AUTOMATED VEHICLES

PLANNER'S PORTFOLIO

ISSUE #18

March 2019

delaware county planning department

PLANNER'S PORTFOLIO
AUTOMATED VEHICLES

Planner's Portfolio Series

The Planner's Portfolio Series is an outreach effort developed by Delaware County Council in order to explore the planning concepts available for communities to take advantage of the unique opportunities across Delaware County.

The pattern on the cover page, and found throughout this series, represents the importance of each individual component in the larger network. The Planner's Portfolio Series explores several of these components and how they can support community character in Delaware County.

For more information, contact the Delaware County Planning Department at 610-891-5200 or visit www.co.delaware.pa.us/planning to see the complete Planner's Portfolio series.

OVERVIEW

Automated Vehicles have been a growing trend in the transportation industry, with major companies and universities researching and testing vehicles. Automated vehicles rely on sensors to assist with driving functions. These technologies have been developing over time and in recent years there have been advances that would allow automated vehicles to pilot themselves. As automated vehicle technologies continue to advance, they are expected to shape our transportation landscape.

This Planner's Portfolio will explore the types of automated vehicles, current testing initiatives, and detail the potential benefits of Automated Vehicle Technologies.

Autonomous Vehicles rely on onboard sensors to control vehicle movement and performance. Autonomous vehicles use a variety of cameras, sensors, and radar systems to identify their positions and adjust to changes around them in order to operate the vehicle safely.

Connected Automated Vehicles use onboard sensors and communicate with sensors in the surrounding area, such as onboard other vehicles and connected infrastructure. Connected infrastructure could be included in train crossings, intersections, merging areas and other appropriate structures.

AUTOMATED FUTURE

For municipalities in Delaware County, Automated Vehicles provide a number of different options to consider when planning for the future. Automated Vehicles may require different space for loading and unloading passengers. Connected automated vehicle technologies provide opportunities to upgrade or enhance infrastructure. Using connected infrastructure can help municipalities respond to emergencies by prioritizing emergency vehicles. As infrastructure is replaced and updated municipalities should consider the benefits of connected automated vehicle technologies in planning for their communities' future. CAV technologies will likely have major impacts to transportation but may also see impacts to land use, air quality and equity. Municipalities should also make sure that their infrastructure is in good repair, as vehicle sensors may have difficulty tracking potholes or other potential roadway damage.

“MUNICIPAL LEADERS SHOULD CONSIDER THEIR SHORT AND LONG-TERM INFRASTRUCTURE NEEDS, AND ENSURE THAT ANY NEW INVESTMENTS BETTER POSITION THEIR CITIES TO SUPPORT AND INTEGRATE AUTONOMOUS VEHICLE TECHNOLOGY. THIS WILL INCLUDE EFFORTS TO INVEST IN DATA STORAGE AND PROCESSING CAPACITY, INVESTING IN SENSOR NETWORKS AND BROADBAND, AND ENSURING THAT STREETSCAPES AND RIGHT OF WAYS CAN BEST ACCOMMODATE AVS.”

- NATIONAL LEAGUE OF CITIES

Levels of Automation

There are several levels of automation. Many of the elements of low levels of automation are already on the market today; lane departure warnings, automatic braking, and parking assist are things that many people use every day. The levels of automation shown below, show the range of possibility for automated vehicles. Many higher levels of automation are already in testing.

