EMERGING TECHNOLOGIES

MOVING PEOPLE
CONNECTING PLACES

Technology is advancing at an exponential rate. Two years ago, the Alamo Area Metropolitan Planning Organization (MPO) began a Bike Share Master Plan Study to consider expanding bike share services within Bexar County and to study the feasibility of implementing bike share services in Boerne, New Braunfels and Seguin. Overnight, 2,000 app-driven scooters appeared in San Antonio, changing the landscape and causing a new evaluation of dockless type mobility solutions as part of the MPO study.

Accomplishments Over the Past Five Years

The appearance of 2,000 scooters overnight on San Antonio city streets is just one example of the proliferation of technology in the field of transportation. Over the last five years technology driven Transportation Network Companies (known as TNCs), such as Uber and Lyft, have made their presence felt in the region. The City of San Antonio (CoSA) and the Texas Department of Transportation (TxDOT) are using emerging technologies to monitor congestion (event and incident management) and to collect and share real time travel data. Other agencies, including Comal County, are using technology in the form of high-water detection systems to keep roadways safe during and after extreme weather events.

Emerging Technologies

In 2016, the MPO participated in the first Texas Mobility Summit convened by the Texas Department of Transportation to take the Smart City concept and turn it into a nationwide initiative. As a result of the summit, the MPO partnered with Texas A&M Transportation Institute, the University of Texas at Austin's Center for Transportation Research, and the Southwest Research Institute, as well as multiple local partners including the CoSA and VIA Metropolitan Transit to form the Texas Automated Vehicle (AV) Proving Ground Partnership. Together, the group submitted a proposal and was selected as a national proving ground by US Department of Transportation in early 2017. The MPO attended a second Texas Mobility Summit in 2017 and began participating in the organization's Communities of Practice around new technologies in 2018.

Also, in June 2017, VIA Metropolitan Transit launched their goMobile app, which allows riders to pay for their trip via their phone. That same year, VIA worked to tackle the challenge of big data by convening and hosting their very first GoCodeSA Codeathon. The goal of the event is to spark innovation by providing local entrepreneurs and coders with transportation data they can use to create technological solutions in a short period of time. The event has since become an annual event and developed ideas for how to connect transit data to Amazon's Alexa and applications for more comprehensive trip planning.

In 2017, the MPO funded two projects with Surface Transportation Block Grant funding seeking to make smart ITS improvements in the region. The first was a smart signal upgrade for the City of New Braunfels that will install advanced controllers, networking equipment and control software for 179 traffic signals at a cost of $2 million. The second involved ITS enhancements for the CoSA to implement communication network improvements at a cost of $4.5 million.

In 2018, the City of San Antonio in partnership with USAA launched the Safest Driver Contest using mobile technology created by Cambridge Mobile Telematics. The mobile app was downloaded over 14,000 times. This same year, the City of San Antonio also launched their 311SA mobile application which uses gamification to encourage city residents to take pictures of and log areas in need of city services.

Emerging Technologies

Overview

Transportation is rapidly being changed by new technologies. Over the duration of this long-range transportation plan, technology and automation could make significant improvements in roadway capacity without the addition of pavement, generate better travel time reliability, and tackle safety challenges. The extent that technology impacts will be felt over the next 25 years, will likely depend on decisions made by both public and private entities as well as the cost and benefits of the technological advances.

The Alamo Area is a high growth region and the challenge will be to continue to build, operate and maintain a safe, reliable multimodal transportation system. Technological advancements will be integral to being able to move people and goods. But, at this time, no agency knows exactly what, where and how significant advancements in technology will impact our current and planned systems.

What can we expect?

Expected elements of transportation technology in the timeframe of *Mobility 2045*:

- Autonomous and Connected Vehicles (cars and trucks platooning)
- 5G, or the fifth generation of cellular mobile communications
- Increasingly smarter phones (handheld communication technology)
- Collision warning systems
- Enhanced traffic signal control technology
- Expanded traveler information systems
- Increases in rideshare and car sharing
- Land use impacts
- Low cost, same and next day delivery (by drones)
- More alternatively fueled vehicles
- More mobility/navigation apps
- Smart cards (payment system)
- Trackless transit vehicles
- Wireless traffic management
- Implications to revenue – federal and state gas tax impacts

Local Efforts

VIA goMobile App

VIA Metropolitan Transit launched its new goMobile app in June 2017. The new mobile ticketing and trip-planning app, powered by moovel North America, will allow bus and VIAtrans patrons to purchase fares using their smartphone, and activate them when they are ready to ride. The digital ticketing process expedites boarding and reduces the need for cash and transfer cards. The app's trip-planning feature provides bus arrival information to help riders plan more easily and accurately.

