The NW 33 Smart Mobility Corridor: Pursuing smart mobility in a suburban, exurban, and rural context

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Abstract

Much of the attention for smart mobility initiatives has focused on urban environments. To avoid falling behind economically, rural, exurban, and suburban areas must consider previous paradigm shifts in technology, such as rural America's slow adoption of electricity in the beginning of the 20th century, as cautionary tales. Central Ohio's NW 33 Innovation Corridor Council of Governments (COG)—comprised of Union County, the City of Marysville, the Marysville – Union County Port Authority, and the City of Dublin—represents these non-urban environments and offers an encouraging example to small communities interested in attracting smart mobility research and development. Since the COG was awarded a $6 million grant from the United States Department of Transportation in 2016, the area has seen more than $200 million in additional investment for the newly-christened NW 33 Smart Mobility Corridor along U.S. Route 33. Regional players such as Honda of America, The Ohio State University, and the Transportation Research Center proved valuable as assets and sources of funding, but just as valuable as assets were the region's weather and development patterns. The region's clear vision, collective inventory of assets, and embrace of public-private partnerships are among the keys to the swift investment and activity.

KEYWORDS

NW 33 Smart Mobility Corridor, Connected vehicle, Rural smart mobility

The Case for Smart Mobility

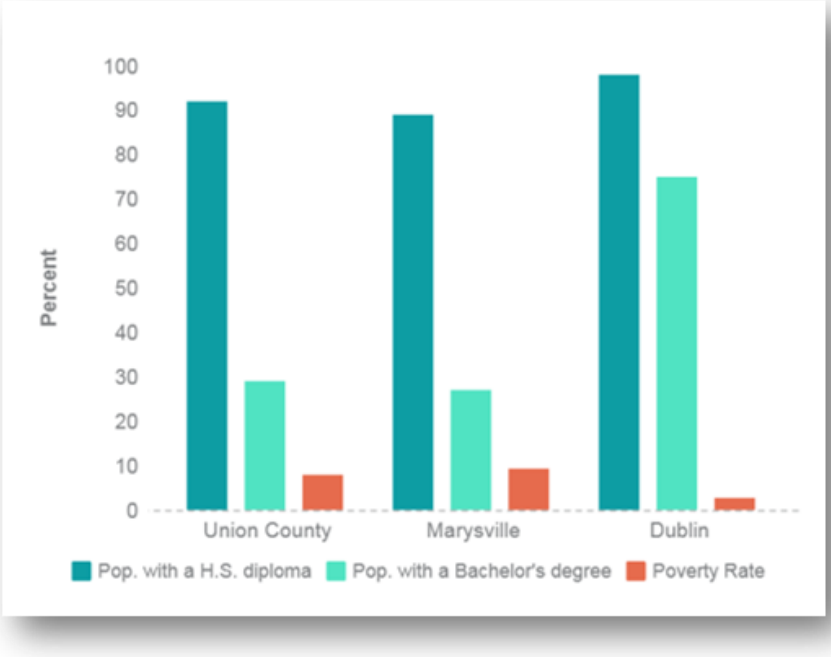
In the early 1930's, electricity powered 90% of the homes in America's cities. Meanwhile, this luxury was available only to 10% of rural Americans, and it was not considered economically feasible to do anything about it. It wasn't until 1936 when President Franklin D. Roosevelt signed the Rural Electrification Act that a substantial percentage of isolated communities could power themselves with a technology that had been serving urbanites as early as the 1880's, over 50 years earlier. The same can be said of telecommunications and broadband infrastructure. There are still parts of rural America that are not well connected. Taking the past as a predictor of the future, smart mobility could easily follow a similar trajectory.

The United States is on the cusp of another technological shift. The rise of smart mobility promises to transform the means and technology behind transportation in urban, suburban, exurban and rural spaces alike. However, much of the early research, development and implementation of smart infrastructure has been focused in urban communities. The 2016 United States Department of Transportation's (USDOT) competition for a smart mobility grant, the Smart City Challenge, directed attention toward the needs of mid-sized cities. Smart infrastructure, despite the utopian vision of hyper-connected cities, could have an equal impact on remote roadways and the aging, agriculture-based population in America's countryside. Likewise, populations in America's suburbs and exurbs will have new mobility needs as they continue to attract business and provide public services. If unengaged with the arrival of smart mobility, these populations may find themselves 50 years behind once more.

