

# 2022 Center for Applied Transportation Sciences (CATS) Mobility Symposium – White Paper

## *Advancing Mobility Performance in the Greater Tucson Area through Technology-based Transportation*

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January 25, 2023



THE UNIVERSITY OF ARIZONA  
COLLEGE OF ENGINEERING

Center for Applied  
Transportation Sciences

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# Introduction

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The University of Arizona’s Center for Applied Transportation Sciences (CATS) was founded in 2021 “*to serve as a research, training, and capacity-building resource for regional governments, educational institutions, and private sectors in the field of Smart Cities.*” Observing a growing interest in technology-based transportation and integrated smart mobility systems across the United States, CATS convened a symposium on October 6-7, 2022, at the University of Arizona with national experts and transportation partners from the Greater Tucson to advance productive discussions about the mobility ecosystem in the Greater Tucson Area.

The theme of “Integrated technology-based Mobility” framed the context and focus of the symposium. Thirty (30) representatives came together to build a common understanding of the State of the Practice of technology-based transportation in the United States (U.S.) (see Appendix A for a list of participants). Together, they explored, considered, and discussed opportunities for advancing a technology-based mobility strategy in the Greater Tucson Area. Together, they shared emerging technologies and trends, best practices, and current mobility-related pain points and discussed the most promising technology-based solutions and directions for advancing future collaboration.

This White Paper encapsulates the discussions, themes, and key findings from the Mobility Symposium. It also reviews emerging trends and best practices and highlights current pain points in the Greater Tucson Area’s transportation ecosystem. It lays the foundation for furthering the formulation of an integrated technology-based mobility strategy for the Greater Tucson Area’s transportation system with a set of action items.

## Organization

This white paper is organized into three sections

1. Section 1 builds a common understanding of how technology-based solutions can enhance transportation systems. It introduces technology-based transportation solutions by describing emerging technology trends, defining technology-based transportation solutions, and presenting the opportunities their adoption can offer the Greater Tucson region. It also includes a case study of an application of Houston ConnectSmart, a technology-based transportation solution.
2. Section 2 explores opportunities for leveraging technology-based transportation in the Greater Tucson Area. It presents the needs for which these types of solutions could be considered along with the types of solutions to be considered. It also identifies the range of collaboration and coordination among stakeholders to bring a technology-based transportation solution to the Greater Tucson Area.
3. Section 3 contains a summary and action items to move the Greater Tucson Area forward and towards adopting a coordinated technology-based transportation strategy.

Appendices contain a roster of symposium participants and a symposium packet.

# Technology-based Transportation Solutions

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The Greater Tucson Area is thriving, growing, and prosperous. It encompasses a geographically large area with urban, suburban, rural, and tribal communities, each with distinct character and diverse customer needs, and placing both challenges and opportunities on the area's transportation system. Strategies to address transportation and mobility are often molded by policy priorities, including safety, congestion, environmental, and equity, determining need and pain points and then matching the best solution to address both priorities and needs.

Technology, often a catalyst to change, offers tremendous potential for addressing transportation priorities and community needs. From personal cars to buses to even trains, Americans have relied on transportation to get to work and school, shop to access critical amenities, or care for their families. Over the years, we've seen significant progress in upgrading vehicles, enhancing transit accessibility, creating better riding experiences, and enhancing accessibility and reducing emissions. Technology is at the core of many of these improvements.

While it remains challenging to predict how emerging transportation technologies will play out in the United States, it's important to track the development and application of new technologies to determine which will and can pave the way for enhanced transportation systems to drive the Greater Tucson Area forward.

## Emerging Transportation Technology Trends

Over the past few years, trends in the number of smart cities and regions and the need for sustainable transportation and advanced mobility solutions have been growing. New technologies and technology applications are emerging and/or becoming widespread across the country. To lay the framework for the symposium, keynote speaker Victor Mendez first defined mobility within the broader view of transportation and then laid out a few of the technological innovations currently trending and offer potential for transportation.

Varying in development and complexity, the following technologies share an underlying and very basic principle: they play a critical role in helping us get from Point A to Point B in an efficient and safe manner. While some fill mobility gaps or enhance our transportation system, others open doors to new, seemingly unfathomable, yet exciting, mobility opportunities. They include:

- **Micro mobility**, such as scooters, bikes, and other small, generally lightweight and low-speed transportation options. Micro mobility systems, including their electrified options, can be individually owned, and they are increasingly deployed through shared fleets by private companies. Shared systems offer on-demand access to users and can make public transportation more accessible through first and last-mile strategies. Micro-mobility is often viewed as a critical building block to creating a more resilient transportation system by providing nearly universal access to affordable transportation regardless of socioeconomic status or geographic location.

