The 2018 CSG National Conference in Northern Kentucky/Greater Cincinnati in December featured a day-long policy academy on “The Intersection of Innovation and Infrastructure.” The event included policy discussions on autonomous and connected vehicles and truck platooning, state strategies for advancing the electric vehicle marketplace, ride-hailing and mobility innovations, how to enable the technology underpinning infrastructure innovation and the infrastructure investments and policy changes needed to drive innovation forward. In addition, Michael Stevens, chief innovation officer for the city of Columbus, Ohio, gave a keynote address about the city’s multi-million-dollar smart city initiative. Here’s a summary of what took place along with select comments from the day’s speakers. Below you’ll also find a variety of links to articles and reports that drive the conversation forward on many of these topics.

**Autonomous & Connected Vehicles and Truck Platooning**

The policy academy’s opening panel highlighted autonomous and connected vehicles and truck platooning and included panelists from Honda North America, the National Highway Traffic Safety Administration, the American Trucking Associations and truck platooning company Peloton Technology.

Craig Orlan, senior state relations specialist for Honda North America, told attendees his company’s journey into the automated and connected vehicle space began 15 years ago when the company undertook a vehicle safety initiative. Honda began to emphasize not just crash survival features (airbags, seatbelts, body structure) but crash avoidance technology, such as lane keep assist.

“Over time we’re seeing a dramatic decrease in both the frequency and severity of crashes as a result of this technology,” Orlan said. “To date we’ve deployed this technology in over 1.7 million vehicles and we plan to have this technology standard by 2020 on all Honda and Acura vehicles going forward. In addition to reducing the frequency and severity of crashes, we believe this technology provides a bridge to more advanced (autonomous vehicle) technology both in terms of technology and building consumer confidence in this tech.”

Noting that surveys show many Americans are apprehensive about automated vehicle technology, Orlan said demonstrating its potential to save lives will be key. But convincing the public may also require automakers to be completely up front about the technology.

“We are … being very careful in how we market and explain this technology, making sure consumers understand not only its capabilities but its limitations as well,” he said. “We are applying the Physician’s Creed ‘do no harm’ to our development strategy to ensure that improvements don’t come at the cost of individual safety.”

Beyond the crash avoidance technologies already being implemented in Honda vehicles, the company plans to introduce higher level automation vehicles over the next decade.
When it comes to enacting good state-level automated vehicle policy, Orlan advises bill drafters to stick to the terminology on levels of driving automation as defined by the Society of Automotive Engineers (SAE) International.

“We want to make sure that everybody is talking about the same things and that we’re all kind of starting from the same place,” Orlan said.

Orlan also recommends that states establish a task force made up of stakeholders who have a role to play in ensuring the safety of vehicles on the roads.

“We’re talking about DMVs, police, health and human services and safety, workforce development, insurance, the people who are doing highway and infrastructure work as well as industry,” Orlan said. “Ohio is a model that we really like. It’s one that we’ve really encouraged other states to look at. They’ve put together a task force called DriveOhio that includes all of the various stakeholders. It’s given us as an automaker a single point of contact that we can work with … but it has ensured that the state has some supervision over us, making sure things are being deployed in a safe and responsible manner but still giving us the flexibility to do what we need to do … as the technology develops.”

Orlan said such task forces should limit their discussions for now to focus on the testing of automated vehicles.

“We don’t think we know what the future looks like in terms of deployment, so it would be premature for states to kind of jump in there and start addressing how these vehicles are going to be deployed,” he said.

Orlan believes state policymakers also should enact legislation to pre-empt localities from taking their own positions on automated vehicle technologies. A patchwork of state and local legislation around the country is one of the three biggest obstacles facing the automated vehicle industry, he said. Other obstacles include consumer acceptance and ensuring the privacy of data collected by automated vehicles. Orlan said automakers have formed a voluntary pact to handle data in a safe and responsible manner and taken other actions around cybersecurity as well.

One application of automated and connected technologies that has received a fair amount of attention is truck platooning. But as the founder of one company operating in the platooning space told conference attendees, it’s important to make a distinction when it comes to how platooning trucks may operate in the near term.

“This is not high automation,” said Steve Boyd of Peloton Technology. “This is driver assistance, connected vehicle technology that improves driver teamwork, safety and efficiency. … Down the road certainly there will be truck technologies that have higher automation associated with them but those we think are further out.”

Boyd said it’s an important distinction to make because many have expressed concerns about the potential of truck platooning to eliminate jobs.

