

CONNECTED AND AUTOMATED VEHICLES TOOLKIT: A PRIMER FOR COUNTIES

The National Association of Counties (NACo) has created the *Connected and Automated Vehicles Toolkit: A Primer for Counties* to provide county leaders with an overview of and framework for engagement with the rapidly-growing connected and automated vehicles (CAV) sector.

Breakthroughs in connected and automated vehicles technologies are poised to revolutionize local and national transportation systems over the next decade, potentially bringing significant changes to the built environment and how residents live, work and move around their communities. With the fast pace of these technological advancements, it can be difficult for government policy and procurement systems to keep pace. As technology manufacturers, software developers, auto companies, universities and other professionals continue to imagine and test these disruptive technologies, county officials, county engineers and transportation planners should have a working knowledge of them in order to make decisions about future local transportation needs and investments.

The Connected and Automated Vehicles Toolkit provides an overview of how federal, state and local governments are responding to this rapid change and transition to integrate technology, communications, vehicles and infrastructure. Each section of the toolkit – technology, policy, deployment and next steps – provides a high-level overview of the state of play at the federal, state and local levels and links to further information and resources on each topic.

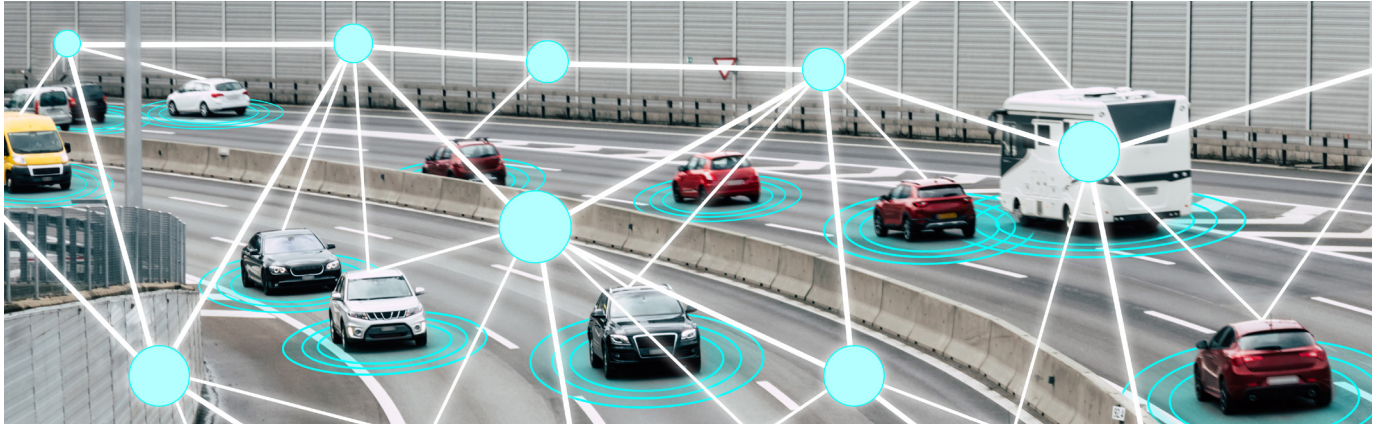
This toolkit will help county leaders assess and tap into their county's potential to engage in the continued development of the connected and automated vehicles field and determine how they can take advantage of coming opportunities.

This print publication features select information from the technology, policy and deployment sections of the online toolkit.

To explore the full toolkit
and next steps section, visit
www.naco.org/CAVToolkit

TECHNOLOGY

Connected and automated vehicles (CAVs) are two separate but related advancements in transportation technology. A vehicle can be connected but not automated, automated but not connected, neither or both, and it is important to understand these distinctions. This section provides an overview of CAVs. For more on Major Milestones and Existing & Emerging Technologies in the development of CAVs, visit the toolkit online at www.naco.org/CAVToolkit.