- ***Electric Vehicles (E.V.)*** extend beyond personal use (as of 2020, nearly 1.8 million E.V.s were registered in the U.S.-more than triple the amount in 2016<sup>1</sup>) to public transportation with the electrification of buses and trains (and previously mentioned micromobility systems).
- ***Unmanned aerial vehicles (UAVs) or “drones” and eVTOL (electric vertical take-off and landing aircraft).*** The advancement in the UAV/ eVTOL aircraft improves efficiency by increasing the operating range and enabling autonomous technology. In particular, the eVTOL platform offers various applications, such as air taxis, private air vehicle, cargo transportation, and air ambulance.
- ***Autonomous and Connected Vehicle*** technology extends beyond serving not only people (through personal vehicle use and transcends public transportation) but also goods delivery through the freight systems and infrastructure. The automotive industry is inching forward with Autonomous vehicles, but related technologies such as Advanced Driver Assistance Systems and connected vehicles offer safety and entertainment features that are becoming increasingly attractive to consumers.
- ***Artificial intelligence (A.I.)*** is increasingly being invested in and adopted by transportation organizations and mobility service providers. A.I. is being used for business analytics or intelligence, but also to automate repetitive and low-level tasks, but also to identify business risks, and to improve security. From speech recognition to fraud detection to software development.

Many of these technologies are in various stages of development, adoption, and growth. They struggle with issues such as battery technology (E.V. and eVTOL), evolving regulation (impacting operational issues for A.V. and eVTOL in urban areas and developmental delays in building the infrastructure to support technology (vertiports, intramodal centers, etc.)) and competition for already limited funding for transportation infrastructure.

To address the latter issue, there are several Federal and State funding opportunities that can act as an enabler of technology development and adoption. Three of the more recent opportunities stemming from the bipartisan infrastructure law/Infrastructure Investment and Jobs Act (IIJA) from the U.S. Department of Transportation include:

1. Strengthening Mobility and Revolutionizing Transportation (SMART) will provide \$100 million over the next five years to provide grants to eligible public sector agencies to conduct demonstration projects focused on advanced smart community technologies and systems to improve transportation efficiency and safety. See: <https://www.transportation.gov/grants/SMART>
2. Advanced Transportation Technology and Innovation (ATTAIN) offers \$60 million over the next five years to promote advanced technologies to improve safety and reduce travel times for drivers and transit riders, and ATTAIN can serve as a national example. See: <https://www.fhwa.dot.gov/bipartisan-infrastructure-law/attain.cfm> and <https://ops.fhwa.dot.gov/bipartisan-infrastructure-law/index.htm>
3. Advanced Driver Assistance Systems (ADAS) for Transit Buses Demonstration and Automated Bus Maintenance and Yard Operations Demonstration provides \$6.5 million is available for demonstration projects under the Public Transportation Innovation

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<sup>1</sup> IEA (2021), *Global EV Outlook 2021*, IEA, Paris <https://www.iea.org/reports/global-ev-outlook-2021>, License: CC BY 4.0

Program. See: <https://www.transit.dot.gov/grant-programs/advanced-driver-assistance-systems-adas-transit-buses-demonstration-and-automated>

Moving forward and progressing emerging technologies and new mobility solutions require new ways of doing business for cities and regions and coordinating agencies. This includes breaking down institutional silos and working together through public-private partnerships to set regional and common goals and priorities, build coordinated mobility strategies and collaboratively pursue and secure funding opportunities like the ones above.

## Technology-based Solutions for Demand Management

Growing traffic and roadway congestion means slower speeds, longer travel times, and longer traffic queues congestion and related pollution are creating challenges for cities and regions across the nation. Traveling by road by daily commuters has fueled increased traffic congestion, and with driving alone as the primary mode of choice in most regions, commuters are looking for efficient, sustainable, equitable, and safer modes of travel to the workplace and other desired destinations. Moreover, many cities and regions are struggling with complicated decisions regarding increasing roadway capacity, with some having already reached their limit of expanding the road infrastructure due to the limited land space or funding availability.

Like other regions facing rising demand for transportation infrastructure, the Greater Tucson Area is facing the need to find alternative solutions to manage congestion. When traffic demand approaches the roadway capacity, the quality of service or the roadway functionality rapidly diminishes. When demand exceeds capacity, traffic flow breaks down completely. Roadway capacity is considered fixed (e.g., the ability or capacity of a road to accommodate a particular volume and density of vehicles), and several factors can affect capacity such as lane and shoulder width, the number of intersections, alignment of the roads and curves, driver, and vehicle attributes, etc. Capacity can also be affected by special events (e.g., football games), traffic incidents, and weather.