“Even as automation increases in trucking, we see an ongoing role for the freight operator—for the driver—in trucks and in freight operations,” he said. “Level 1 platooning—there is no change to driver roles, essentially. There is no reduction in jobs. In fact, we think there’s an increase, specifically around additional technical jobs that support these kinds of advanced systems. … These days when you approach a truck and work on it, you plug a laptop in. You don’t just turn a wrench, so it’s a whole new level of work.”
Boyd believes these kinds of high-tech changes to the truck driving function could make the nature of the work more attractive to drivers, while also improving safety and health for the trucking workforce.

“This hype about job destruction is ridiculous,” Boyd said. “I think we all need to work to educate folks about the opportunities rather than the fears.”

Twenty-two states now allow some degree of commercial deployment of platooning with more working on it now, Boyd noted. Colorado and Ohio are among the states that have acted administratively rather than legislatively to allow platooning.

Ross Froat, director of engineering and information technology policy at the American Trucking Associations, said there are several reasons states have moved quickly to enable truck platooning and testing.

“It’s an exciting technology,” Froat said. But also, “it’s the fuel efficiency. There’s a really big key item there of fuel-efficient vehicles going down the road at a closer distance. ... The fuel efficiency gain out of those two trucks, three trucks, four trucks—however anybody is testing these—is a really, really big gain for trucking efficiency.”

Other positives about truck platooning, Froat said echoing Boyd, include the potential to improve safety for drivers and to make driving jobs more appealing to a new generation.

“There is a large driver shortage right now in the industry,” he noted. “[Truck driving] is not sexy and people perceive it as an older type of job that they don’t want to get involved in. But it’s really not. There’s so much technology on board these trucks right now that every new driver that I speak to is excited about driving a truck. There’s so much going on in trucking and communications.”

The National Highway Traffic Safety Administration last fall issued the third iteration of its guidance document for states, the federal government and industry on automated cars and trucks. NHTSA’s director of government affairs, policy and strategic planning Brian Barnard told policy academy attendees that while the previous version focused on the agency’s authority and jurisdiction in passenger vehicles, version 3.0 has another focus.

“We’re taking a look at all of the other infrastructure modes and how they can prepare for an automated future,” Barnard said. “One of the things we heard when we were collecting feedback on 2.0 is that there were requests from states and the safety community for additional best practices so one of the things we included in 3.0 was guidance for how states can address some of the issues that their citizens and communities are facing. For example, while the federal government regulates vehicle performance and vehicle safety, the states have a role in managing licensing and driver operations. We provide best practices for states on how they can address automated vehicle licensing and automated vehicle operator training.”

Barnard said the U.S. Department of Transportation is working with the U.S. Department of Labor to look at workforce impacts of automated vehicle technology and the two agencies expect to develop findings to help inform policymakers and the industry.

**State Strategies for Advancing the Electric Vehicle Marketplace**

The policy academy’s second panel examined the policy impacts of electric vehicles and how policymakers can help shape the marketplace in the years ahead. Panelists representing automakers Honda and Toyota spoke about their companies’ plans in the electric vehicle space and Allison Carr of the North Carolina Clean Energy Technology Center discussed actions state governments have engaged in to move the market forward.
Carr’s organization, which is based at North Carolina State University in Raleigh, issues quarterly reports called “50 States of Electric Vehicles,” [5] which catalogue proposed and approved legislative, regulatory and utility rate design changes affecting electric vehicles.

“32 states and D.C. took actions related to electric vehicles during (the 3rd quarter of 2018),” Carr said. “For our purposes, an action is a relevant legislative bill that has been introduced or acted upon, an executive action or an action taken by a governor, or a regulatory docket, utility rate case or rulemaking proceeding.”

Carr explained that the center typically looks for activities that fit into one of six categories: financial incentives, studies and investigations, deployment actions, regulation, market development and rate design.

“Twenty-three states took action (on EV studies and investigations),” she said. “This is the most common action for states to take. ... Most notably, five different states published final or nearly final reports on transportation electrification and at least 12 states are considering EV actions as part of larger investigations related to grid modernization.”

Carr said seven states and D.C. took action on electric vehicle market development during the third quarter of last year. Those included actions related to providing access to parking and/or high-occupancy vehicle (HOV) lanes as well as electric vehicle procurement.

“States are proposing legislation that would require a certain percentage of electric vehicles be purchased either within the state motor pool or within the state as a whole by certain dates,” she said. “These are some of the goals that states are setting to say ‘30 percent of vehicles purchased must be electric by 2020 or 2025.’”

Some additional statistics cited by Carr: 11 states took action in Q3 on 56 electric vehicle incentives including rebate programs, sales tax incentives, grant programs or state tax credits. Sixteen states and D.C. took action on electric vehicle charging infrastructure deployment.