VIA's goMobile is the next in a series of technological advancements VIA has introduced to enhance passenger amenities and modernize the agency's programs and services. The goMobile app is free to download for Apple and Android devices. Fares and passes can be purchased using credit cards. The app was designed in partnership with moovel, a transit technology provider, and features local landmarks and iconography that become animated once the ticket is activated. Passengers will simply show their phone screen to the operator when boarding.

VIA GoCodeSA Codeathon

GoCodeSA Codeathon is a partnership event hosted by VIA Metropolitan Transit that challenged area tech talent to imagine new transit solutions for the region. The first event was held May 20-21, 2017 where teams spent 24 intense hours of strategic thinking and creative coding. The first-place team was selected from more than 50 participants with an integration that allows users to utilize Amazon Echo and its Alexa Voice Service for trip-planning assistance, using next-bus arrival information at a specified stop. Contestants competed for $4,500 in cash and prizes, provided by various sponsors. VIA maintains access to Codeathon projects for possible development and future reference.

The idea for the codeathon was part of the agency's ongoing investment in smart transit solutions that expand access to service, increase mobility, and enhance the passenger experience. Codeathon teams could work on any type of project, such as web apps, mobile apps, wearable solutions, data visualizations, algorithms, or visual mock-ups. Challenges, data sets, and other resources focused on public transportation. This event was held again in 2018 and will likely become an annual event for VIA.

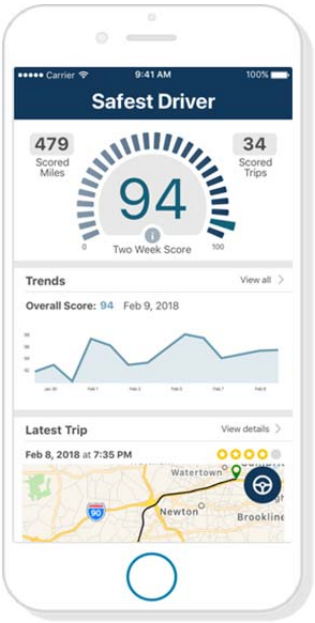
City of San Antonio Automated Vehicle Pilot Request for Proposals

In July 2018, the City of San Antonio issued a Request for Information (RFI) for an Automated Vehicle Pilot Program. The intent of this RFI was to gather data to assist the City in understanding the feasibility of using autonomous vehicles for specific use cases within the City. The City identified potential multiple uses including:

- Innovation Zones – The City of San Antonio is developing Innovation Zones in several key areas of the city. The Innovation Zones will be used as proving grounds to test various types of smart city technology, including autonomous vehicles, smart streetlights, various sensors, and Wi-Fi connectivity. The following areas are two of the initial Innovation Zones to be considered.
    - Brooks – Brooks is a 1,300-acre mixed use campus that includes various options to live, learn, work and play. This area has attracted over 3,000 jobs and includes facilities for institutions of higher learning, light manufacturing, retail, and residential living. The potential use case is the transportation of employees, visitors, and residents in and around the campus. Consideration should be given on how to integrate the VIA Metropolitan Transit (VIA) Brooks Transit Center and VIA's new Primo operation on SW Military Drive in 2019.
    - Medical Center – The South Texas Medical Center is a 900-acre campus which includes over 27,000 medical facility employees, over 29,000 employees at associated business, and over 300,000 vehicles daily. The potential use case is the first mile/last mile transportation of employees, visitors, and patients in and around the medical center. Consideration should be given on how to integrate the VIA Metropolitan Transit (VIA) Medical Center Transit Center and VIA's existing Primo operation on Fredericksburg Road.