There are an array of tools, processes, and practices that are used to mitigate congestion, referred to as “congestion management.” In addition to building new roadways and upgrading existing roadways, there are varying measures to address congestion management. In recent years, technology-based solutions have emerged to help improve the highway system and make it work better for everyone. These solutions are being increasingly applied to manage travelers/commuters and transportation demand as the need for solutions to make better use of or expand roadway capacity and competition for transportation infrastructure funds grows.

Technology-based transportation solutions that focus on the demand side managing traffic by informing or incentivizing travelers to make better decisions about when (e.g., avoid peak traffic times, work from home) and how to travel (e.g., trip sharing via carpooling, using alternative modes to driving alone such as transit, biking, shared mobility, and walking), It also including applying technology to improve traffic flow and operations (e.g., adaptive signals, distributed routing).

The following outline some of the approaches to which technology is being applied to make better use of existing capacity:

- Mobility on Demand (MOD) and Mobility as a Service (MaaS) platforms (see Case Study),

- Signal control, including adaptive signal control,
- Enhanced information dissemination, including Advanced Traveler Information Systems, arterial dynamic message signs (DMS) and smart work zone notifications,
- Connected Vehicle Technologies such as truck platooning, intersection management, work zone applications, and intermodal connectivity,
- Multiagency Transportation Management Centers,
- Active Parking management, and
- Arterial Traffic Incident Management.

Determining the best approach to meet the diversity of needs and public and business expectations is by working together to identify the best approach or set of approaches that can work synergistically. Having shared concerns, needs and constraints does not necessarily mean the congestion management solutions will look the same from city to city throughout the Greater Tucson Areas.

## Case Study: Houston ConnectSmart

While applications of MOD/ Mobility as a Service are slow in coming to the U.S., they tend to mirror the European model with a focus on public transportation. One of the earliest US-based MaaS applications, launched in 2021, is Pittsburg’s pilot “Move PGH.” The program aims to provide Pittsburghers with increased access to more transportation options, including transit and micro-mobility (see: [move-pgh.com](http://move-pgh.com)). MOD/MaaS type systems are emerging in the U.S., and like Move PGH, and they are built off the traditional transit smartphone applications with payment and ticketing included along with other forms of regionally available and integrated mobility options to offer a seamless mobility experience. The majority of these, if not all, do not include driving as a mode of travel.

There are a few MOD/MaaS single-app-based systems with a focus on congestion management that incorporate behavioral economics (influencing or incentivizing traveler’s behaviors), including ConnectSmart in Houston, Texas, and INNOVATE 680 in Contra Costa County, California. Both are funded through the United States Department of Transportation Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant program, awarded in 2016 and 2018, respectively, offer public transportation along with ticketing and payment capabilities, including automobiles and driving as a mobility option, and incorporate a behavioral economic or incentive component to influence wise mobility choices that reduce travel demand and roadway congestion.

The remainder of this section provides a deeper look at the Houston ConnectSmart program, which is significantly further along than the Contra Costa County project and recently launched in August 2023.

Houston’s ConnectSmart Program purposefully sidesteps traditional strategies for managing congestion. Building upon the conventional MOD/MaaS—a reality in Portugal, Finland, the United Kingdom, Singapore, and other countries around the world—ConnectSmart significantly expands its potential.

While ConnectSmart relies on a digital platform that functions as a traditional MOD/MaaS with intermodal trip planning, ticketing, and payment capabilities, it embodies two



significant differentiators: (1) it integrates behavioral economics with ADM strategies to encourage travelers to adopt more sustainable mobility behaviors to reduce the drive-alone rate; and (2) serves as a conduit for data flow exchanges to optimize the regional transportation systems and services, making them more efficient, more reliable, and safer (See Figure 1).

Figure 1: ConnectSmart Platform



The ConnectSmart Program is leading to a new understanding of mobility in the Houston metro region and is reshaping how travelers get around in the Houston region, making it easier and more efficient to access mobility.

The program's platform was tailored specifically for Houston's unique transportation network and mobility options. Available through a mobile app or website, it offered travelers predictive and reliable trip information and increased accessibility to current and emerging mobility options. But the program is more than getting from point A to point B; it's about expanding access and opportunity, such as landing a job, making it easier to meet with family, or accessing essential services.