It is important to note that the current administration in Washington DC has demonstrated an interest in funding for more rural and exurban infrastructure. If the most recent TIGER Grant awards are any indication, leaders have an opportunity to present rural smart mobility projects that rise to the top of USDOT priorities.

Fortunately, a trio of champions has surfaced in rural Ohio. Union County, along with its county seat Marysville and the City of Dublin in neighboring Franklin County, has positioned itself as a smart mobility hub and as such has

attracted over $217 million in investment from government entities, universities, and private companies. Their success lies in the development of the NW 33 Smart Mobility Corridor, a 35-mile strip of U.S. Route 33 designated as a proving ground for smart infrastructure and autonomous vehicles. The three entities change the narrative of where smart mobility investment is happening, representing rural, exurban, and suburban landscapes respectively. The message here is simple: with some inventory of local assets, public-private collaboration and forward thinking, communities of any size can not only participate in but shape the paradigm shift toward a smart mobility future.



Education and poverty levels of the three municipalities in the COG

Union County--Rural

Demographics

Union County, including the City of Marysville, is a predominantly flat, rural county with 55,000 people. Because of explosive growth in Marysville and the townships near Dublin, Union County was the fastest growing county in Ohio in 2016. The county's relatively low population spread across 432 square miles of mostly farmland results in a low population density of 121 per square mile. 90% of the population considers themselves non-Hispanic White. 29% of the population possesses a bachelor's degree, while 92% possess a high school diploma. 7.9% of the population lives in poverty.

Assets

The 35-mile stretch of Route 33 between East Liberty and the Columbus outerbelt is home to over 65 automotive companies including OEM's and Tier 1 suppliers.

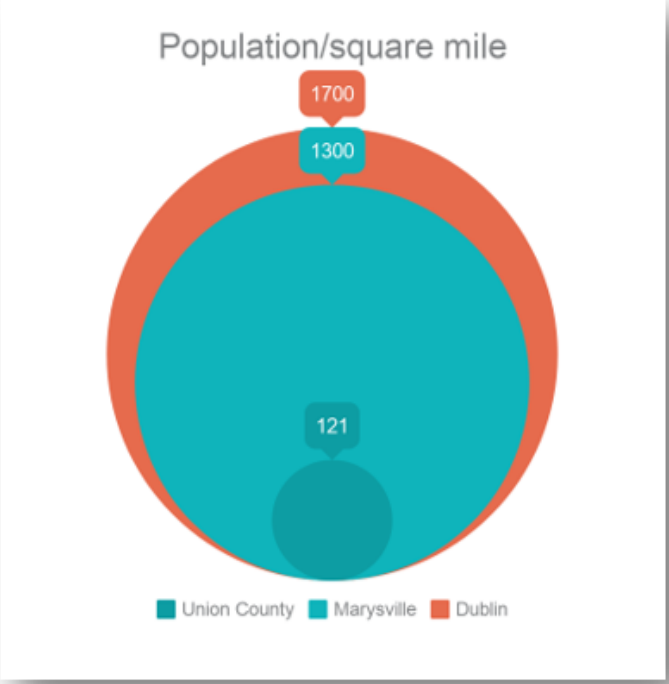
Further north on Route 33 closer to East Liberty is the Transportation Research Center (TRC), the largest independent automotive proving ground in the United States. Within the 24/7 research facility's 4,500 acres is a 7.5 mile high-speed Oval Test Track and a Vehicle Dynamics Area, among other testing grounds. On the TRC's property is the National Highway Traffic Safety Administration's (NHTSA) Vehicle Research and Test Center (VRTC), the agency's in-house laboratory.

Marysville--Exurban

Demographics

Marysville, OH is a fast-growing farming community of approximately 23,000 residents. It's connected by U.S. Route 33 to the Columbus metropolitan area, about 18 miles away. At only 16 square miles, the city resembles most rural

county seats in Ohio with the notable exception of a substantial manufacturing presence. Today, over 17% of the city's workforce is employed in the manufacturing sector, compared to the state-wide average of 10%.



Population density of the three municipalities in the COG

The city's demographics are otherwise typical of a small, rural city. Roughly 27% of the population over the age of 25 has a bachelor's degree. The high school graduation rate comes in slightly higher than the nation's average at 89.2% compared to 87%. Poverty is relatively low at 9.3%. There are few minorities in the community as of the 2010 census, with 90% of residents considering themselves as non-Hispanic Whites. Marysville is 16 square miles in size with 1300 people per square mile.