Full Automation

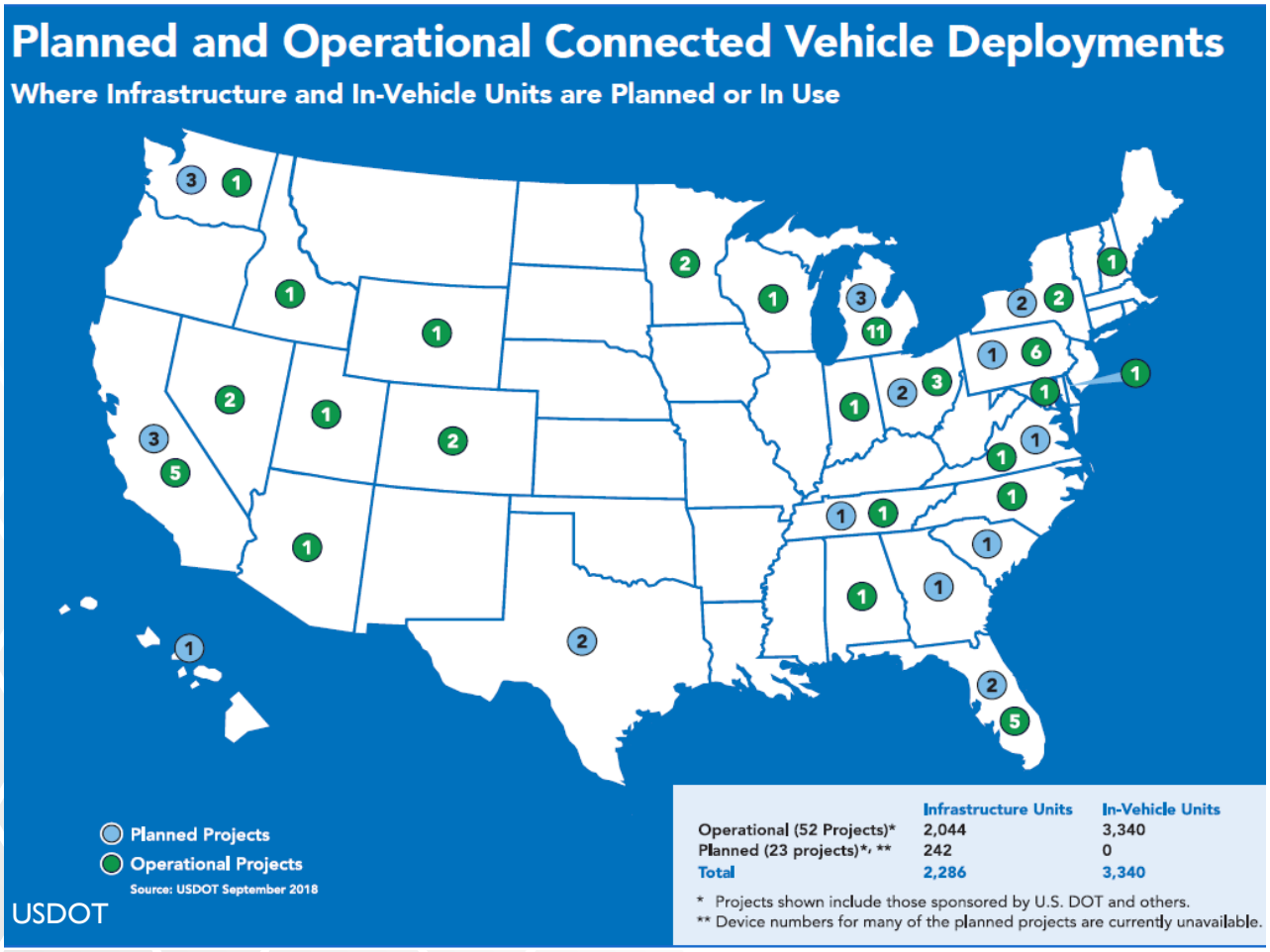
0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Source: National Highway Traffic Safety Administration, Society of Automotive Engineers

CURRENT TESTING

Automated Vehicle testing has increased across Pennsylvania in recent years, anchored by Pennsylvania's strong educational institutions. As of 2018, Pennsylvania had five authorized testing organizations with authority across the state, according to PennDOT (2019). Many Universities like Carnegie Mellon and Penn State are driving the development of Automated Vehicles in Pennsylvania. PennDOT now has an Autonomous Vehicles Policy Task Force, comprised of industry leaders, state officials, and consultants, with the goal of guiding the implementation of Automated Vehicles in Pennsylvania. PennDOT has started an annual AV Summit, which provides space to share ideas, learn, and collaborate around Automated Vehicle development in Pennsylvania.

Carnegie Mellon University Autonomous Vehicles (cmu.edu)