“What we’re seeing is that most of the focus over the past year has been on light-duty vehicles,” Carr said. “But one of the trends that we’re seeing maybe emerging is action related to heavier-duty vehicles, promoting electric buses—transit and school buses—in ways that states are providing pilot programs, incentives, grant programs to deploy electric buses.”

But Carr noted that half of all the actions during the third quarter of 2018 took place in just four states—California, Massachusetts, New Jersey and New York—where state legislative sessions continue year-round.

Basim Motiwala, a government relations specialist for Honda North America, told policy academy attendees his company has an ambitious agenda for electric vehicles over the next decade.

“By 2030, two-thirds of our global vehicle sales we hope to be electrified in some way or form,” he said. “That includes hybrids, plug-in hybrids, battery electric vehicles as well as fuel cell electric vehicles.”

But Motiwala said currently there are a number of factors holding back the adoption of electric vehicles in the United States.

“First and foremost, I think gas prices are not as high as they were projected years ago and to be quite honest a lot of our internal combustion engine vehicles are so good that consumers still prefer those,” he said. “I think a lot of consumers, their first thought when they’re thinking about an
alternative fuel vehicle ... is ‘how is my life going to change?’ When you think about a battery electric vehicle, it may be perfect for somebody who has predictable driving habits, drives an average of 30 miles a day, has a charger, lives in the suburbs. A lot of things need to line up for their lifestyle to not really be impacted.”

Hydrogen fuel cell electric vehicles, which can recharge in three to five minutes, come closest to duplicating drivers’ experiences with gas-powered vehicles, Motiwala said. That’s one reason Honda supports state policies that take a technology-neutral approach to offering incentives to electric vehicle purchasers.

“I think when everybody hears (electric vehicles) the immediate thought is battery electric vehicles and quite frankly in a lot of the legislation that we see, it will say ‘electric vehicles’ and the definition is it has to have a battery with a certain size,” Motiwala said. “What that does unfortunately is it leaves out other vehicles like fuel cell vehicles. They are electric vehicles. They do have a battery as well. It’s a smaller one but they generate the electricity on board. ... At the end of the day we want consumers to pick what type of vehicle best suits their needs.”

Toyota is another automaker with big plans in the electric vehicle space.

“As Honda is doing, we will introduce at least 10 new electric vehicles by the early 2020s,” said Toyota state government affairs director Erik Kirkhorn. “By 2025, every model in the Toyota and Lexus lineup will either be a dedicated electric vehicle or have an electrified option. ... We also plan to sell 5.5 million electrified vehicles by 2030.”

But Kirkhorn too is concerned about the pace of electric vehicle sales in the United States. Based on what Toyota saw as they developed the market for hybrids like the Prius, it could take a while to convince the American consumer, he said. In 2016, battery electrics accounted for just 0.61 percent of the total market (up from 0.48 percent previously).

“That is compared to the 3 percent that hybrids have,” he said. “And I note that because Honda and Toyota introduced hybrids more than 20 years ago, but it did take that length of time to get to just 3 percent of the market. So (electric vehicles) are not selling fast. This is a long-term consumer acceptance process. We have plans for investment (in electrified vehicles), Honda has plans for investment, all auto companies do but we’re also faced with little consumer acceptance. Batteries and infrastructure remain a challenge. ... A lot of these vehicles are cost-prohibitive to consumers. That (cost) will go down clearly over time as battery technology advances.”

For now though, many automakers are hedging their bets, planning new electric vehicle models for the future and at the same time trying to meet consumer demand for larger, often gas-powered vehicles.

“Right now the marketplace ... is 70 percent truck, 30 percent sedan,” said Kirkhorn. “A couple of years ago, that was just the reverse. That, combined with low gas prices, you have this shift to trucks. ... It’s going to take a while to reach that point where these (electric vehicles) are successful for companies. Each company has its own path toward the future but ... at the same time you have to consider what is happening out there in the marketplace. If there continues to be low gas prices and there continues to be high popularity of SUVs and trucks and at the same time we’re all going to be introducing autonomous vehicles in the future. ... It’s a marketplace for transportation unlike any time in history. ... At the same time there are a lot of vexing problems out there and these companies have to make major bets on maybe a sort of uncertain future.”

Kirkhorn and Motiwala also weighed in on a policy activity 17 states have taken in recent years:
enacting electric vehicle registration fees.

