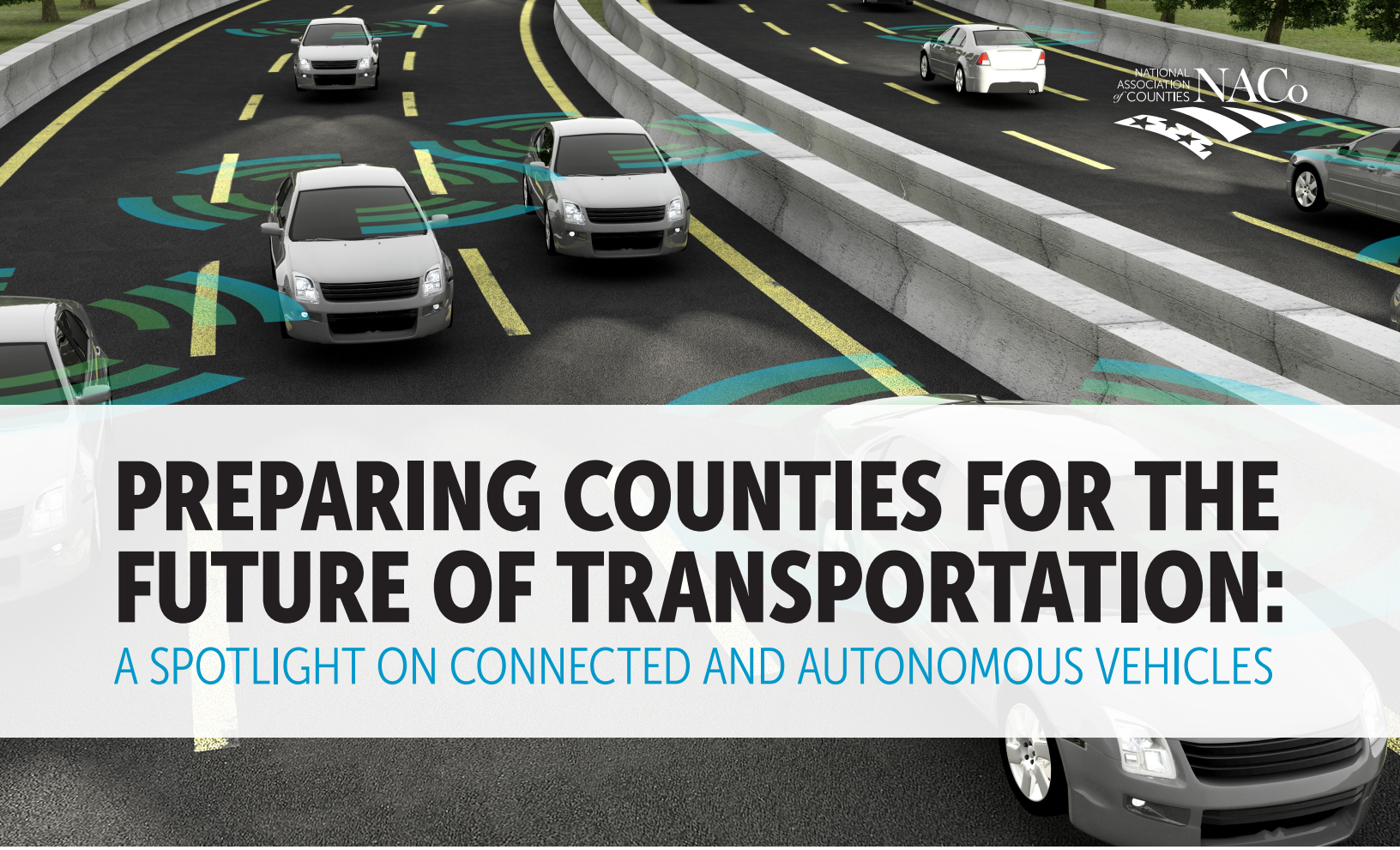

PREPARING COUNTIES FOR THE FUTURE OF TRANSPORTATION:

A SPOTLIGHT ON CONNECTED AND AUTONOMOUS VEHICLES

Within the past decade, the global marketplace has seen significant advances in the integration of communication technologies into transportation infrastructure and vehicles. This quickly evolving landscape makes it imperative that county officials, engineers and planners understand these advancements when making decisions about future needs. Technology manufacturers, software developers, auto companies, universities and many other professionals are imagining and testing a variety of techniques to optimize the nation's transportation system. Through the use of integrated technology, communications, vehicles and infrastructure, these breakthroughs are poised to revolutionize transportation systems and could bring significant changes to the built environment and how residents live, work and move around communities.