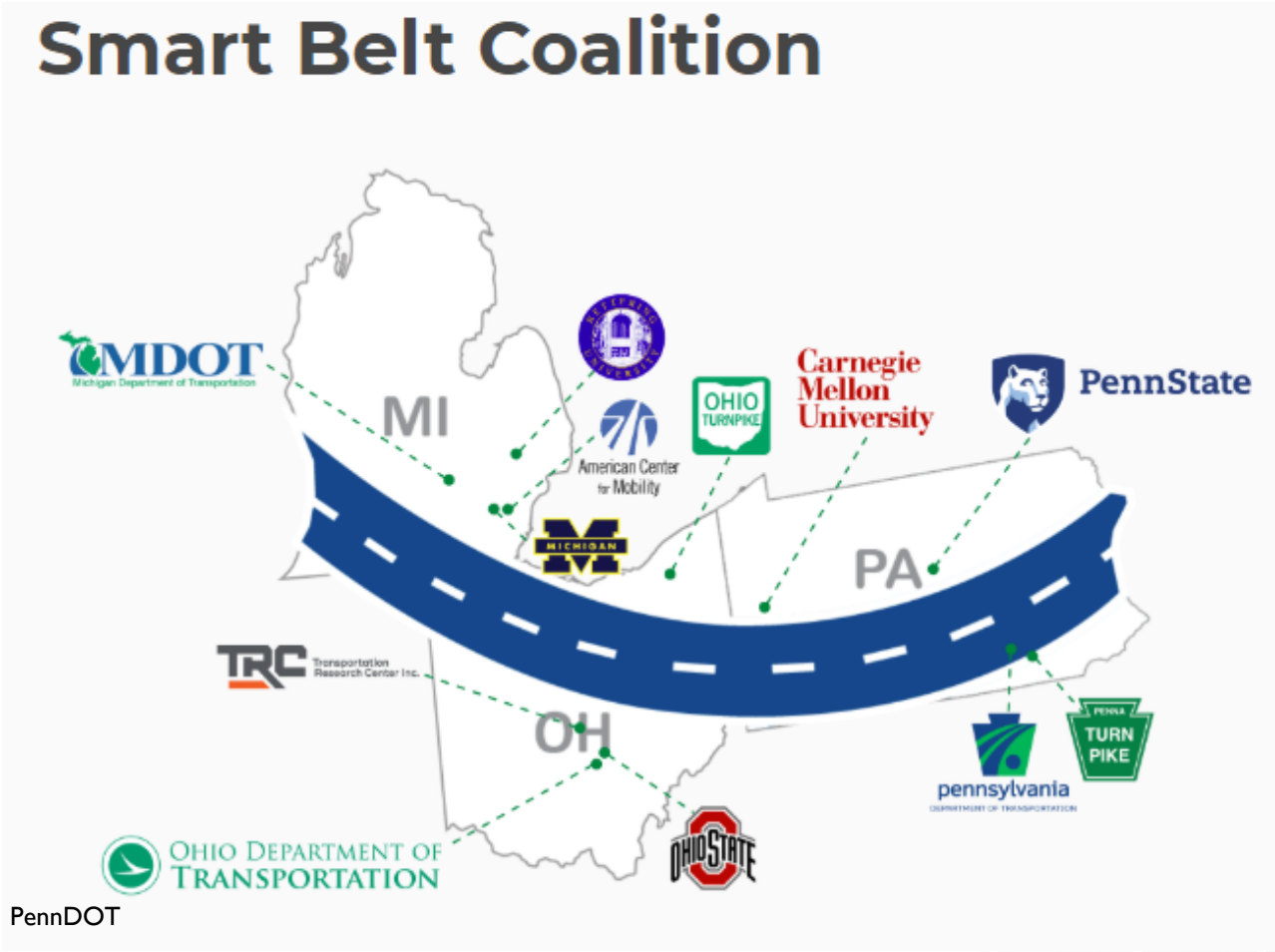


PennDOT 2019

Current Testing Organizations in Pennsylvania (2019)

- Aurora Innovation Inc.
- Qualcomm Technologies Inc.
- Carnegie Mellon University
- UATC LLC
- Argo AI LLC