“We understand that these electrified vehicles that are on the roads are not paying any sort of fuel tax and so what states try to do with these registration fees is they try to make it a little bit higher and they’re trying to get that tax,” said Motiwala. “Our stance currently is if that registration fee is reasonable, meaning that the average person drives 15,000 miles a year on an internal combustion engine, they end up paying X amount of fuel taxes, that’s what should be reflected for an electric vehicle (in the fee) so as long as it’s reasonable, we don’t oppose those measures. Having said that though, we prefer that those fees are not there because it can disincentivize somebody who’s thinking about purchasing an electric vehicle because it’s a lump sum that they have to pay as opposed to paying a little bit whenever somebody goes to the gas station and fills up.”

Kirkhorn said Toyota has taken the same stance.

“Anything that represents a consumer disincentive to purchase, we’re opposed to,” he said. “We do understand why states are doing it. … It’s not the Chevy Volt, the Honda Clarity or the (Toyota) Prius that’s causing a lot of road damage. Just the opposite. … We’ve done studies and seen what causes road damage and why and what the factors are and we don’t think that to kind of uniformly apply a fee is the scientific approach.”

Ride-Hailing and Mobility Innovations

The policy academy’s third panel highlighted the ever expanding universe of mobility providers and the efforts by both public transit agencies and the private sector to wrangle these options under one service for the traveling public.

“Regions and transit agencies are becoming mobility conveners and brokers so it’s not just a transit agency but also a place that is trying to figure out how do we also provide these other services so that we can be a kind of one-stop shop,” said Ellen Partridge, policy and strategy director for the Shared-Use Mobility Center. “On the commercial side there is certainly a convergence of automotive technology and shared mobility. There is a huge chess match that is going on between Uber and Lyft with the acquisitions that they’re making.”

Partridge pointed to Lyft’s acquisition of bikeshare company Motivate and Uber’s acquisition of electric bike maker Jump as but two of the recent deals in the mobility space. The rival ride-hailing companies are also both players in another micro-mobility option that proved hugely popular in 2018 but also hugely challenging for municipal officials in some places—electric scooters.

“All these kinds of micro-mobility are merging and cities are trying to figure out how to deal with them, particularly scooters,” Partridge said. “I have recently been in Nashville and Austin, where scooters are everywhere. In Austin, the transit agency told me in the last month they had 300,000 rides on scooters, which is one-tenth of the rides that the transit agency provided.”

Partridge said with Uber and Lyft seeking to become more than just modernized taxi services, the model is shifting to what is known as mobility-as-a-service.

“I think that both Uber and Lyft, with their acquisitions of bikeshare, of scooter-share, other kinds of platforms, are moving toward this,” she said. “And this raises real questions about how this will work in the future. Will this create a monopoly? If Uber has all the bikeshares in town and all of the scooter-shares on its app, it will not include Lyft unless there is some kind of pressure to do that. In looking at mobility-as-a-service, we need to think about what’s the role of government in trying to make sure there is not that kind of monopolization. That would not be helpful to consumers.”
As noted above however, public transit agencies around the country are also looking to become one-stop-shop mobility providers by introducing smartphone apps and other technologies. One of those is the Southwest Ohio Regional Transit Authority (SORTA), which serves the Cincinnati area.

“We are currently seeking a vendor to deliver ... a mobility-as-a-service application platform that will help plan a user’s trip end-to-end using multiple agencies because we are a three-state metropolitan area,” said SORTA’s manager of service analysis Mark McEwan. “Our goal with this project is end to end, multi-mode trip planning and one payment across all providers that would be included in this. Our first push will be to integrate all the different transit agencies into this application and then move to include TNCs like Uber and Lyft, bikeshares, scooters and whatever comes next.”

SORTA also has partnered with Uber, the city of Cincinnati and the regional planning organization on the Cincinnati Mobility Lab, which includes a study of transit and Uber trips by area travelers.

“One of our hopes is that we will be able to see clear travel patterns of Uber service that is currently served or can be served by public transit or we want to see patterns of increased Uber trips where public transit becomes less frequent or less reliable like on weekends or late nights,” McEwan said. “Through this study we really hope to come back with answers to the question regarding (ride-hailing companies’) complementary versus competitive nature and possible interoperability opportunities of services to decrease our costs and to gain ridership. We are working with Uber to explore possible ways to use their technology in the transit space for improved customer satisfaction and ease of use.”

McEwan concedes that public transit agencies like his in many ways are playing catch up as they try to navigate the new mobility universe.

“Transit agencies are still trying to figure out how all this new technology and innovation fits into their model and how their model needs to change to ultimately improve all people’s mobility,” he said. “As the second or third highest means of commuting to work in most mid-to-large-size cities, public transit needs to be an integral part of the changes that are constantly evolving in this space and state governments need to make sure that we are in on those conversations and decisions.”