Assets

Since the opening of a motorcycle plant in 1979, Honda of America has expanded its footprint in the Marysville area. Today, Honda operates the Marysville Auto Plant, the Performance Manufacturing Center, and Honda Research and Development Americas, Inc all along Route 33. A second auto plant is in neighboring Logan County in East Liberty. Between the two auto plants, well over 15 million units have been manufactured. On March 6, 2018, the 25 millionth automobile manufactured in Honda's North American facilities was made in Marysville.

City of Dublin--Suburban

Demographics

Approximately 25 square miles in size, Dublin is a wealthy suburb on the northwest corner of Columbus. Rather than become a typical bedroom community along the Columbus outerbelt, Dublin has positioned itself as a major jobs center in the region with Cardinal Health, Wendy's, and Ashland, Inc. among others headquartered within the city limits. The city had over 45,000 residents in 2016, a 10% increase from 2010, and a low density of 1700 people per square mile. 98% of residents over the age of 25 have a high school diploma and 75% have at least a bachelor's degree, compared to the nationwide average of 30%. Poverty is very low at 2.7%.

The city's population is more diverse than most surrounding communities. 76% of the population identifies as non-Hispanic White while 17% of the population, much of the remainder, identifies as Asian.

The NW 33 Smart Mobility Corridor: Pursuing smart mobility in a suburban, exurban, and rural context

Assets

Dublin's Metro Data Center supports the city's Dublink system, 125 miles of fiber optic cable that run throughout Dublin and surrounding communities. Dublink provides connected businesses with subsidized ultra-high speed network connectivity. Dublink's bandwidth of 100 gigabits per second (Gbps) widens the region's technical possibilities. At 100 Gbps:

- Data equivalent to 80 million file cabinets filled with text can be transferred daily.
- Every one of Ohio's 1.8 million enrolled K-12 students could download an e-book simultaneously in just over two minutes.
- 300,000 X-rays can be transmitted in just one minute.
- 8.5 million electronic medical records can be transmitted in 1 minute.
- Smartphone data can be sent at 50,000 times faster than current average speeds.

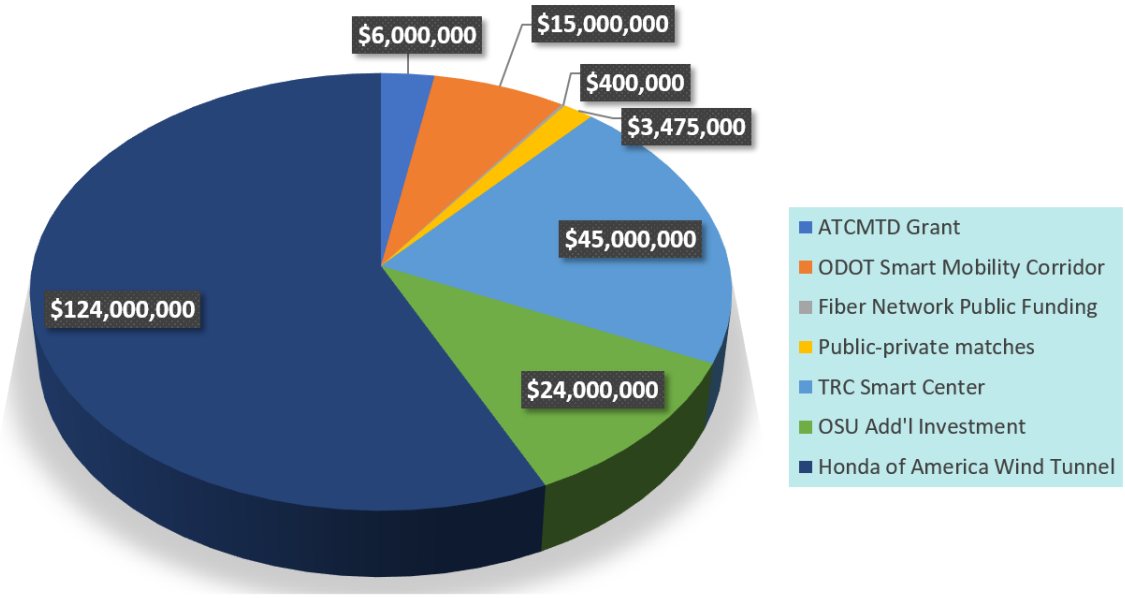
Other Local Assets

The Ohio State University is located 30 miles to the southeast of Marysville in Columbus and generates the talent to help Central Ohio maintain an innovative edge. Available at the university is a unique interdisciplinary major in Data Analytics. Additionally, the university manages but does not own the TRC.

