastructure suitable to connect to the rest of the state. These communities do not have the resources available for tomorrow’s infrastructure. Some participants in smaller and rural communities feel AV/CVs will not be relevant to them if they do not have the appropriate network built.

Participants statewide expressed a desire for increased collaboration with all entities involved in AV/CV transportation.

Tucson participants suggested that the development of an organization that can provide a consistent message to all stakeholders across the entire state is necessary. This type of designated organization may help with a specific concern raised in Phoenix regarding how coordination will be possible among jurisdictions to ensure there is a seamless transition across city boundaries.

Participants in Tucson also discussed changes necessary for driver’s licenses, insurance, the requirements for operating a vehicle and public education. Furthermore, Tucson talked about procurement rules, and wondered what changes might be needed in that arena.

In Flagstaff, participants foresee policy and regulation challenges for autonomous transit. The public may embrace autonomous transit, but are there legal and liability issues?

FUNDING

The issue of funding was raised statewide. In Flagstaff, participants are concerned that their local governments have small budgets and limited staff time to deal with the magnitude of coming changes associated with AVs. They believe public-private coordination will be required, and that options other than public-only funding should be considered. The cost of AV/CV technology is a significant concern to Flagstaff, and they emphasized that solutions should be paired with need.
Tucson raised similar concerns and noted that the gas tax will be insufficient for future needs. Participants saw AV/CVs as an opportunity to create a new funding source, with the potential for a more successful model. Phoenix participants also would like to use the opportunity for exploring new funding strategies such as a user fee for curb usage.

Phoenix is struggling with the concept of near-term investments, and whether to invest in current conditions or invest in a future state of technology which may not prove to be reality. The argument is centered around the balance between what to invest in now versus what will matter most in the future. Phoenix noted that they can’t waste current funds on yesterday’s transportation goals. For example, Phoenix discussed the current system of moving passengers from the Sky Harbor airport to the rental car facility – it is a big investment. But, will the return be as great in the future transportation reality?

**What Participants Said**

› Is there enough budget and staff time at the local level to plan and adapt to technology change?
› Near term vs long term investment needs
› Be creative about new revenue sources

**JOBS, INDUSTRIES AND ECONOMICS**

Tucson and Phoenix identified opportunities related to new jobs and training programs that will be required to operate and maintain an AV/CV system. Phoenix was specifically focused on workers with a background in machine learning and robotics. Flagstaff’s participants saw opportunities in AV/CV technology supporting and enhancing the tourism industry. Flagstaff also discussed ways to attract technology companies to test vehicles in their city, which represents a different operating environment than Phoenix or Tucson.

Both Phoenix and Tucson expressed concerns about the impacts to existing jobs, such as Uber and Lyft drivers, transit operators and truck drivers. To mitigate the impacts to jobs, some of the participants suggested that community colleges, trade schools and high schools modify their curriculums to prepare students for the jobs of the future. For example, students who would like to become a mechanic may need to learn how to repair LiDAR sensors or other technology that enables autonomous vehicles to work.

Some participants in Phoenix acknowledged that although there could be a loss of jobs in long-haul trucking, the ability to platoon and operate over longer hours could result in opportunities and savings for the movement of freight.

Some of the participants suggested that community colleges, trade schools and high schools modify their curriculums to prepare students for the jobs of the future.
LAND USE
Participants statewide predict that sprawl may increase with increased use of AV/CVs. Phoenix participants considered that a vehicle mile tax (VMT) may help counter that tendency. Flagstaff identified an opportunity to incentivize land use opportunities through ordinances, codes and zoning changes. All the participants saw a reduced need for parking, which also opens opportunities for land re-use.

In Phoenix, participants are concerned about the relationship between housing and transportation, including that the fact that lower housing costs may require higher transportation costs for commuting. Phoenix discussed ways to bring housing and transportation discussions together to solve the affordable housing need. Phoenix also foresees AV/CVs as an opportunity to create a more sustainable environment.

Participants statewide predict that sprawl may increase with increased use of AV/CVs and that Vehicles Miles Traveled (VMT) will increase.

TRAFFIC IMPACT
In Phoenix, participants identified that if AV/CVs are deployed in a mobility on-demand model, where the vehicles would not have to park, the overall vehicle miles traveled (VMT) will increase. If VMT increases, it is likely that congestion will worsen since vehicles will be constantly moving as opposed to spending most of their time parked. Additional delays could occur if infrastructure is not standardized and/or is not functioning properly.