- City Employee Shuttle (Point-to-Point) – The City of San Antonio has approximately 12,000 employees with approximately 2,000 located in various locations within downtown. The potential use case is the transportation of employees from one building location to another.
- City Fleet Integration – The City of San Antonio builds and maintains San Antonio's streets, storm water, and transportation infrastructure, as well as provides solid waste management services. The potential use case is incorporating autonomous vehicles into municipal fleets.
- Military Base Shuttle (Point-to-Point) – Joint Base San Antonio (JBSA) was created in 2005, and is the largest joint base in the Department of Defense. JBSA is comprised of three primary locations: Fort Sam Houston, Lackland, and Randolph, plus eight other operating locations. JBSA supports over 250,000 personnel with 80,000 of those enlisted within the military. The potential use case is the transportation of employees from one building location to another.
- USDOT Designated Proving Ground (Fredericksburg Road) – In November 2016, the United States Department of Transportation (USDOT) initiated a notice soliciting proposals for a pilot program to designate automated vehicle proving grounds. In January 2017, Fredericksburg Road, as part of the Texas Innovation Alliance state-wide partnership, was selected as one of 10 designees nationally. As a test-bed site, Fredericksburg Road will offer the City and other transportation partners an ability to evaluate autonomous vehicle technology and its ability to reduce pedestrian and vehicle conflicts. In addition, this corridor from downtown to the Medical Center includes VIA Metropolitan Transit's Primo Bus Rapid Transit Route. The test-bed will explore possible technology to optimize bus interval spacing along this high frequency route, which could improve the consistency and efficiency of rider service.

City of San Antonio Safest Driver Application



The City of San Antonio Transportation and Capital Improvements department worked with Cambridge Mobile Telematics and USAA on a mobile app contest. The mobile app was developed by Cambridge Mobile Telematics in support of the City's Vision Zero Initiative. The app provided participants with helpful feedback on their driving based on five metrics: speed, acceleration, braking, cornering, and phone distraction. USAA provided the incentives for the contest including three grand prizes of $10,000 each and multiple weekly prizes of up to $2,000 each. The app tracked the driving habits of participants in the background without them having to log on each time. In addition to hoping to spark better driving behaviors, the app served as a data collection tool for the City of San Antonio who plans to use the information to implement countermeasures in some of the areas where behaviors such as speeding seem to be an issue or improve operations in areas where people may be experiencing an unusually high level of delay.

City of San Antonio 311SA Mobile App

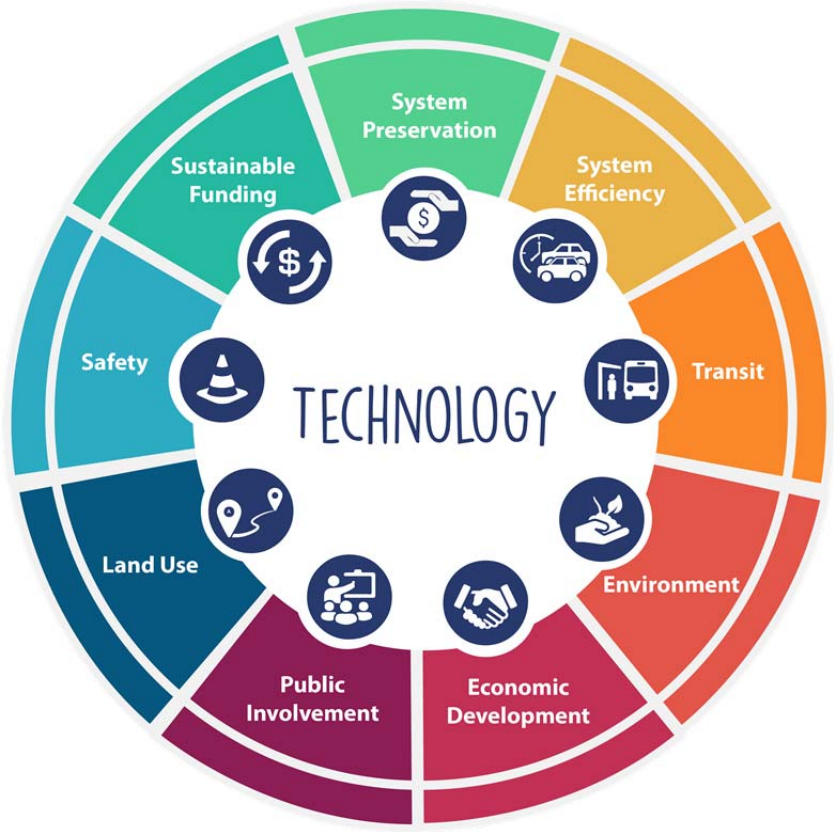
In August 2018 the City of San Antonio launched the new 311SA mobile app at an interactive event that brought together residents and community leaders while showcasing app functionality, highlights and community participation. A component of the City of San Antonio's Smart Cities initiative, the new 311SA mobile app illustrates how San Antonio is utilizing technology to promote growth and help create positive change in the community. The app provides an alternative to calling 311 through a user-friendly experience and allow s residents to report issues easily, check the status of their service requests, get badges for their engagement on services and view other requests submitted in their area.