The following represent the key customized features that are offered through the ConnectSmart app:

- **Intermodal Trip Planner**—Users can plan a trip based on their personal preferences (e.g., fewer transfers, less walking, lowest cost, etc.) and rank resulting options by a variety of filters (e.g., earliest arrival, earliest departure, shortest time, etc.).
- **Transit Planner and Ticket Payment**—Users can plan, buy, and activate a transit ticket.
- **Employer and Social Carpool**—Users can join and form employer-based or interest-based groups to find carpool matches and schedule and track carpool rides
- **Cycling Engine**—Users can locate available bike-share stations and can select bike routes based on their personally defined comfort level.
- **Parking Navigation**—Drivers could include parking as their end destination or an intermediate stop in their route planning.



- **Traveler-Information**—Users can view live roadside videos and read agency-provided roadway signs in the app.
- **Trip Logs**—Users can log their work-from-home trips and may link them to traveler incentive programs.
- **Mobility Wallet**—Users can manage their transactions, collect coins and tokens, purchase transit tickets, and redeem points for gift cards.
- **Tow and Go**—Drivers may access emergency roadside service on select corridors at no cost.

While ConnectSmart is only just now launching, it represents a 10-year commitment across TxDOT, TranStar, regional stakeholders and transportation providers, technology providers and major employers, and others. The level of collaboration and coordination required to sustain this concerted effort across the eight counties of the Houston-Galveston Transportation Management Area cannot be emphasized more. ConnectSmart program is implementing a robust marketing, communications, and agency partners and stakeholder engagement effort to support the project and will be sharing best practices, lessons learned, and performance metrics as adoption across the region grows.

# Considerations for a Technology-based Strategy

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During the symposium, participants worked in small groups to discuss common goals and pain points facing the Greater Tucson Area, identify some of the technology-based solutions that could serve the Area, determine the stakeholders that need to be involved and consider how coordination should continue. This section summarizes these discussions in the following ten (10) considerations regarding the current situation and readiness for collaborating on a technology-based transportation strategy in the Greater Tucson Region

1. The timing is right for developing a shared vision, and goals and collaborating on solutions to solve shared pain points.
2. Emerging technology is constantly in motion and frequently overhyped. Having clear goals with well-defined pain points or problems helps shift through the hype and align technology with needs and set priorities accordingly. Stakeholders agreed that the timing is right to move forward with a vision or strategy that addresses the need for more roadway capacity without expanding the current infrastructure and adding new roads. They also agreed there is a need to balance system-wide goals with public needs and expectations.
3. Shared needs and pain points (not prioritized) across stakeholders include:
  - Funding and lack of resources—this covers the lack of funding in general and the need for resources for ongoing maintenance and planning. It also addresses the revenue shortfalls caused by the gas tax and the potential for alternative funding such as vehicle miles traveled (VMT) or road user charge systems.
  - Travel behavior inventory—insights on travel behavior patterns, attitudes, and perceptions about mobility and transportation could help inform policy and program development.
  - Operations and performance management—roadway reliability improvements through signal optimization, addressing long cycle lengths and distributed routing during peak hour congestion.
  - Accessibility and equity—recognition of a need to understand and find ways to meet the needs of diverse populations, including those living in remote areas, and connecting neighborhoods or communities to mobility options.
  - Multi-modal system— shared interest for an approach that integrates multi-modes in addition to driving but with a focus on shifting drivers to non-driving modes.
  - Safety—overall need to focus on safety, including better incident management to prevent secondary incidents from occurring.
  - Non-recurring congestion management—recognition of the impacts of non-recurring congestion management such as schools (pick up and drop off), weather-related road closures, special events, and emergency evacuation.
  - Data Management—there is a lack of good, accurate, and shared data, including live data.
4. Technology-based solutions for demand management represent an opportunity for the Greater Tucson Area.

5. A coordinated strategy for demand management should build upon existing demand management programs and public transportation already in place and then consider future technology-based solutions for the greater good of the entire Greater Tucson Area.

The systems and technologies that are already in place include

- Adaptive signals
- Active monitoring through smart sensors
- Variable Messaging Signage on freeways
- Dynamic traffic modeling
- Google maps
- Arizona 5-1-1

The systems and technologies that could be expanded or newly considered included:

- ConnectSmart application (the same or similar)
- Connected and automated vehicle technology
- Integrated corridor management
- Ramp Metering
- Variable Messaging Signage on arterials
- E-VTOL
- Demand responsive Transportation Service (not fixed route)
- Smart Work zones and coordinated maintenance (requires more transparency)
- RITIS for performance measure development
- Incident integrated traveler system for incident management

6. Champions and a process or framework for developing a coordinated strategy to facilitate stakeholder coordination and collaboration are needed.