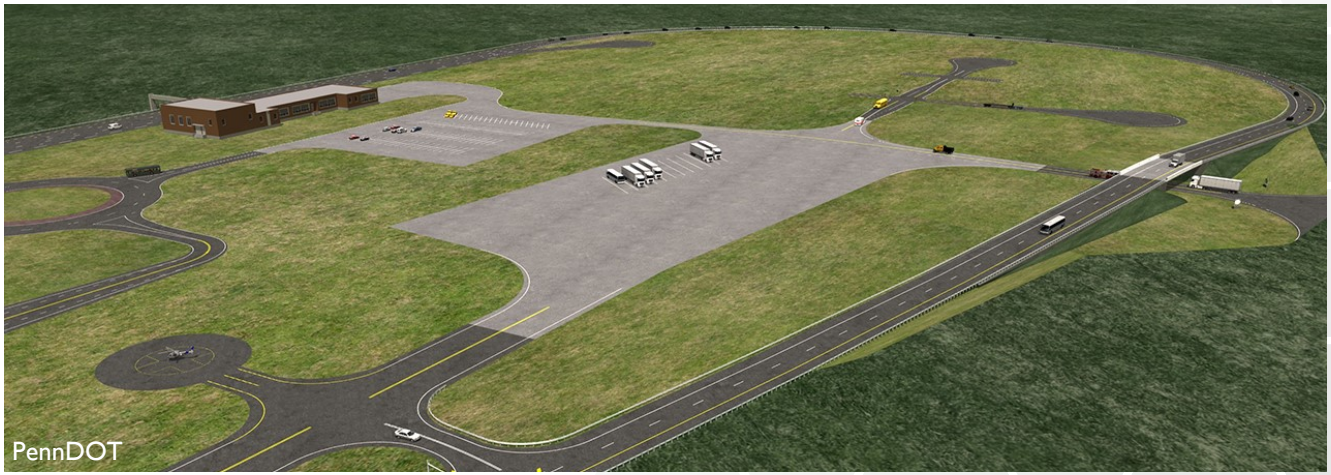
Pennsylvania transportation agencies (PennDOT, Pennsylvania Turnpike Commission) and their Ohio and Michigan counterparts have partnered with various transportation agencies and universities to form the Smart Belt Coalition. The aim of the Smart Belt Coalition is to bring leaders from across AV technology leaders to collaborate and support testing, research, and policy. The Coalition provides the opportunity to share information and promote the development of Automated Vehicle technologies.



PennDOT

PennSTART

The Pennsylvania Turnpike Commission, PennDOT, and Penn State University have partnered to advance PennSTART, which is a state of the art testing facility for transportation operations and safety. The facility will allow the testing of Automated Vehicles in a controlled environment. PennSTART is still in the development phases and is expected to be operational in 2020.



PennDOT

BENEFITS OF AUTOMATION

Automation can provide numerous benefits to communities. According to the National Highway Traffic Safety Administration, 94% of serious crashes are caused by human error. One of the largest benefits from automated vehicles, is safety; by reducing human error from vehicle operation, our communities can become safer places. In 2017 PennDOT reported a total of 128,188 vehicle crashes. Of those crashes, 81,749 resulted in injury or fatality. PennDOT estimates that the average cost for each Pennsylvanian is $1,414 for each crash. Automated Vehicles could benefit our economies and communities by reducing the costs associated with crashes. Automation should also reduce emissions due to better traffic flows and improved safety, helping to address air quality challenges. By allowing vehicles to connect with one another and with infrastructure, Connected Automated Vehicles should increase safety by alerting drivers rerouting traffic around hazards and prioritize emergency vehicles. Connected vehicles could also give real time information on emissions and help the system reduce pollution. Riders waiting for pick up could receive real time information about vehicle location or time of arrival, giving riders more peace of mind. Connected Infrastructure and Connected Autonomous Vehicles have so much potential to create a safer and more equitable future for our transportation systems.

Automated vehicles can also provide mobility options for those who have disabilities or are unable to drive. Vehicles could be contacted and pilot themselves to pick up riders, allowing those with disabilities or other mobility challenges to access opportunities that had been previously unavailable. Automated vehicles could also help to solve the challenges to connect users to transit, acting as a shuttle service. This increased access to transit can help create a more equitable transportation future.

Trucking

Trucking is an industry that could realize many benefits to safety and cost savings from automated vehicle technologies. The benefits from platooning (driving vehicles in a tight line to reduce drag) has the potential to save fuel and allow vehicles to operate more efficiently. Trucking could see increased safety across the industry by reducing accidents and decreasing costs.

In Delaware County trucking accounts for 68% of all freight moved by tonnage and generates over $100,000,000 in revenues (Delaware County Transportation Plan, 2017). In 2014 there were 740 people employed in the trucking industry in Delaware County (*Delaware County Transportation Plan,* 2017).

According to the UC Berkeley Center for Labor, "Autonomous trucks are best suited to long-distance highway driving, while humans will still be needed to navigate local streets and handle non-driving tasks." With automation, the landscape of trucking will change, shifting the risk of long distance driving away from human drivers. Local trips, away from highways, will still need human drivers for the foreseeable future.

(Left) Truck in Upper Darby, Delaware County

OTHER PLANNER'S PORTFOLIOS:

COMPLETE STREETS
April 2016

TRAFFIC CALMING
January 2017

NATIONAL TRENDS
September 2017

Court House and Government Center
201 West Front Street
Media, Pennsylvania 19063

For more information, contact the Delaware County Planning Department at 610-891-5200 or visit www.co.delaware.pa.us/planning to see the complete Planner's Portfolio series.