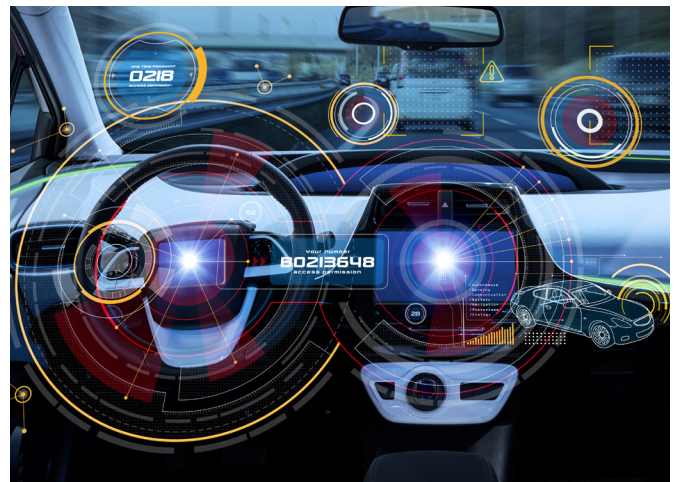
CONNECTED VEHICLES

Connected vehicles (CV) are those that can communicate with other vehicles (V2V), infrastructure (V2I) and devices (V2P) through wireless network technology, such as Wi-Fi and radio frequencies. Vehicle-to-Everything communications, or V2X, is the umbrella term for the communication systems contained within the connected vehicle network. These systems can sense the transportation environment around them and collect and share real-time information to alert drivers to nearby incidents, diversions or heavy traffic, thereby improving transportation safety and mobility.

One of the most familiar CV technologies is dedicated short-range communications (DSRC). DSRC provides wireless two-way communications via the broadcast and reception of messages among vehicles and the roadside to transfer information over a specific radio frequency, the 5.9GHz spectrum in particular. They can be used for traffic signal control, traffic monitoring, automatic toll collection, traffic congestion detection and emergency vehicle signal preemption of traffic lights, to name a few.

AUTOMATED VEHICLES

Automated vehicles, also known as driverless cars, are vehicles equipped with technology that enables them to operate with little to no human assistance. These vehicles can drive themselves by using cameras, radar, lidar (image sensing), GPS and computer vision to sense their surroundings. Once an environment has been scanned and obstacles and relevant signage detected, the vehicle's equipment reacts as the situation dictates, controlling the steering mechanism, accelerator and brakes as required. Currently, there are no fully automated vehicles on the market; there are, however, vehicles that include connected and automated features which allow them to operate somewhat autonomously, but still require the driver to be actively involved. There are six levels of automation, as defined by the Society of Automotive Engineers (SAE).



POLICY

FEDERAL

As of Spring 2019, **the National Highway Transportation Safety Administration (NHTSA) has released four main federal policy documents on automated vehicles.** They are:

- Federal Automated Vehicles Policy Statement
- Automated Driving Systems 2.0: A Vision for Safety
- Automated Vehicles 3.0: Preparing for the Future of Transportation
- Comprehensive Management Plan for Automated Vehicle Initiatives



These documents were issued as guidance, not rulemaking, as they are intended to be updated regularly as the technology evolves. According to Automated Vehicles 3.0: Preparing for the Future of Transportation, “the Federal government is responsible for regulating the safety performance of vehicles and vehicle equipment, as well as their commercial operation in interstate commerce, while states and local governments play the lead role in licensing drivers, establishing rules of the road, and formulating policy in tort liability and insurance.”

STATE

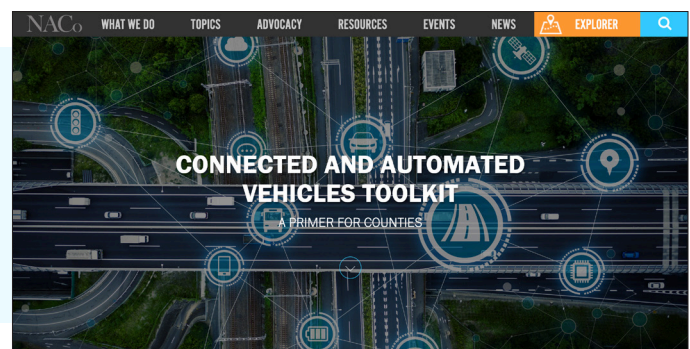
To date, **44 states have proposed and 30 states have enacted legislation to define the requirements, regulations and investment structures under which connected and automated vehicles must operate.** In another 10 states, governors have issued executive orders related to autonomous vehicles. While the U.S. Department of Transportation (DOT) has put forth model state policy around CAVs, it strongly encourages states not to codify this guidance as a legal requirement to avoid conflicting federal and state laws and regulations that could impede deployment. **To learn more about CAV legislation in your state, visit the National Conference of State Legislatures’ Autonomous Vehicles State Bill Tracking Database.**

LOCAL

Per U.S. DOT, **the local role in CAV policy primarily revolves around regulation of local land use – via zoning and permitting – ownership and operation of local roadway, sidewalk and parking infrastructure and enactment and enforcement of local traffic laws.** Since at least 2014, counties as independent entities and as part of their regional transportation planning organizations have begun to pass resolutions and incorporate language into their long-range plans that encourage the research, testing and deployment of connected and automated vehicles – and their associated technologies – on local roads.