Union County, the City of Marysville, and the City of Dublin all take advantage of Central Ohio's climate in their research and development efforts. Throughout four distinct seasons, Marysville may experience extreme heat or cold, rain, wind, snow and ice.

Investment in the Corridor

In total, the NW 33 Smart Mobility Corridor has attracted $217 million in pursuit of smart mobility research and development.



NW 33 Smart Mobility Corridor Investment

Recognizing the unique cluster of automotive assets in the area, Union County, the City of Marysville, the Marysville – Union County Port Authority, and the City of Dublin partnered to establish the NW 33 Innovation Corridor Council of Governments (COG) in a bid to retain and attract innovative businesses working in smart mobility. In 2016, The COG was awarded the $6 million Advanced Transportation and Congestion Management Technologies Deployment Program grant (ATCMTD) by USDOT, whose objective was, "the development of model deployment sites for large

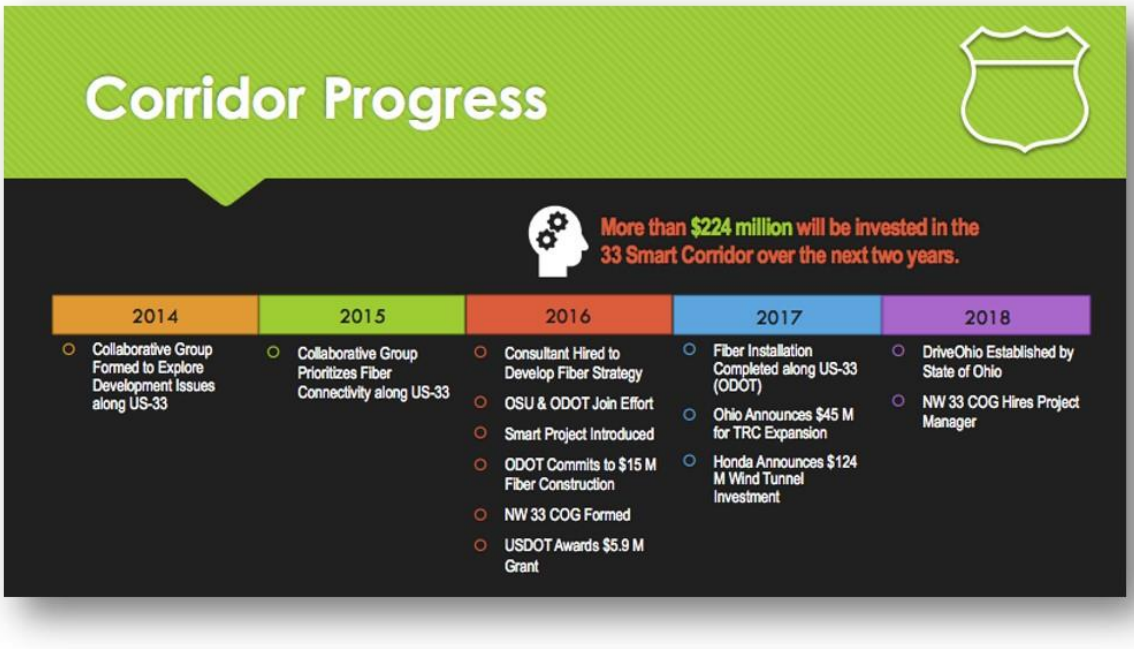
scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment."

In November 2016, the state of Ohio announced a $16 million investment to create a Smart Mobility Corridor on Route 33 between the TRC and the Metro Data Center in Dublin, with Marysville in the center. As part of the investment, in 2017 and 2018, the Ohio Department of Transportation (ODOT) is installing a redundant 35-mile fiber that will support the deployment of the ATCMTD grant.

The TRC has received the bulk of investment. In January 2017, Ohio governor John Kasich announced that the TRC would receive $45 million to build the first phase of a 540-acre Smart Mobility Advanced Research and Test (SMART) center within the grounds. The Ohio State University contributed $25 million, the state $12.5 million, and JobsOhio $7.5 million. Shortly later in April, Honda announced that they would invest $124 million into an advanced wind tunnel facility in the TRC.