7. Moving forward with a coordinated technology-based strategy that would benefit the Greater Tucson Area requires an understanding of existing and shared needs, resources, and problems and, equally importantly, collaboration across all stakeholders. Two of the biggest values to involving all stakeholders are in strengthening and expanding awareness and knowledge of shared problems and technology solutions and ultimately gaining buy-in, support, and coordination across all stakeholders.

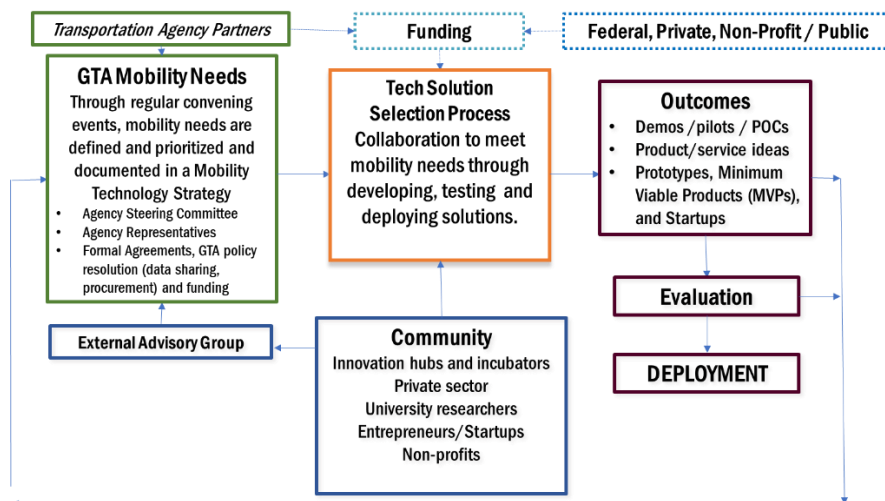
8. Stakeholders (and roles) to involve in the process:

- Public agencies, including DOT (operations and maintenance), shared transportation service providers (shared goals), IT departments (support, servers, and equipment selection), procurement departments (policies and procedures beyond highway projects)
- Tribal lands and other agencies, including MPO (coordination and data collection), FHWA (funding and technology assistance), and the Port of Tucson
- Traveling public (involved in planning and funding approvals)
- Employers and private organizations (funding and access to employees/commuters)

- Technology providers
  - Academia (development, data processing and system users)
  - Politicians and advocacy groups.
9. Stakeholders also agree that a process or framework for a coordinated strategy, while needed, is currently lacking—and most stakeholders shared the opinion that CATS can play a key role in developing and facilitating this process. A framework may keep the strategy focused on a shared direction and ensure a systematic sequence of activities will take place (e.g., define a goal, problems, expected ROI or performance measures, data, resource sharing, etc.) within a set timeframe. Regarding the question of whether a single champion to spearhead this process, stakeholders agreed that each individual stakeholder shares in that role (with leadership support and buy-in) and that the MPO could do more to improve collaboration across the Greater Tucson Area.
10. There are several excellent examples of collaborations and processes that can serve as best practice examples. They include:
- AZTECH Phoenix
  - Tran Star Houston
  - DRCOG
  - RTC Las Vegas
  - SANDAG (ICM)

There are many models for designing a systematic approach or framework for developing a coordinated technology mobility strategy. Figure 2 is a Greater Tucson Area (GTA)-tailored model developed for the Central Texas Regional Mobility Authority during a 2020 project for an integrated and coordinated technology corridor strategy in Central Texas.

Figure 2: A Sample Framework



# Conclusion

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The symposium emphasized the importance of being aware of the role emerging technologies and monitoring trends in demand-response technology, including their capabilities and related tools. This understanding helps stakeholders to forward plans for an integrated and coordinated technology-based transportation strategy. There was consensus that learning about programs like the Houston ConnectSmart program enhances understanding of smarter transportation planning, data integration, and sharing that could benefit the Greater Tucson Area. They agreed this is the level of innovation needed to be successful with technology-based deployments in the Greater Tucson Area.