While there is no database for these policies, a selection is highlighted in NACo’s online toolkit along with a summary of the Transportation Research Board’s (TRB) Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies. This document from TRB identifies 18 policy and planning strategies that state and local governments can implement to better manage the introduction of CAVs into the market in order to ensure the safety, enhanced mobility and health of residents. For each strategy, TRB assessed its effectiveness, efficiency, political acceptability, operational feasibility, geographic impact (urban, suburban, or rural), who might implement it and the key hurdles to implementation.

Learn more about policy considerations for local government and the federal and state resources listed here by visiting the toolkit online at **www.naco.org/CAVToolkit**



DEPLOYMENT

FEDERAL

Over the past decade, the federal government has incentivized CAV deployment at the state and local levels through the funding of test beds and pilot deployment projects, including the:

- Connected Vehicle Pooled Fund Study
- Connected Vehicle Test Beds
- Global Cities Teams Challenge
- Connected Vehicle Pilot Deployment Program
- Smart City Challenge
- Mobility on Demand Sandbox Demonstration Program
- Advanced Transportation and Congestion Management Technologies Deployment Program
- Automated Vehicle Proving Grounds
- Automated Driving System Demonstration Grants

STATE

As laid out in NGA's *Governors Staying Ahead of the Transportation Innovation Curve: A Policy Roadmap for States*, **the primary ways states can take – and are taking – advantage of the deployment of new and emerging transportation technologies are by:**

- Creating test beds and pilot programs.
- Partnering directly with private sector.
- Investing in infrastructure and technology.
- Establishing transportation research and innovation centers.
- Creating working groups.

Many states have created connected and/or automated vehicle programs, including Arizona, Colorado, California, the District of Columbia, Florida, Illinois, Iowa, Maryland, Michigan, Nevada, North Carolina, Ohio, Oregon, Pennsylvania, Utah, Washington, Wisconsin and Wyoming. A full listing of enacted laws related to “Infrastructure and Connected Vehicles,” “Operation on Public Roads” and “Vehicle Testing” can be found by filtering the data available through NCSL's Autonomous Vehicles State Bill Tracking Database. A number of these laws preempt and restrict local governments, from not requiring companies to inform local governments of testing on their roadways to forbidding local governments from regulating or prohibiting pilot programs.

LOCAL

Similar to their counterparts at the state level, local governments have led and funded initiatives, formed public-private partnerships with formal agreements that advance local priorities and allowed private sector programs to run on local roads with no written agreements. These programs have focused – and are focusing – on not only single occupancy vehicles but also automated shuttles and connected vehicle applications for transit, freight and emergency vehicles. These deployments are occurring through:

- Transportation innovation centers
- Testbeds and pilot programs
- Task forces and working groups

Learn more about the counties and communities who have developed these programs by visiting the online toolkit or checking out NACo's Connected Counties: Tech Innovations in Transportation, NLC's Autonomous Vehicle Pilots Across America or Bloomberg Philanthropies and the Aspen Institute's Initiative on Cities and Autonomous Vehicles.

INDUSTRY

A multitude of diverse private entities from the automotive to technology to telecommunication industries are working together to develop connected and automated vehicles and their associated technologies. The network of partnerships and alliances connecting these players is complex and overlapping. **These companies are developing not only the hardware and software that make an autonomous vehicle run – internal and external to the car – but also the service industry and applications through which the vehicle is expected to operate and the systems necessary to the collect, analyze and store the amount of data it is expected to accumulate.** As they move closer to mass deployment, private industry will also have to work with federal, state and local governments to prepare consumers for autonomous vehicles and the new market they will create around the monetization of the driving process versus the classic car sales model.

To explore the above-mentioned deployment efforts and next steps your county can take, check out the full toolkit online at www.naco.org/CAVToolkit

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