But some have serious concerns about partnerships between public transit agencies and companies like Uber and Lyft, particularly when it comes to sharing data, whether it be in transit studies like the Cincinnati one or as part of mobility-as-a-service applications.

“Data that’s shared with the government through these partnerships becomes a public record available to competitors as well as to the media,” said Matthew Daus, transportation technology chair at the City University of New York’s Transportation Research Center and partner and chairman at the Windels, Marx Transportation Practice Group. “The lawyers for Uber and Lyft and Via and all these other companies (have been) negotiating agreements (on) how that data is going to be handled with the local governments like SORTA and others that are going to be working on these platforms.”

Daus is also concerned about what such partnerships may mean for the duty of care concept under tort law.

“When government gets involved in a public-private partnership with private companies ... and something goes wrong, there’s the issue of what’s the duty of care for the government,” he said. “Are you insulating yourself from liability when things go wrong with these partnerships? Let’s say there’s a crash and there’s something in the agreement that should or should not have been done and these (plaintiff) lawyers, they sue everybody. They’ll sue Uber and Lyft and they might sue SORTA, they might sue other entities. ... This is the problem with innovation on mobility services. ... Now it’s not just the driver and the vehicle owner or the company that owns the car.”
A Smart City Story: Columbus

The policy academy also featured a keynote address by Michael Stevens, chief innovation officer for the city of Columbus, Ohio.

When community officials in Columbus came together to submit the winning bid in the U.S. Department of Transportation’s Smart City Challenge in 2016, they recognized transportation was going through a significant period of reinvention and disruption with self-driving cars on the horizon and new mobility options like ride-hailing vehicles already on the streets. They recognized the disruption because the city had seen something like it before.

“The last time there was going to be a significant change in transportation—a disruption like we’re seeing now—was back in the early 1900s,” said Stevens. “At that point, Columbus was the buggy manufacturing capital of the United States. One out of every four buggies was made in Columbus, Ohio and within 10 years … we went from people using the horse and buggy to the automobile.”

Winning the Smart City Challenge meant Columbus was able to capture $40 million from the Department of Transportation and an additional $10 million from the Paul G. Allen Philanthropies that it could put toward creating a series of Smart Columbus initiatives that is helping the city adapt to the latest moment of great change.

“We’re working to empower our residents’ lives through responsive, innovative mobility solutions,” said Stevens. “We really want to demonstrate how intelligent transportation systems and equitable access to transportation can have a positive impact on our residents.”

With the assistance of more than $500 million additional dollars pledged by private sector partners, Smart Columbus has been able to move forward with projects like a regional transit bus system equipped with connected vehicle technology, a multimodal trip planning application, smart mobility hubs throughout the community, mobility assistance for individuals with cognitive disabilities, trip assistance for expectant mothers to get to prenatal care visits, event parking management and autonomous vehicle shuttles to transport passengers in three areas of town. The city has also established a center where consumers can test drive and learn about electric vehicles and adopted incentives for multi-unit residential developments to install electric vehicle charging infrastructure in their parking lots.

“Before this effort started, a little less than 1 percent of the vehicles sold in central Ohio were electric vehicles,” Stevens said. “We’re almost five times that amount now and we think we’re going to continue to grow that.”

Stevens said these initiatives and others help improve the quality of life for Columbus residents, help provide mobility solutions for a region expected to grow by a million people over the next three decades and help transition the city’s economy for the future.

“Ohio is the second-largest state of tier 1 and tier 2 (suppliers to automobile) manufacturers,” he noted. “Those (companies are) making bumpers and steering wheels and other parts of cars that you will not need in a connected, autonomous vehicle environment. So instead of just sitting back and trying to hold on to what we have as long as we can, what can we do to make sure we’re positioning our city and our state for … this change in technology and disruption that is occurring?”

Columbus has also looked to tap into and learn from the voluminous data produced by the city’s many mobility and micro-mobility providers, Stevens said.

“When Bird dropped their electric scooters in August—and literally … their motto is they just drop
them—within 24 hours, you’ve got 500 scooters on your streets and in your right-of-way and there’s a moment of municipal panic of ‘what are we going to do?’” he said. “In our 24 hours of panic, we realized we had no regulations in place that said you couldn’t put them there, so we said we’re not going to play the game of picking them up and impounding and (becoming) front page news. We’ll let them drop and then we’ll work with (the company) afterwards. And they came to us afterwards and one of the things we asked them and they were willing to do is share data with us.”

As a result, city officials have been able to examine the data on where the scooters have deployed and how they’re being utilized by the people of Columbus, Stevens said.