Participants at all three town halls discussed the relationship between congestion, AVs and transit. Generally, the participants believed public transit will likely be the first to adopt AVs. For example, the Phoenix Sky Train is already automated. However, there are questions about how public transit will fit into the total transportation network as AVs are adopted, and what investments should be made to prepare for the future. If agencies discontinue investments in transit systems and limit mode choice, Arizonans may use low-occupancy vehicles thus increasing the congestion.
POSITIVE DATA USES

Both Phoenix and Tucson participants were excited about the possibility of AV/CV data collection, and the opportunities that it will present to their cities. Both noted that vehicles could report infrastructure problems back to the cities, allowing faster response times in maintenance. Both cities also recognized data opportunities beyond this level, as private companies are already recognizing a profit from data collected by a series of connected sensors. The cities require the development of policies and contracts that allow them to benefit from the commercialization of their data and information. However, there is a concern of privacy protection associated with data activity. Flagstaff and the rural communities did not discuss data challenges and opportunities.
CONCLUSION

Arizonans who participated in the town halls generally feel unprepared to assess what AV/CV means for their communities. At the same time, AV/CV testing in Arizona’s Central Region/Phoenix metropolitan area has positively impacted the comfort level of participants who live in that region. Central Region participants appeared to feel more prepared to accept AV/CVs than other regions within the state, largely because of the ongoing testing that has been happening in their communities. AV/CV testing in Arizona is proving to produce advantages. The state is in a positive position to leverage the experience it has gained from testing in the Central Region to empower other communities statewide.

There are concerns and questions in all regions throughout Arizona related to infrastructure planning, policies, cost and safety. Consistent education and statewide involvement of stakeholders will be key as AV/CV transitions from a testing position to a mode of transportation available to the public.

EDUCATIONAL RESOURCES

All participants recognized that communities have adapted to shifts in transportation throughout history. The shift toward automated and connected vehicles is a similar paradigm from the horse to the car. To that note, there is a need for low-cost and easy-to-access educational AV/CV resources particularly in smaller, rural areas, to ensure all communities are well-informed about the shift to AV/CV technology throughout Arizona.

The Central Region/Phoenix metropolitan area has spent a high level of effort identifying potential issues and solutions due to testing, making this region a good candidate to assist in development of educational materials that could benefit communities statewide. Other municipalities outside of the Central Region may not have the resources to easily obtain the information, or the direct technical knowledge required to evaluate potential implications of AV/CV for their community.

Many questions and concerns shared in the town hall meetings were general in nature regarding AV/CV technology. Participants were searching for responses to broad questions that are tailored to Arizona communities. Some common questions included:

› When are AVs “safe enough” for the general public to accept the technology?
› How do we determine areas where the introduction of AV/CV is acceptable?
› How do we work through the unknown liability issues?
› How will we address the significant cybersecurity and data privacy considerations?
INFRASTRUCTURE PLANNING

With any major lifestyle change, there are implementation challenges that communities need to overcome. As more technologically advanced transportation systems are implemented, all town hall participants noted that it is important for stakeholders to start thinking about the next steps to prepare for automated and connected transportation. Some common implementation questions included:

› What is the integration process?
› How can we assess road readiness?
› How can we be confident that our infrastructure investments are not quickly outdated?
› Can current roads support AVs?
› Will there be a standard operating environment?
› What do we need the electrical or wireless system to be?
› What are other infrastructure requirements?
› How will engineering standards change?
› How will this impact workforce (e.g., current freight movement drivers)?

Several stakeholders also brought up the importance of their role to guide the vision for future cities. While AVs will change Arizona’s transportation system, it is important to consider other modes of transportation so that the entire system continues to provide options for Arizonans to connect within their community. As AVs become widespread, it is equally important to create a balanced transportation system that includes transit, pedestrians, bicyclists or other modes. For example, AV/CVs may provide significant first/last mile opportunities, which is the travel from a major transit hub to an Arizonan’s origin or final destination, typically a mile long, to enhance transit operations.

Participants viewed transportation plan updates as a great opportunity to guide the implementation of technology and help communities form a vision for their future transportation system.
There are many advantages to AV/CVs including a greater freedom for those unable to drive. However, the cost of AV/CV could be prohibitive for some segments of the population; policies or programs that support distribution of the potential mobility benefit to a larger segment of Arizona communities is an area that will require in-depth review.

Liability issues will require additional dialogue with insurance companies, law enforcement and other related stakeholders. A consideration may be to create liability and safety standards together to address and mitigate common concerns.