Designed by Cityflag Inc., the app transforms the way residents and government collaborate, contributes to social welfare and builds a more inclusive and transparent public process. The gamified public service app uses game dynamics and mechanics based on incentives and rewards to engage citizens with their community, creating a more informed and committed active citizen.

How will technology impact us?

Figure 3.1 graphically shows the MPO's goal areas. The MPO has identified elements of technology that will impact these major goal/focus areas.

Figure 3-1. MPO Goal Areas



System Preservation: Being able to maintain infrastructure that has already been constructed

- Enhanced traffic signal control technology
- Increases in rideshare and car sharing
- Wireless traffic management

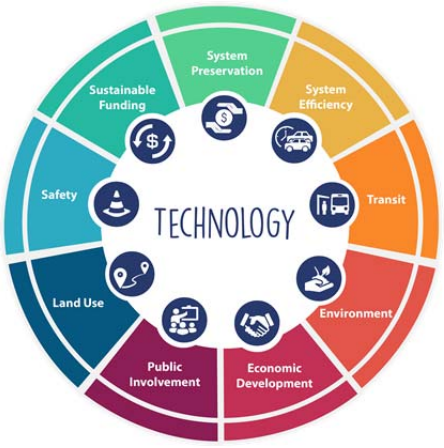
System Efficiency: Being able to operate the transportation system effectively

- Enhanced traffic signal control technology
- Expanded traveler information systems
- Delivery on demand / by drones
- Increases in rideshare and car sharing
- More mobility/navigation apps
- Smart cards (payment system)
- Wireless traffic management
- Trackless transit vehicles

Emerging Technologies

Transit: Including shared ride services to move people

- Smart cards (payment system)
- Trackless transit vehicles
- Expanded traveler information systems
- More mobility/navigation apps



Environment: Ensuring implementation does not harm air quality, water quantity or water quality

- More alternatively fueled vehicles
- Enhanced traffic signal control technology

Economic Development: Ensuring jobs and educational opportunities are available

- Potential for higher density development
- More mobility/navigation apps

Public Involvement: Ensuring the public has input into the plans, policies and processes that are developed

- Social media
- Use of smart phones and iPads for polls and other public input

Land Use: Fostering appropriate, context sensitive land use patterns

- Potential for higher density development
- More mobility/navigation apps

Safety: Reducing fatalities and serious injuries

- Autonomous and Connected Vehicles (cars and trucks platooning)
- Collision warning systems
- Trackless transit vehicles
- Enhanced traffic signal control technology

Sustainable Funding: Ensuring all available financial tools are available to build, operate and maintain the transportation system

- More alternatively fueled vehicles may impact federal and state gas tax

MPO Policy Board Actions

At their meeting in March 2018, the Alamo Area MPO Transportation Policy Board acted on a resolution of support for implementing emerging technologies including infrastructure supporting Autonomous Vehicles in the IH 35 North Corridor.