**Enabling the Technology Underpinning Infrastructure Innovation**

The fourth panel of the day looked at the kinds of investments that are needed in the technological backbone that helps power many of the transportation innovations discussed during the policy academy and the partnerships that can help encourage further innovation.

One of those kinds of partnerships is the one mentioned by Honda’s Craig Orlan during the day’s first panel. Created by an executive order from then-Gov. John Kasich in January 2018, DriveOhio is housed within the Ohio Department of Transportation as one of the department’s technology initiatives. Working in collaboration with other state agencies, DriveOhio is able to use their authority to cut red tape when companies want to come to the state to research, test and deploy new transportation innovations.

“The transportation model we have today is simply not going to work for tomorrow,” said DriveOhio’s executive director Jim Barna. “We can’t build our way out of congestion. We can’t engineer our way out of accidents and fatal (crashes) so we are looking at technology. We are also seeing the rapid advancement of self-driving, connected vehicles, connected infrastructure, as well as unmanned aircraft systems. We as the state of Ohio know there are billions and billions of dollars being spent in this space and we want to attract that investment and we want to accelerate deployment of this technology to address these transportation challenges.”

Barna said he and state transportation officials are increasingly concerned about the need to invest in both basic improvements to roads but also a new generation of infrastructure that will both support and reflect the changing nature of transportation and mobility.

“Eventually we’re going to have to have a national conversation on revenue, on transportation revenue,” he said. “As we look at electric vehicles coming to the market, as we look at more and more hybrids, even just looking at the fuel efficiency of even trucks and SUVs, we’re starting to experience a significant decline in transportation revenues. … Right now the gas tax will not be sustainable over the next five to 10 years.”

In addition to transportation infrastructure, Barna said state policymakers need to move forward with investments in broadband and high-speed communications networks.

“As we look at connected (vehicle) technologies, it’s going to be imperative that we have (broadband) coverage statewide,” he said. “It can also provide safety layers to self-driving technology. There are companies out there developing what we call remote operators and what basically they’re doing is if a self-driving car encounters some sort of situation it’s not familiar with, the driver can take over at some remote location and navigate that self-driving vehicle through that situation. And that driver can monitor multiple vehicles. … That’s all possible through broadband. … It will play a central role in transportation in the future.”
Of course Ohio is far from the only state deploying technology to improve transportation and bring in the innovators.

“We’re all working on this stuff,” said Blaine Leonard, technology and innovation engineer at the Utah Department of Transportation. “It’s all advancing and we’re all sharing that together. We’re watching Columbus and we’re watching Ohio and we’re watching Michigan and we’re watching California and they’re watching us and we’re all trying to share this and do this together.”

Utah has deployed its own corridor of radio-based connected vehicle technology to serve a city bus system in Salt Lake City. As a bus travels down the corridor through 24 intersections, if it’s behind schedule, it asks the traffic signal ahead to give it a little extra green time to get it back on schedule. The first connected vehicle technology corridor using Designated Short-Range Communications (DSRC) of its kind in the country, it has been operational for more than a year.

“Our studies have demonstrated that we’ve improved the reliability of those buses by about 3 to 6 percent on their schedule,” Leonard said. “In the transit world, that’s pretty huge.”

Leonard said for states and communities to enable these kinds of technologies, it’s necessary to invest in and partner with the private sector to invest in the technology infrastructure backbone—fiber networks that can allow for the fast transfer of data.

“In the state of Utah in our network we have about 2,700 miles of fiber,” he said. “That allows us to reach our traffic signals in all corridors of the state—urban and rural. That enables the kind of technologies we want to do. That’s the foundation.”

Leonard noted that more than half of Utah’s fiber network was built as part of public-private partnerships with 25 telecommunications firms, which has allowed the state to save tens of millions of dollars.

Utah is also working to pave the way for self-driving cars by tackling an issue that has less to do with the infrastructure itself: consumer acceptance.

“Studies show that upwards of three-quarters of our population is uncomfortable with the concept of a car that drives itself,” Leonard said. “We’re not going to get this technology into use and get the benefits that we need from a safety and mobility standpoint unless you and I and our neighbors are comfortable with it.”

One of the ways the state hopes to get people comfortable with it is to allow them to ride in low-speed automated shuttles. Utah officials will bring the shuttles to eight to 10 locations early this year, study how the public interacts with the vehicles and determine whether they can supplement public transit offerings.

But as other states and communities seek to emulate what places like Ohio and Utah are doing, Leonard said it’s important they not be intimidated by the long list of initiatives already underway to move transportation innovations forward.