Upgrading Arizona’s transportation system will require significant dedication in order to develop sufficient, sustainable funding sources. The build-out of the potential system will also require a great deal of political will. Many participants were hesitant to allocate funding to technology-based projects when there are immediate maintenance transportation issues such as potholes that need to be resolved. To help Arizonans understand the value of implementing projects that support a technology-based future, agencies may consider pairing technology with a “real” problem. Arizonans may be more willing to support funding of a project if they can see that the technology will solve familiar problems in their communities.

There is a role to play for a neutral umbrella organization in the state, which could provide on-going information to stakeholders regarding changes in technology, policies, best practices and other potential benefits. This organization may also:

1. Facilitate an information exchange between municipalities and technology companies.
2. Provide information and support for private grant funding.
3. Assemble tools and best practices to assist communities in evaluating the best way forward for their situation, needs and priorities.
4. Focus on providing public entities such as police departments the information and resources needed to begin training and education for their officers in order to remove the current questions and ambiguity.
5. Explore the opportunities and drawbacks surrounding cyber security and data ownership.
6. Identify non-technical professions who could be consulted to identify strategies to reduce the disruption from adoption of these new technologies.

In conclusion, there is currently a wide gap between AV/CV concept and reality for most Arizonans. Consistent education, involvement and awareness will help shorten the gap as AV/CV continues to mature.
PARTICIPANTS

**Town Hall Presentations and Industry Data**

**Eric Plapper**  
Program Manager, HDR

**Veronica Siranosian**  
Vice President, AECOM

**Greg Rodriguez**  
Mobility Policy Principal, Stantec

**ARIZONA FORWARD TRANSPORTATION COMMITTEE**

Involved with this white paper project

**Jennifer Pyne**  
Deputy Director, Valley Metro

**Lauren Evans**  
President, Pinyon Environmental, Inc.

**Dave Skinner**  
Senior Vice President, HDR

**Lori Singleton,**  
President and CEO, Arizona Forward

**Tricia Covert**  
Director, Marketing and Public Relations Arizona Forward

**Suresh Raghavendra**  
Program Manager, AECOM

**Jason Simmers**  
Principal Engineer, Kittleson and Associates, Inc.

**Dayna Wasley**  
Planner, AECOM

**Ray Yparraquire**  
Senior Traffic Engineer, HDR
THANK YOU TO OUR TOWN HALL PARTICIPANTS

AARP Arizona
AECOM
APS
Arizona Commerce Authority
Arizona Community Foundation
Arizona Hispanic Chamber of Commerce
Arizona State University
Best Best & Krieger LLP
City of Apache Junction
City of Avondale
City of Chandler
City of Flagstaff
City of Mesa
City of Phoenix
City of Scottsdale
City of Surprise
City of Tucson
Chandler Chamber of Commerce
Cosanto Foundation
EEC
Federal Highways Association
Freeport-McMoRan
Greater Phoenix Economic Council
HDR
Intel
Iteris
Kittelson & Associates, Inc.
Lake Havasu Metropolitan Planning Organization
Lloyd Construction Company, Inc.
Maricopa Association of Governments
Northern Arizona Intergovernmental Public Transportation Authority
Northern Arizona University
Pima Association of Governments
Pima Community College
Pinyon Environmental, Inc.
Psomas
REDD, Inc.
Salt River Project
Town of Gilbert
Town of Marana
Town of Oro Valley
Transdev Services, Inc.
T. Y. Lin International
University of Arizona
Valley Metro
WSM Architects
XMotion
Y2K Engineering

AND thank you to the organizers of the Lake Havasu City Rural Transportation Summit to enable a forum for this discussion during the Summit.
ARIZONA FORWARD

Arizona Forward is an organization that has supported the state of Arizona for more than 50 years by advocating for major sustainability initiatives to create a balance of economic, environmental and community benefits. The organization has a membership reflecting diverse representation from government jurisdictions, large and small businesses, educational institutions and non-profit organizations. Arizona Forward is positioned to utilize its leveraging power and act as a catalyst to facilitate and execute projects that deliver improved and sustainable quality of life for the state.

From the inception of the organization, Arizona Forward has maintained a transportation committee focused on various initiatives throughout the years including the I-11 and the Central Arizona light rail system. Currently, the Mobility and Clean Air Solutions Committee is made up of more than 50 professionals involved in Arizona's mobility public and private sector.

arizonafoward.org