Figure 3-2. TPB Resolution Supporting Innovative Technologies on IH 35 North

Resolution of Support for Implementation of Autonomous Vehicle Technology in the IH 35 North Corridor

WHEREAS; the Alamo Area Metropolitan Planning Organization (MPO) is one of the four largest MPOs in the state of Texas, and

WHEREAS, the Alamo Area MPO Transportation Policy Board is the forum for cooperative decision-making regarding regional transportation issues in Bexar, Comal, Guadalupe, and a portion of Kendall Counties; and,

WHEREAS, the MPO is responsible for a multi-modal transportation planning process; and

WHEREAS, mobility, accessibility, and safety are critical to the metropolitan area's economic vitality and quality of life; and,

WHEREAS, the IH 35 corridor between San Antonio and Austin is the fastest growing corridor in the entire country;

WHEREAS, the corridor between San Antonio and Austin has the slowest average speed-per-mile, lowest levels-of-service, most crashes, and most fatalities on IH 35 from Mexico to Canada;

WHEREAS, the Alamo Area MPO develops plans and programs to address the needs of the greater San Antonio area;

WHEREAS, the Alamo Area MPO has developed a plan to expand IH 35 by four managed lanes (two in each direction);

WHEREAS, the future use of autonomous vehicles has the potential to reduce crashes, reduce congestion and improve level-of-service;

WHEREAS, the current IH 35 plan should consider the emerging technology and potential use of autonomous vehicles; and

WHEREAS, the Alamo Area MPO understands that Senate Bill 2205, which governs automated vehicles operating within Texas, became effective September 1, 2017.

NOW, THEREFORE BE IT RESOLVED that the Alamo Area MPO supports planning for autonomous vehicles in its IH 35 expansion plan in order to provide infrastructure that supports current and future technologies.

PASSED AND APPROVED this 26th day of March 2018.

Kevin Wolff, Chairman
Alamo Area Metropolitan Planning Organization

Disruptive Technologies

Of the technologies with the greatest potential to disrupt transportation planning and infrastructure, the ones expected to have the greatest impact are autonomous vehicles, electrification, and shared-use mobility.

Automated Vehicle Technology

Automated technology has the potential to be disruptive in a number of ways. First, the technology is largely being developed by the private sector and numerous corporations are in a race to see who can develop the best automated technology. This is problematic from a planning standpoint because it has the potential to introduce a number of different infrastructure needs or requirements. Automated technology is also hoped to be able to address significant concerns around safety, specifically crashes caused by driver error which make up approximately 94% of all crashes.

Electrification

Vehicles are already significantly cleaner than they were 30, 20, even 10 years ago but many believe we will continue to see an increase in electric vehicles with Europe expecting that all new cars sold will be electric by 2035. Given our region's recent nonattainment status, this could help us meet National Ambient Air Quality Standards. Both Volvo and General Motors have publicly stated they envision an all-electric future. This shift not only impacts the demand for charging stations but it also threatens funding for transportation projects currently tied to the motor vehicle fuel tax.

Shared Use Mobility

Millennials have already shown us that vehicle ownership is not a top priority for everyone. TNCs like Uber and Lyft are increasing in popularity and many futurists believe we are transitioning away from vehicle ownership to shared-use mobility. Shared mobility includes transportation services and resources that are shared among users, either concurrently or one after another – this includes things like public transit, taxis, bikesharing, carsharing, ridesharing, ride-hailing, scooter sharing, microtransit, and more. Shared use mobility has the potential to reduce the number of vehicles on our roads by allowing people more transportation options and reducing the need for car ownership. Unfortunately, ride-hailing also has the potential to reduce public transit, biking, and walking and thus has the potential to increase both congestion and vehicle miles traveled.

Impacts to the MPO Planning Process

At this time, the MPO has not made any changes to its travel demand model to reflect significant changes in travel technologies. With the advent of Connected and Automated Vehicles, it can be expected that new assumptions in the MPO's modeling may need to be updated, including:

- Travel Demand Model Networks: potential vehicle use restrictions and revised speed and capacity assumptions
- Trip Generation: impact of unaccompanied children or elderly
- Mode Choice: impact of shared vehicles and auto occupancy
- Trip Distribution: reduced travel times
- Trip Assignment: revised volume/delay function and lane use restrictions

Priorities Over the Next Five Years

Over the next five years, the MPO plans to:

- continue to review best practices in autonomous and connected vehicle policies in order to understand future considerations for these types of technologies.
- continue to stay involved with local, state, and federal efforts to explore the potential impacts, timelines, and costs associated with the deployment of automated vehicle technology.
- incorporate fiber technology wherever possible.
- work to set policies around the topic of connected and autonomous vehicles.
- work to educate the public around connected and autonomous vehicle technology in advance of any initial deployment in our region.