Special Topic: Automated Vehicles

The Promise and Potential of AVs

Automated vehicles (AVs), or "self-driving" cars, are a prime example of the transformative potential of sustained investment in foundational technologies for passenger and commercial vehicles. AVs are the cumulative result of advances made across a suite of underlying technologies, including advanced sensors, data processors, GPS and artificial intelligence.[1] These underlying technologies support advances in other automated modes of transportation, such as unmanned aerial vehicles (UAVs), and enhance the operations and features of vehicles on the road today.

While the catalysts of AV technology development and adoption vary for passenger and commercial vehicles, AVs have the potential to fundamentally reconfigure America's transportation landscape across the board. A transportation system that integrates AV technologies will help promote a safer, more productive and more mobile world:

- When it comes to safety, the National Highway Traffic Safety Administration (NHTSA) has estimated that approximately 94 percent of crashes are caused by human error. As NHTSA recently acknowledged, AVs have great potential to "save lives" by mitigating this "human error" on roadways.[2]

- In terms of efficiency, AVs can give time back to commuters and travelers and dramatically increase productivity in transportation-reliant industries.[3] The annual benefit to U.S. consumers from AVs is estimated to reach $163 billion by 2050.[4] In the trucking industry alone, the use of AVs can significantly reduce fuel consumption and carbon dioxide emissions.

- Finally, the use of AVs, for personal and commercial purposes, will create significant mobility and economic benefits such as enhanced independence for seniors and people living with disabilities and reduced shipping and logistics costs. For example, unmanned aircraft system deliveries could enhance last-mile shipping options for communities in all corners of the country, providing significant savings and benefiting harder-to-reach rural areas.

The State of the AV Landscape

The United States has led the way through an era of rapid advancements in AV technology, particularly over the past two decades. DARPA's original grand challenge for AV development in 2004 lit a spark that accelerated the development of viable, early-stage AV models in the United States.[5] Today, the United States ranks first globally when it comes to the technology and innovation aspects of AV readiness.[6] The United States hosts far more companies involved in the AV development and supply chain than any other country, with at least 163 related company headquarters.[7] This level of activity is enabled by a robust public- and private-sector research and development (R&D) landscape for creating and perfecting underlying and complementary AV technologies.[8]

The AV development landscape continues to evolve rapidly as the technology matures and opportunities for testing and deployment expand. The average disclosed start-up investment in core AV technologies grew twelvefold between 2010 and 2016, and the complexity of in-vehicle software is expected to quadruple between 2016 and 2030.[9] An estimated 70 percent of spending on AV technology comes from outside the automotive sector.[10] Meanwhile, the global UAV market is forecast to reach $100 billion between 2016 and 2020.[11]

Looking to the Future of AVs

Keeping up with this rapid pace of change and maintaining the United States' leadership role in AV development requires policy conditions that will support the next stage of development, testing and deployment and enable innovation economywide, as all sectors will be affected by a changing transportation landscape. Policymakers should work with key AV players and stakeholders to:

1. **Revise outdated rules and standards and encourage deployment.** Many auto safety standards assume a conventional vehicle configuration and the presence of a human driver behind the steering wheel, impeding the deployment and testing of new driving technologies. Similarly, in the aviation industry, existing regulations assume onboard human piloting, resulting in complex and ambiguous paths to certification and operation. In addition, many regulations in industries that are critical to AV deployment, such as the insurance industry, must also evolve to establish a supportive landscape for AV adoption. Regulators should develop programs — such as grand challenges and similar initiatives — that actively facilitate future innovation and support the integration of AV technologies.

2. **Ensure harmonization to promote innovation and transportation system safety.** The difficulty of navigating patchwork regulatory regimes stymies progress on AVs. Harmonized rules and standards at the state, federal and international levels — developed with industry collaboration — are a key enabler of future technological advances. It is essential that all types of developed AVs have a uniform set of expectations for communication and interaction to ensure safety.

3. **Ensure technology-neutral regulation.** Self-driving vehicle technology is evolving quickly, and regulations will need to be technology neutral and flexible to allow for its continued development. Overly prescriptive and technically specific policies will quickly become out of date and will stymie the safe and continuous development of AV technology. A forward-looking and comprehensive regulatory approach that is informed by data and grounded in a set of performance-based standards will enable regulators to craft guidance for a more efficient, effective and inclusive mobility system.

4. **Ensure security and safety.** Public- and private-sector collaboration on frameworks for safety and security ensures trust in automated vehicles put on U.S. roads and in our national airspace. The federal government should increase collaboration with industry to provide clear safety standards that allow developers to deploy safe and secure vehicles.

ENDNOTES

1 MIT Technology Review. (2018, March 12). What's driving autonomous vehicles.
2 U.S. Department of Transportation. *Preparing for the future of transportation: Automated vehicles 3.0.*
3 For example, the trucking industry is poised to dramatically benefit from platooning methods.
4 Securing America's Future Energy. (2018, June). *America's workforce and the self-driving future: Realizing productivity gains and spurring economic growth.*
5 DARPA. (2014, March 13). The DARPA grand challenge: Ten years later.
6 KPMG. *Autonomous vehicles readiness index 2018: Assessing countries' openness and preparedness for autonomous vehicles.*
7 *Ibid.*
8 MIT Technology Review. (2018, March 12). What's driving autonomous vehicles.
9 McKinsey Center for Future of Mobility. (2017, October). *The automotive revolution is speeding up: Perspectives on the emerging personal mobility landscape.*
10 KPMG. *Autonomous vehicles readiness index 2018: Assessing countries' openness and preparedness for autonomous vehicles.*
11 Goldman Sachs Research. Drones: Reporting for work.