Four key takeaways are:

1. **Stakeholders have a shared understanding of transportation innovation and technology trends that are driving technology-based solutions, particularly for demand management.** There is consensus that technology can be a solution for managing demand.
2. **A collaborative strategy requires balancing system goals and user (public) needs and matching the right mix of technology/technology-based solutions to meet those needs.** Needs must be prioritized and be based upon shared, common goals priorities; this makes sure the process remains focused and not on hyped technology (e.g., “shiny objects” or “silver bullets”).
3. **Stakeholders gained an understanding of the concept and value of technology-based demand management and the value of data generated by transportation-based solutions.** The ConnectSmart application was perceived as being applicable to the Greater Tucson Area, and the required level of collaboration across stakeholders was achievable. Recognizing one of the benefits of the ConnectSmart program was integration with TranStar and data sharing across stakeholders, and stakeholders identified the lack of shared, interoperable data as a potential roadblock for furthering an effective collaborative strategy. There was an agreement to look at other entities (Phoenix, Houston) and that CATS can also play a role.
4. **Agreement on the need for a framework for creating a shared strategy that includes champions, stakeholders, and a clear process to define shared vision, purpose, and measures and to select and evaluate solutions.** Stakeholders agreed that a coordinating body or framework for developing a collaborative strategy was lacking. CATS was positioned as the “glue to keep everyone moving forward together” and could thereby support this effort in several ways:
  - Coordinate future symposiums or workshops related to this topic to further grow knowledge and understanding of technology and emerging trends. Topics for future workshops include ITS systems of the future, Road User Charges, Congestion Pricing, and Incentive Programs; Lessons learned from other regions and smart cities.
  - Serve as an organizing body to work through a CATS-formulated framework for the strategy roadmap. This includes identifying the goals, and indicators for success, identifying short-term targets and “low-hanging fruit” (early wins) and clarifying desired performance measures.

- Serve as a data repository for shared data (archived and real-time data) and/or setting up a regional archival system.
- Conduct background research, data analytics, and other supporting activities to inform strategy development and demonstrate the value of a coordinated strategy (e.g., the importance of doing this, challenges faced by not doing it, and build support/buy-in from elected officials and the public on related investments of resources)
- Facilitate the pursuit of Federal and other grant funding by leading grant writing and coordinating meetings.

Based on the information gathered during this symposium, the following four action items are suggested immediate next steps in preparing for the development of a coordinated technology-based mobility strategy for the Greater Tucson Area.

1. Clarify and define CATS' role as a facilitator and supporter to all Greater Tucson Area stakeholders in developing the strategy.
2. Determine and/or develop a process or framework for bringing together key stakeholders to work collaboratively towards a coordinated technology-based strategy for the Greater Tucson Area.
3. Collect, review, and share best practices for regional collaboration and data sharing identified during the symposium; share best practices in (CATS-facilitated) Workshops or Teleconference Meetings.
4. Identify potential funding opportunities for furthering the strategy development and/or implementation.

# Appendix A: Participants

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Affiliation	Name	Title
Tucson Department of Transportation and Mobility	Sam Credio	Director
Tucson Department of Transportation and Mobility	Shellie Ginn	Deputy Director
Tucson Department of Transportation and Mobility	Blake Olofson	Interim Traffic Engineering Administrator
City of Tucson	Manisha Bewtra	Mayor's Planning, Mobility, and Development Advisor
Pima County	Carmine DeBonis Jr	Deputy County Administrator
Pima County Department of Transportation	Kathryn Skinner	Director
Pima County Department of Transportation	Lauren Fecteau	Traffic Operations Manager
Pima County Department of Transportation	Paul Casertano	Division Manager – Planning and Engineering
Pima County Department of Transportation	Gabriel Leyva	Analytics & Process Manager
Pima County Department of Environmental Quality	Natalie Shepp	Senior Program Manager
Arizona Department of Transportation	John Roberts	Engineering Manager
Arizona Department of Transportation	Jay Gomes	Regional Traffic Engineer
Arizona Department of Transportation	Rod Lane	Southcentral District Engineer
Pima Association of Governments	Hyunsoo Noh	Modeling Administrator
Town of Marana	Diahn Swartz	Traffic Engineer
Town of Sahuarita	Paul Burton	Traffic Signal Operations Manager
Town of Oro Valley	Jose N. Rodriguez	Engineering Division Manager



Town of Oro Valley	Cheryl A. Huelle	Traffic Engineer
Tohono O'odham Nation	Melissa Pablo	Representing, Mr. Damascus Francisco RTA - Technical Management Committee
Federal Highway Administration	Karla Petty	Arizona Division Administrator
Center for Applied Transportation Sciences (Host)	Yao-Jan Wu	Director
Center for Applied Transportation Sciences	Alyssa Ryan	Assistant Director
Center for Applied Transportation Sciences	Henrick Haule	Center Manager
University of Arizona	Greg Hitt	Economic Development and Community Engagement.
Center for Applied Transportation Sciences	Adrian Cottam	IT Manager
Center for Applied Transportation Sciences	Carin Calle	Accountant
VMM Holdings (Keynote Speaker	Victor Mendez	Keynote Speaker
Texas Department of Transportation (Speaker)	Brenda Bustillos	Transportation Engineer
Metropia	Yi-Chang Chiu	Founder, CEO
MZ Insights (Facilitator)	Mia Zmud	Principal

