CHAPTER SEVEN
TECHNOLOGICAL INNOVATIONS
Page intentionally left blank
Innovations in Technology

Technology influences many aspects of our lives including how we communicate with each other, where we live and work, and the personal choices we make. In recent years, the intersection between transportation and technology innovations has been growing at an exponential rate. The private sector has been rapidly testing new ideas and products such as ridesharing using mobile applications, using automation for package deliveries, and exploring the viability of self-driving vehicles. This has led to new private-public partnerships in the transportation sector and opportunities to build upon best practices.
It is important to study these technologies because they have the potential to stimulate economic growth, increase efficiency, and improve quality-of-life for residents in the San Joaquin County. However, because many of these innovations are still in the infancy stage, it is difficult to predict what type of public funding opportunities will be available for these initiatives in the future. In the short-term, SJCOG will be conducting further research and use policy recommendations to support the implementation of new technologies in the region.

Connected Autonomous Vehicles

Connected/Automated Vehicles (CAVs) encompass a suite of technology advancements that allow a vehicle to coordinate with other vehicles to enhance safety and efficiency (connected) and be operated without a human driver (automated). CAVs can be broken up into two distinct innovative technologies that are being simultaneously developed: autonomous operation and connected vehicle operation. These emerging technologies have the potential to transform how we travel every day, ranging from improving safety on the road to increasing traffic efficiency.

Autonomous vehicles use tools such as satellite mapping and onboard sensing to operate without human input, while connected vehicle operation uses real-time information and intelligent transportation systems for vehicles to communicate with each other and roadway infrastructure. Connected vehicle operation is further broken down into Vehicle to Vehicle (V2V) communication and Vehicle to Infrastructure (V2I) communication.

Existing Initiatives

While autonomous vehicle design and development are largely being driven by the private sector, public agencies are looking at ways to safely update our current infrastructure to facilitate CAV deployment. There are also many examples of private companies partnering with public agencies to test CAV pilot programs. Examples of these ongoing efforts include:

- **Connected Vehicle Pilot Deployment – One California Project**: This multimodal initiative led by Caltrans, MTC, METRO, and SANDAG aims to enable safe networked wireless communications between vehicles, infrastructure, and personal communications devices.
- **Strategic Transit Automation Research (STAR) Plan**: In December 2017, the Federal Transit Administration (FTA) released a five-year plan to explore potential benefits of vehicle automation for public transit. The FTA will utilize enabling research, strategic partnerships, and integrated partnerships.
- **Department of Motor Vehicles (DMV)-Proposed Driverless Testing and Deployment Regulations**: Regulations for post-testing deployment of autonomous vehicles will establish requirements for manufacturers to meet prior to operation on California’s public roads. In December 2017, these proposed regulations were released for public review.
In the future, Vehicle to Vehicle (V2V) communication must be integrated with Vehicle to Infrastructure (V2I) communication and Intelligent Transportation Systems to allow a vehicle to be connected to the roadway system. If this is achieved, it has been argued that vehicle collisions and congestion should decrease. SJCOG is exploring ways to facilitate the adoption of infrastructure technologies and is working with its regional partners to develop the supportive policies needed to aid CAV deployment in the San Joaquin County. Tools such as incentive programs and planning grants can bring innovation into the region by encouraging local jurisdictions and private companies to test pilot projects. Infrastructure such as lane width, road striping, traffic signalization, pedestrian walkways, and congestion monitoring also need to be modernized to allow for a CAV fleet.

A future regional innovation grant program will be created by SJCOG to fund infrastructure modernization projects. First steps in establishing the grant program will include identifying funding sources and working with a technical advisory committee to develop program criteria, project eligibility and scoring metrics. The types of projects to eventually be funded is speculative at this time; however; projects being considered for funding in other areas include:

- Transit and/or Freight Signal Priority
- Mobile Accessible Pedestrian Signal System
- Freight Dynamic Travel Planning/Performance
- Dynamic Transit Operations
- Dynamic Speed Harmonization
- Probe-Enabled Traffic Monitoring
- Probe-Based Pavement Maintenance

Next Steps

Safety Facts

5.6M

POLICE-REPORTED MOTOR VEHICLE CRASHES IN 2015. V2V TECHNOLOGY HAS THE POTENTIAL TO ADDRESS A MAJORITY OF MULTI-VEHICLE CRASHES

Image Source: nhtsa.gov
Self-Driving Cars

To this day, petroleum gasoline and diesel have been the primary energy source used to power passenger vehicles and light-duty trucks. Vehicles that run on gasoline and diesel produce larger quantities of greenhouse gas emissions and criteria pollutants when compared to their alternative fuel counterparts, leading to harmful air quality concentrations.