Establishing the NW 33 Smart Mobility Corridor

The most illustrative of the investments is the COG's successful bid for the ATCMTD grant. The $6 million represents only 3% of total investment in the area but is an example of the kind of pooling of resources and public-private cooperation necessary to pull non-urban areas into the smart mobility conversation. It also instigated the establishment of the NW 33 Smart Mobility Corridor and the substantial growth in investment therein.



Timeline of the Smart Mobility Corridor (Courtesy of the NW 33 Council of Governments)

While the seeds of the COG's success were planted in 1962 when ODOT and The Ohio State University established the TRC, and further with the arrival of Honda in 1979, the conversation about development issues more seriously began in 2014. Community officials in and around Union County recognized the need for additional fiber connectivity if the region was to flourish in the 21st century economy. At the time, Union County lacked a variety of broadband service providers. The low level of competition prevented infrastructure investments, reduced the availability of services, and created high subscription costs. The proposed solution was to extend fiber optics between the TRC and the Dublink network in Dublin. In 2016, the COG formed and began its pursuit of the ATCMTD grant, with Logan County, Honda Research and Development Americas, Battelle, the TRC/The Ohio State University, ODOT, and the Mid-Ohio Regional Planning Commission (MORPC) as additional partners. The COG also formed a complementary relationship with Smart Columbus, which is implementing smart infrastructure projects as part of Columbus' successful bid for USDOT's Smart City Challenge.

The NW 33 Smart Mobility Corridor: Pursuing smart mobility in a suburban, exurban, and rural context

To work within the parameters of the grant, the COG expanded the scope of the project with a simple vision, "to demonstrate how smaller cities can leverage intelligent transportation technology to improve congestion, safety, and employment access." With this wider scope, the COG recognized the unique position Union County was in to market itself as a proving ground for autonomous vehicles. New proposed activities included smart infrastructure installation, autonomous and connected vehicle testing, and data collection and commercialization. The application highlighted Route 33's weather exposure, the opportunity to test vehicles in a closed setting at the TRC as well as public roads, the ability to test in a variety of densities and environments, and the willing collaboration between state, county, and municipal entities to support the project's complexity.

The COG's grant application laid out plans for the NW 33 Smart Mobility Corridor, as it was then announced, in seven distinct elements:

1. Infrastructure--notably a redundant fiber optic cable loop, 62 roadside DSRC units, and roadside video equipment and sensors--to support automated and connected vehicles.
2. Dynamic signal phasing and timing, with DSRC units installed in 32 intersections, including all of Marysville's lights and the balance in Dublin.
3. A local smart network.
4. A connected test fleet of up to 1200 vehicles equipped with onboard DSRC units.
5. A Pedestrian in Crosswalk Warning System in intersections identified by the COG.
6. Connected vehicle applications to safely manage mobility in the event of accidents or weather conditions.
7. Program management, maintenance and operations.

On October 13, 2016, USDOT announced the COG had been awarded the grant. Additional funds came swiftly and firmly established the region as Ohio's Smart Mobility Corridor. By November, the state added $16 million to fund the redundant fiber optic loop. A few months later in 2017, the state announced that $45 million would go to the TRC and Honda announced they would spend $124 million on a wind tunnel. One $6 million grant, in the span of a year, attracted more than $200 million in additional investment between East Liberty and Dublin. Between the Smart Mobility Corridor and the investments attached to the nearby Smart Columbus project, Central Ohio has seen more investment in smart mobility infrastructure than almost anywhere in the world.

NW 33 Smart Mobility Corridor (Courtesy of the NW 33 Council of Governments)

The NW 33 Smart Mobility Corridor: Pursuing smart mobility in a suburban, exurban, and rural context

Best practices to support the arrival of smart mobility

A blue-collar county of 55,000 residents is in the center of a proving ground for connected and automated vehicles. The COG's success is not an accident, but the result of following the best practices to attract investment. Non-urban communities serious about preparing for the future economy and serving its residents through smart mobility should consider the following steps, all modeled by Union County, the City of Marysville, and the City of Dublin.

Establish a vision

City and county officials began the conversation as early as 2014 to bring fiber optic cable to Route 33. At the time, the effort focused on maintaining competitiveness in an evolving economy, but the conversation resulted in a wider vision and therefore positioned Route 33 as a smart infrastructure hub and potential automated vehicle proving ground. The vision was grounded in its commitment to improving "congestion, safety, and employment access," but elastic enough to incorporate objectives of additional investments.