“I think for a lot of cities, they may look at what Ohio’s doing and think ‘wow, that’s great but I can’t undertake something that large. I don’t have $40 million (the amount the Smart Columbus project received from USDOT),’” he said. “I think the key is ... a lot of cities and communities could look at that list and say ‘but I’m going to try that one’ and start small but start somewhere.”

And Leonard says in many places it wouldn’t hurt to invest in regular maintenance and renewal of the basic transportation infrastructure since those improvements can benefit not only today’s drivers but
also the automated vehicles of the future.

“You and I do better if the pavement stripes are in good shape,” he noted. “You and I drive better if the signs are clearer. And you and I do better if there are no potholes in the roads. Those kinds of things need to happen for us, from a safety standpoint, but those things also advance the capability of automated vehicles to operate on our roads.”

**Addressing Policy and Infrastructure Needs to Drive Innovation**

Making those investments in basic infrastructure and tackling any policy roadblocks that may stand in the way of innovation were the focus of the day’s fifth and final panel.

Brian Pallasch, managing director of government relations and infrastructure initiatives at the American Society of Civil Engineers, is one of the people responsible for ASCE’s [Infrastructure Report Card](http://www.asce.org/infrastructure-report-card), which comes out every four years. The most recent report card, issued in 2017, gave the nation’s infrastructure an overall grade of D+. Pallasch detailed some of the key numbers for policy academy attendees.

“Traffic delays in this country cost about $160 billion a year,” he said. “It’s 6.9 billion hours in delayed traffic. … It’s about 42 hours per driver. That’s about a week’s worth of time you spend in your car.”

Pallasch also noted that more than 8 percent—or 56,000—of the nation’s 600,000 bridges are structurally deficient.

“They’re still safe to drive on but that means they need some sort of significant repair probably … or more constant monitoring. … There are bridges that are weight-restricted,” he said.

That may be important to keep in mind as companies plan to put platoons of heavy automated trucks on the nation’s roads in the years ahead.

“Without a good working infrastructure … we can’t have a good working economy,” Pallasch said. “And I think what we’re finding now with businesses and where (they) are locating … that the folks who have better infrastructure are being able to attract more employment. They’re able to attract more economic growth.”

Pallasch said ASCE estimates that over the next decade, the nation needs an infrastructure investment of $4.5 trillion from all sources—federal, state and local. Only about $2.5 trillion is currently expected to be spent during that time, which leaves a gap of $2 trillion.

“The largest gap that we face is in surface transportation and that’s for a number of reasons,” he said. “The main one is that at the federal level, the federal government has become a poor partner with (state governments) in advancing surface transportation ideas and funding. The federal gas tax has not been raised since 1993. … We are trying to buy 2019 infrastructure using 1993 dollars. That is really not a great way to proceed.”

Noting that plenty of models exist for state governments to emulate in coming up with new transportation revenues, Pallasch said officials can increase state gas taxes and fees, charge new registration fees for electrics and hybrids, and experiment with mileage-based user fees.

“I think we need to evaluate what makes sense across the board,” said Kim Menke, community and government relations manager for Toyota Motor Engineering and Manufacturing North America. “Certainly, we’ve made some major steps forward with tolling, both on roadways as well as bridges. Some of our legislators have really taken it on the chin and raised fuel taxes to be able to make short-
term improvements, but that's not sustainable.”

Menke said a mileage-based user fee could be an approach to consider but so could an access fee, paid by everyone.

Still, the cost of major infrastructure projects seems to increase each year and as states contemplate how to fund projects that may cost several times their annual transportation budgets, they will likely need all the partners they can get. They may also need an essential and long overdue conversation to happen at the federal level. Case in point: a bridge project near the site of the 2018 CSG National Conference that has become an infrastructure poster child—the 56-year-old Brent Spence Bridge, which carries Interstates 71 and 75 across the Ohio River and which has been deemed functionally obsolete due to carrying twice as much traffic as it was originally designed for.

“Ultimately I think part of the solution to figuring out the Brent Spence Bridge is actually figuring out what the proper role of the federal government is,” said ASCE’s Pallasch. “We’ve been arguing and will continue to advocate for increasing the federal share of investment in surface transportation. ... We’ve skipped a whole generation of investing in our nation’s infrastructure at the federal level and having the federal government step up to the plate and create some more resources. I’m hopeful ... that if Congress actually takes seriously a bipartisan effort to increase infrastructure spending and there is the mythical infrastructure package that has been sort of rumored for so long that we may have enough revenue that maybe a project of national significance like that bridge could be part of that—that there would be a little bit extra money for a project like that.”