WHAT ARE CONNECTED VEHICLES?

Connected vehicles (CV) are those that can communicate with other vehicles (V2V), infrastructure (V2I) and devices (V2X) through wireless network technology, such as global positioning systems (GPS), Wi-Fi and radio frequencies. Vehicles and infrastructure equipped with CV technology can alert drivers – and all other system users – to nearby incidents, diversions, heavy traffic, open parking spots and icy roads ahead, to name a few, thereby improving transportation safety, mobility and the environment. One of the most frequently used CV technologies is dedicated short-range communications (DSRC). DSRC systems work by providing a two-way wireless link between vehicles and between vehicles and roadside systems to transfer information over a specific radio frequency. They can be used for crash prevention, vehicle platooning, traffic light control, traffic monitoring, automatic toll collection, traffic congestion detection and emergency vehicle signal preemption of traffic lights.

WHAT ARE AUTONOMOUS VEHICLES?

Autonomous vehicles (AV), or driverless cars, are vehicles equipped with technology that enables them to operate without human assistance. They 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, relevant road markings and signage are detected, the vehicle's equipment reacts as the situation dictates, controlling the steering mechanism, accelerator and brakes as required. It is projected that autonomous vehicles will improve public safety and mobility and will reduce emissions and fuel consumption through the optimization of driving patterns and speeds.

SIX LEVELS OF AUTOMATION[1]:

Level 0: No Automation. The driver is fully in charge, and the car has no automation.

Level 1: Driver Assistance. The car can perform a specific function for the driver (ex. cruise control).

Level 2: Partial Automation. Driver is disengaged from operating the vehicle, but must always be ready to take over control (ex. driver using cruise control and lane centering).

Level 3: Conditional Automation. The car can make its own decisions, and the driver – while not actively engaged – should be ready to take control in the event of sensor interference or malfunction due to severe weather or lane striping issues.

Level 4: High Automation. The car is fully autonomous, and driver has no direct control. However, the car can only operate in specific, ideal scenarios where everything has been fully mapped (ex. on a college campus or city downtown).

Level 5: Full Automation. The car is fully autonomous, and driver has no direct control. There are no restrictions, and the car can go anywhere.

Currently, there are no Level 5 fully autonomous vehicles on the market; there are, however, Level 1 and 2 automated vehicles as most new cars on the market today feature Level 1 automation features, and several automakers have cars on the market that offer Level 2 automation features. Recent studies have found that driver reaction times in Level 3 vehicles are too slow to take back control when the self-driving systems fail and attempt to pass control back. Therefore, several automakers have decided to skip production of Level 3 vehicles and are focusing on the development of Level 4 autonomous vehicles for deployment within the next five years.

[1] Automated Driving," SEA International, https://www.sae.org/misc/pdfs/automated_driving.pdf.

WHAT STEPS CAN COUNTY LEADERS TAKE TO PREPARE TODAY?

- **Examine local traffic patterns and safety data.** Which roads are used the most? What are the most commonly travelled commuter routes? Where are the local congestion and incident hot spots? How would connected infrastructure at those intersections help reduce the number of those crashes? These data can help to identify locations most suitable for immediate upgrades.
- **Assemble a task force or coalition of stakeholders to voice concerns and identify multi-sector approaches.** Stakeholders could include not just county planners and engineers, but also citizen groups, safety advocates, law enforcement, industry representatives and legal counsel.
- **Identify industry growth potential, including workforce training opportunities.** The advent of this industry could create local opportunities not only for development and testing of the technology, but also to train engineers, planners, lawyers and other professionals on the planning, equipment, infrastructure, legal and financial implications of the industry.
- **Understand that technology can help to solve problems, but isn't always the solution.** Many unknowns still exist around whether and how autonomous and connected vehicles can be efficient, safe, cost-effective components of a local transportation system. Before making major decisions dependent on the use of these new technologies, it is critical that county officials and county engineers assess the viability, practicality and suitability of these innovations in their communities.
- **Draft local policies to improve the county's appeal to automakers for testing/deployment.** What are your local policies around connected and autonomous vehicle technology? What are your state's policies and laws around connected and autonomous vehicles? What are your local land use policies? How might the introduction of autonomous or connected vehicles affect the county's comprehensive plan? How should planned infrastructure upgrades be reconsidered or made more flexible to accommodate future technology innovations in transportation? After a review of these policies, interested county leaders can work locally – and with their states – to create an environment that is welcoming to connected and autonomous vehicles.

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