Develop public-private partnerships

None of the individual entities of the COG possessed all the necessary components to secure the ATCMTD grant. Union County, the Marysville – Union County Port Authority, the City of Marysville, and the City of Dublin each contributed significantly to the successful bid for the ATCMTD grant. The COG itself is comprised of municipalities but partnered with government agencies and the region's assets—some of them private—to actualize the implementation and management of the grant and its surrounding investments. Of important note – these communities compete with one another on day-to-day economic development activities, but they collaborate on a larger vision that cuts across regional assets. Today that means transportation and digital infrastructure, but tomorrow it could mean anything as the framework for cooperation is adaptable.

Take inventory of assets

Local assets are not limited to large manufacturing operations, research universities, or data centers, though these are useful. The COG positioned Route 33 as a location with four distinct seasons, municipalities of varying density, and a low cost of doing business. Communities in favor of embracing smart mobility initiatives ought to think deeply about what they have to offer, including basic characteristics of the area and what those local assets can contribute to the economic development, mobility and connectivity of the greater region.

Involve the state government

It's critical for municipalities with limited resources to engage state government for smart mobility projects. ODOT has been a critical partner with the COG since 2016 and has ensured that the COG's vision aligns with the state's, with positive results. The state of Ohio was quick to react to the ATCMTD grant. Within a month of the award, the state announced the creation of the Smart Mobility Corridor along with additional funds. The state government has continued to see the value of smart mobility research and development. On January 18, 2018, Governor John Kasich established DriveOhio by executive order, a "one-stop shop for researchers, developers and manufacturers to collaborate on autonomous and connected vehicle initiatives in Ohio." The center pulls members from prominent state organizations such as ODOT, the Department of Public Safety, and the Governor's Office of Workforce Transformation to facilitate the attraction, retainment, and management of smart mobility activity throughout the state.

Apply for grants leveraging private sector investment

Grants are instrumental in establishing credibility as a smart mobility destination and attracting additional investment. The $6 million ATCMTD grant resulted in over $200 million in additional investments along Route 33 from the state of Ohio, Honda of America, The Ohio State University, and other sources. Private sector companies with an interest in smart mobility are key to augmenting the impact of public dollars. While the project/vision is in the early stage, a committed outreach campaign to existing businesses in the area to discover their objectives and how public infrastructure investment could amplify their market position is key to the success and sustainability of infrastructure over the long term.

Build a sustainable business model

While applying for grants is a crucial step to attract investment, a sustainable business model is critical to ensure that any progress made through investment stays in place. To pay for the operation and maintenance of smart mobility infrastructure long after the grant money evaporates, Community officials must develop open policy frameworks that encourage private sector involvement and enable reoccurring commercial revenue as well as donations of in-kind equipment and services. The digitization of transportation offers enormous opportunity to rethink the way transportation infrastructure is funded. Communities need to view themselves as data management service businesses

to compete in the new economy. Creating a platform for digital commerce with open data at the center and a bias toward data monetization as the new currency will ensure a community's place in the smart mobility future.

Recognize the applications of smart mobility in a community

Not every community will employ smart mobility the same way. Urban areas may focus on congestion relief and maximizing existing road lanes while rural areas may leverage technology to improve farming techniques or mobility for elderly or disabled citizens. Recognizing the needs of the population and how smart infrastructure enabled by can potentially meet those needs is the first step in embracing a smart mobility future. Recognizing the implications of ignoring that future could prevent a community from falling decades behind, much like rural communities in the 1930's did when they lacked electricity. Today, electricity is a requirement for business and livelihood. In 50 years, smart mobility infrastructure will be considered likewise.

Parting thoughts

The new field of smart mobility is constantly shifting. There are no maps to the future except those created by proactive communities. Citizens will need to shift seamlessly between physical and digital places; the communities that provide this space will inherit the future. Non-urban places have a prescient opportunity to redefine their environment for the next century.

About the authors

On January 23, 2018, the COG announced that Dublin-based engineering services company Alten-Cresttek, as subcontracted by Michael Baker International, would spearhead the installation of the onboard DSRC's and public engagement efforts of the NW 33 Smart Mobility Corridor. Discussions are underway to include workforce development components and data monetization strategies for businesses and local government bodies. Alten-Cresttek is eager to continue the conversation of smart mobility, data, and intelligent transportation systems with industry leaders and experts.

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