# Appendix B: Symposium Packet

## Center for Applied Transportation Sciences Mobility Symposium

*Advancing mobility performance in the Greater Tucson Area through technology-based transportation*

<b>Date</b>	Thursday, October 6 (8:30 AM – 3:30 PM) Friday, October 7 (8:30 AM – Noon)
<b>Location</b>	Health Sciences Innovation Building (HSIB) Room 880 (Day 1); Room 640 (Day 2) UA Main Campus <a href="#">1670 F. Drachman St. Tucson, AZ 85721</a>
<b>Host</b>	The University of Arizona, Center for Applied Transportation Sciences
<b>Sponsors</b>	Pima County, City of Tucson, Arizona DOT

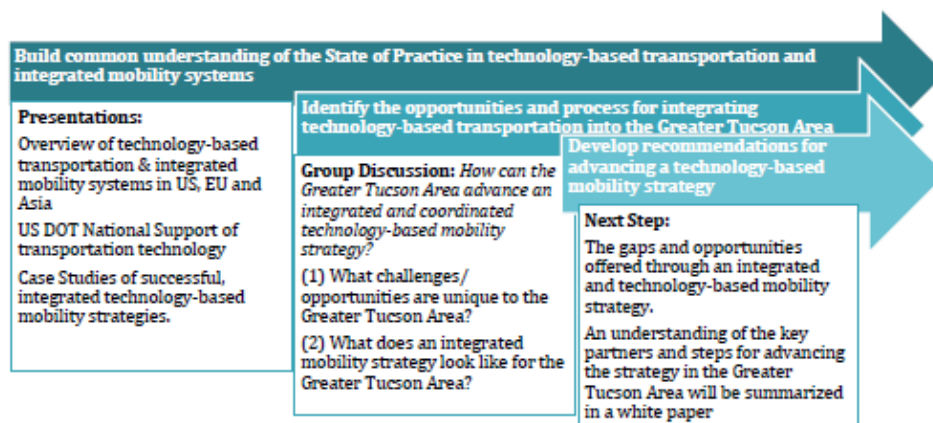
### Overview

The University of Arizona's Center for Applied Transportation Sciences (CATS) was founded in 2021 "to serve as a research, training, and capacity-building resource for regional governments (CATS) was founded in 2021 "to serve as a research, training, and capacity-building resource for regional governments, educational institutions, and private sectors in the field of Smart Cities. Observing a growing interest in technology-based transportation and integrated smart mobility systems across the United States, CATS is convening a symposium to advance productive discussions about the mobility ecosystem in the Greater Tucson Area. It will lay the foundation for an integrated technology-based mobility strategy for the Greater Tucson Area's transportation system.

Together, national experts and transportation partners from the Greater Tucson Area will collaborate to (1) build a common understanding of the State of the Practice of technology-based transportation in the US and globally; (2) define and identify the opportunities for leveraging technology into the Greater Tucson Area; and (3) identify considerations for advancing a technology-based mobility strategy. Symposium participants will learn how emerging technology-based solutions are paving the way for enhanced transportation systems that are more resilient, equitable, sustainable, and efficient.

### Symposium Framework

As shown in the framework below, through a combination of presentations and group discussions, the symposium is designed to disseminate information, build knowledge levels, and enable collaboration on the opportunities, necessary steps, and recommendations for advancing a technology-based mobility strategy in the Greater Tucson Area.