The State of California is actively working to increase fuel efficiencies, promote alternative fuel vehicles, improve air quality, and decrease dependency on petroleum gasoline using policies and regulations. However, disadvantaged communities in the San Joaquin Valley face more challenges than other regions when it comes to new technologies due to unique socioeconomic factors such as low income and lack of resources. Regional efforts to support state policies focus heavily on electricity and natural gas as the main fuel alternatives. Other examples of alternative fuels include hydrogen fuel cell, biodiesel, and ethanol.

Existing Initiatives

A variety of programs at the state and regional level are aimed at accelerating fleet electrification to meet California standards and goals. Not only do these programs improve air quality standards, reduce petroleum use, help achieve greenhouse gas emission reduction goals, but they also improve public health and attract investments and high-quality jobs.

- **Incentive Programs:** The San Joaquin Valley Air Pollution Control District (Air District) offers a myriad of grants, incentive programs, and resources for residents, public agencies, and businesses in the San Joaquin Valley.
- **Infrastructure Plans:** Valley Takes Charge! is a program implemented by the Air District to tackle issues raised in the District’s 2014 Plug-in Electric Vehicle (PEV) Readiness Plan. The 2014 Plan thoroughly examines the barriers, opportunities, and next steps needed for widespread PEV implementation in the Valley.
- **Public Fleet:** The Regional Transit District is the fourth in the nation to operate fully electric buses. The California Energy Commission awarded RTD, in partnership with Proterra, Inc., with a pair of 100% battery-electric buses and the funding for an automated fast-charging station. The RTD fleet also contains low-emission diesel-electric hybrid buses which reduce carbon monoxide, hydrocarbons, and particulate matter up to 90%, and oxides of nitrogen up to 50%.
- **State-level Regulations:** SB 350, the Clean Energy and Pollution Reduction Act of 2015, describes the importance of widespread transportation electrification for meeting state climate goals and meeting federal air quality standards. SB 1275, vehicle retirement and replacement, is the Charge Ahead California Initiative that aims at phasing out high polluting vehicles.

“Once autonomous vehicles replace today’s cars, near misses in the nation’s 300,000 or so signalized intersections won’t be near misses. they’ll be carefully orchestrated movements under the control of computers...” – NBC MACH
Next Steps

• Assist local jurisdictions and transit operators in securing AFV grant programs

• Work with the Air District and partners to implement recommendations from the 2014 PEV Readiness Plan

• Actively search for regional level funding opportunities and assist local jurisdictions and transit operators in securing AFV grant funding

In addition to passenger vehicle use, CAVs are also being developed for the goods movement sector. SJCOG encourages partner agencies and transit operators to support widespread transportation electrification by partnering with state agencies to advance California standards and goals. An existing model is the California Electric Vehicle (EV) Ready Communities Challenge grant program. This program seeks to fund the development of a “blueprint” of actions and milestones to make a community EV ready – with an emphasis on charging infrastructure deployment in disadvantaged communities.

Self-Driving Cars Will Turn Intersections Into High-Speed Ballet

by NBC KQCH / Mar. 09, 2017 / 4:31 PM ET
Transit

As technology innovations like CAVs and alternative fuels become more prevalent, traditional public transit will have many opportunities and potential to adapt to changing times. The state and federal governments are currently conducting pilot programs to test the feasibility of technologies such as driverless buses and the effects of real-time ridership data. Other transit initiatives include fleet electrification, the process of converting all conventional fuel buses to run on electricity alone, and “on-demand micro-transit”, a transit type that acts like a hybrid of a fixed-route bus and a door-to-door personal ride.

Existing Initiatives

In San Joaquin County, the Regional Transit District (RTD) has started to experiment with micro-transit supplementation on top of their regular fixed routes. In October 2017, RTD partnered with Uber Technologies to provide transportation to residents living outside of RTD service areas and previously serviced by general Dial-a-Ride vans. Residents may use a phone line or the Uber phone app to hail a driver, but the requirements of this program stipulate that rides must end or originate from an area not serviced by RTD and end or originate from one of eight transit centers. This pilot program has been successful thus far, with many users trying out the service within the first few weeks of implementation opportunities and find ways of making rural transit a more cost-effective service.
A few cities in the U.S. have tested out micro-transit pilot programs to see how they measure up to traditional transit. Kansas City’s one-year pilot program had agency-owned vans driven by agency-employed drivers to pick up passengers on routes that were mapped as they drove. However, less than 0.1% of the Kansas City population had utilized the service in the year it was offered, which could have been attributed to insufficient marketing. Chariot, the Ford-owned van service, ran into logistical problems in San Francisco because the vans were idling in bus stops and the middle of the street. LA Metro sent out a request for proposals in October 2017 for a microtransit pilot project to see if on-demand vans are the supplement needed for public transit service.

Next Steps

The path forward for public transit may have transit providers take on more of a travel broker role and form strategic relationships with private companies while still providing certain traditional transit services, such as the RTD example above. Logistic issues such as rider education and infrastructure changes will need to accompany any microtransit additions to a region. SJCOG will be working with local transit providers to help identify funding to pursue pilot program opportunities and find ways of making rural transit a more cost-effective service.