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Further Reading

CSG Resources


Other Resources

“VW’s chairman says even small electric cars aren’t going to be cheap.” [27] Quartz, January 20, 2019.
“Fully autonomous cars won’t be here soon, but these advanced self-driving features will.” [28] Mashable, January 19, 2019.
“Uber Has Bigger Problems to Worry About Than the Shutdown.” [38] Bloomberg Businessweek, January 16, 2019.
“Portland riders say they’re skipping cars, thanks to electric scooters.” [40] The Verge, January 15, 2019.
“'It's the wave of the future, there's no stopping it': Gov. Kasich on autonomous vehicles in Ohio,” [57] News 5 Cleveland, January 8, 2019.
“2018 Was the Year of the Smart City Skeptic,” [71] City Lab, December 27, 2018.
“Colorado's internet of roads is a go. Soon cars will 'talk' to signs and traffic signals,” [72] Colorado Sun, December 26, 2018.
“Uber was just approved to resume self-driving tests in Pittsburgh and the rest of the state,” [77] Pittsburgh Post-Gazette, December 18, 2018.
• “There are no such things as self-driving cars (yet).” [82] Axios, December 12, 2018.
• “Uber said to be negotiating a multibillion-dollar takeover of scooter-sharing startup.” [87] The Verge, December 1, 2018.
• “Autonomous Vehicles Are Coming and There’s No Roadmap (Yet).” [92] Next City, November 26, 2018.
• “Jim Barna behind wheel at DriveOhio.” [95] The Columbus Dispatch, November 18, 2018.
• “Electric Scooters Have Been Burned, Buried and Butchered. They’re About to Be Regulated.” [99] Stateline, November 13, 2018.
• “Why smart cities are owning their own data—and why socially responsible companies should let them.” [100] ROI New Jersey, November 13, 2018.
• “How to Improve Cybersecurity in a Smart City.” [102] Readwrite, November 12, 2018.
• “Vehicle data can make AVs safer, but only if companies share it.” [103] Axios, November 7, 2018.
• “The $6 Trillion Barrier Holding Electric Cars Back: Sales are surging, but the costs of building the associated infrastructure suggest this will be a lengthy transition.” [104] Bloomberg Opinion, November 4, 2018.
• “Mary Barra says GM’s driverless cars will ride on public roads (in 2019).” [108] Quartz, November 1, 2018.
• “States are sewing a patchwork of AV regulations.” [111] Axios, October 27, 2018.
“Cities Have Taken the Lead in Regulating Driverless Vehicles,” City Lab, October 23, 2018.
“States Will Lead in Infrastructure Funding Innovations, IBTTA Panelists Say.” Transport Topics, October 18, 2018.
“Autonomous, Electric and Shared—One of These Is Not Like the Others.” Eno Transportation Weekly, October 8, 2018.
“Lyft tests mobility as a service across major U.S. cities.” State Smart Transportation Initiative, October 1, 2018.
“Uber installing its own electric charging stations...for electric bicycles.” Electrek, September 28, 2018.
“Uber is spending $10 million to bolster its new image as a transportation company.” Fast Company, September 26, 2018.
“220,000 EV Drivers in California to Lose Carpool Lane Perk in 2019.” Planetizen, September 21, 2018.
“TriMet debuts $500 million plan to ditch diesel buses, go electric.” The Oregonian, September 15, 2018.
“How 5G will be key to smart city growth and change how we interact with our buildings.” Tech Republic, September 14, 2018.
“LA’s Teaming Up With Other Cities to Get Cheaper EVs.” Wired, September 11, 2018.
“Your city can’t become ‘smart’ without proper payment infrastructure.” Smart Cities Dive, August 29, 2018.
“Toyota invests $500 million in Uber, will partner to deliver self-driving cars by 2021.” USA Today, August 27, 2018.
“Scooter companies are trying to rehabilitate their reputations as cities crack down.” The Verge, August 23, 2018.
“Chicago Could Be Next to Cap Number of Ride-Hailing Vehicles.” Planetizen, August 21, 2018.
“Cities need to move carefully to get TNC benefits.” State Smart Transportation Initiative,
August 20, 2018.


“Cities Are Taxing Ride-Hailing Services Like Uber and Lyft. Is This a Good Thing?” [150] World Resources Institute, August 8, 2018.


“For Columbus, a city is only smart if the public is behind it,” [156] Digital Trends, July 25, 2018.


“Uber’s plan to get more electric cars on the road,” [162] Curbed, June 19, 2018.

“Smart corridor will allow cars to talk to one another,” [163] The Columbus Dispatch, June 16, 2018.


“In Columbus smart city initiative, transportation takes the wheel: Columbus is focusing its smart city efforts around smart transportation to improve its residents’ access to jobs and hospitals,” [175] Internet of Things Agenda, 2017.