**For More Information:** Yao-Jan Wu, (520) 621-6570, [yaojan@arizona.edu](mailto:yaojan@arizona.edu)

## AGENDA

<b>DAY 1</b> <b>Thursday, Oct. 6, 2022</b> <b>HSIB Room 880</b>		
<b>8:30 – 9:00 Registration Check-in, Coffee, Tea, Pastry</b>		
9:00 – 9:15	Welcome and Introductions	<p><u>Host:</u> Yao-Jan Wu, Ph.D., P.E., <i>CATS Director</i></p> <p><u>Facilitator:</u> Mia Zmud, <i>MZ Insights</i></p>
9:15 – 10:00	Innovation and Technology in Transportation	<p><u>Keynote Speaker:</u> Victor Mendez, MBA, P.E., <i>Former ADOT DOT Director, FHWA Administrator, Deputy Secretary of Transportation of USDOT</i></p>
10:00 – 10:20	Technology-Based Transportation	<p><u>Speaker:</u> Yao-Jan Wu, Ph.D., P.E., <i>CATS Director</i></p>
10:20 – 10:40	Discussion: Bringing technology-based transportation to the Greater Tucson Area	<p><u>Moderator:</u> Yao-Jan Wu, Ph.D., P.E., <i>CATS Director</i></p>
<b>10:40 – 11:00 Coffee Break</b>		
11:00 – 12:00	Case Study of Technology-based Adaptive Demand Management	<p><u>Speaker:</u> Brenda Bustillos, Ph.D., P.E <i>TxDOT Transportation Engineer</i></p> <p><i>Houston ConnectSmart</i></p>
<b>12:00 – 1:00 Lunch</b>		
1:00 – 1:10	Morning Recap	Kahoot Exercise
1:10 – 2:30	Group Exercise: Technology-based Transportation	<p>Breakout Group Exercise (see page 3)</p> <p><u>Facilitator:</u> Mia Zmud, <i>MZ Insights</i></p>
2:30 – 3:00	Wrap Up / Review Friday Agenda	
<b>Networking - Light Refreshments</b>		

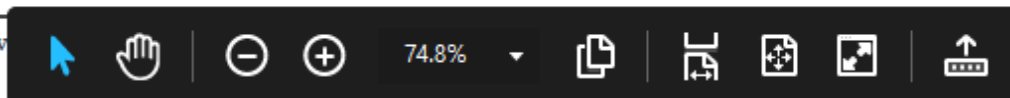
**DAY 2**  
**Friday, Oct 7, 2022**  
**HSIB Room 640**

8:30 – 9:00 Coffee, Tea, Pastry

9:00 – 9:15	Welcome and Day 1 Review	<u>Host:</u> Yao-Jan Wu, Ph.D., P.E., <i>CATS Director</i>
		<u>Facilitator:</u> Mia Zmud, MZ Insights
9:15 – 10:10	Facilitated Discussion on Day 1	<u>Facilitator:</u> Mia Zmud, MZ Insights
10:10 – 10:30 Break		
10:30 – 11:20	Group Discussion	Group discussions and report back
	<ol style="list-style-type: none"><li>1. Group agreement on the key agency partners?</li><li>2. Which stakeholders need to be involved?</li><li>3. What benefits might jurisdictional partners/stakeholders derive from an integrated strategy?</li><li>4. What are the next steps for moving this forward? How can CATS facilitate the process?</li></ol>	
11:20 – 11:40	Facilitated Discussion: CATS ROLE <sup>1</sup>	<u>Facilitator:</u> Mia Zmud, MZ Insights
11:40 – 11:50	Wrap-Up and Next Steps	<u>Host:</u> Yao-Jan Wu, Ph.D., P.E., <u>Facilitator:</u> Mia Zmud, MZ Insights

Lunch

<sup>1</sup> To prov



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## Day 1 Group Exercise/Brainstorming Session

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### Materials

- Markers and 3- 4 flipchart paper
  - 3-6 sticky pads per flipchart station
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### Instructions

**Setting:** There should be one flipchart for each of the four (or select three) topics below.

1. Needs or “pain points” – What are the most pressing congestion issues that technology-based transportation solution can best address?
2. Technology-based transportation solutions – Which technology-based transportation solutions are a good match for the Greater Tucson Area?
3. Regional Coordination – What are the collaboration issues or opportunities to be addressed when carrying out a technology-based transportation strategy?
4. Roles – Which stakeholders need to be part of a technology-based transportation strategy and what are their roles

**Duration:** 60 minutes

#### Step 1: Brainstorming (25 minutes)

1. At the top of each flipchart put the question (1-2-3-4).
2. Break into four groups (1-2-3-4, 1-2-3-4, etc.) and go to their respective flip chart
3. Give them 5 minutes to think about the question on the flipchart in front of them and to brainstorm ideas.
4. Have every one move one flipchart to their right (or left).
5. Repeat Step 3.
6. Continue this until everyone one has brainstormed on every flipchart.

#### Step 2: Clustering and Discussion (10 minutes)

1. Groups, at their original flipchart
2. Each group works together to cluster or group the many responses into categories.

#### Step 3: Report Back and Open Discussion (20 minutes)

1. Each group reports back
2. Discussion after each—agreement? What’s missing? Are there any surprises?

**Usual or Expected Outcomes:** list of ideas from the group and preliminary consensus on how integrated technology-based transportation strategy might take shape in the Greater Tucson Area.

