

***Navigating National Deployment:
Coordination with Other Transportation Agencies and Risk Management***

AMPO Connected and Autonomous Vehicles (C/AV) Working Group

Meeting 2: July 31, 2017 – August 1, 2017 in Cincinnati, Ohio

The AMPO C/AV Technical Working Group held its second meeting from July 31, 2017 – August 1, 2017 in Cincinnati, Ohio. The first day of meetings was held in coordination with the American Association of State Highway and Transportation Officials' (AASHTO) Conference on Performance-Based Transportation Planning, Financing, and Management. AASHTO and AMPO's C/AV Working Groups held a joint meeting entitled "Transporting Cars, People, and Planning into the Self-Driving Future." The meeting discussed how public agencies are addressing C/AV technology and specifically focused on coordination opportunities with state and local transportation agencies. The AMPO C/AV Working Group met on the second day to further discuss coordination opportunities and identify risks associated with C/AV deployment and implementation. This white paper summarizes the discussions of both meetings. The objectives of the meetings included identifying:

- C/AV policy development and implementation, especially focused on the opportunities and challenges of navigating regulatory concerns;
- Incorporation of C/AV technology into the planning process at State DOTs, metropolitan planning organizations (MPOs), and localities related to partnership opportunities and areas where partnership is needed to facilitate C/AV deployment and implementation;
- Actions that State DOTs, MPOs, and other transportation agencies can take now to prepare for C/AV technology;
- The risks associated with C/AV deployment and implementation and potential strategies to manage those risks; and
- Resources to assist MPOs and other transportation agencies moving forward.

The discussion of ongoing activities related to C/AV technology emphasized the need for coordination among State DOTs, MPOs, and other transportation agencies to provide opportunities to increase awareness of C/AV related activities being undertaken by the public and private sector, build synergy among these efforts, reduce redundancy in activities, and efficiently use and leverage limited financial and staff resources. Coordination could help transportation agencies move forward as leaders and with a unified direction for deployment and implementation. Effective coordination could also ensure the technology best supports the operation of the transportation system and the needs of its users.

The participants identified unique characteristics and opportunities within the structure and core functions of MPOs and State DOTs to determine how to best focus their efforts related to C/AV technology. MPOs are stewards of the transportation system within their metropolitan planning areas. The MPO process already functions as a unique forum for discussion, building partnerships, and achieving consensus on policy and vision across a wide range of agencies, stakeholders, and decision makers through MPO policy boards, technical committees, and community meetings as well as the development of planning products, including the Transportation Improvement Program (and metropolitan transportation plan). These venues could provide a forum for regional stakeholders and policy makers to discuss and work through challenges and opportunities associated with C/AV

technology and its impact on the transportation system. MPOs can also use these activities to strengthen existing partnerships, invite new partners, and engage these partners on critical C/AV topics. These activities also provide an opportunity to educate stakeholders on the status of C/AV technology and its benefits to the transportation system, and highlight the MPO's value to the region and state.

The discussion on coordination needs and opportunities went beyond state and local transportation agencies to identify additional stakeholders at the regional, state, and national levels. The participants were interested in how the roles and responsibilities of transportation agencies and their partnerships may evolve especially relating to the private sector.

- Other government agencies (e.g., federal agencies and emergency management)
- Private organizations (e.g., original equipment manufacturers and insurance agencies)
- Associations (e.g., the Institute for Transportation Engineers [ITE])

The discussion highlighted the opportunity for coordination with the freight industry in particular. Since C/AVs have the potential to increase capacity and reduce congestion, they could improve the movement of freight by reducing bottlenecks. Many feel C/AV technology cannot move forward without vehicle electrification, or at least will not achieve its full potential without it. C/AV technology and electrification could benefit freight movement by supporting the advancement of truck platooning and virtual weigh stations, which have the potential to expedite transport while facilitating compliance¹.

Under the topic of coordination, federal partnerships and navigating regulatory concerns were discussed. The participants discussed government regulation of C/AV technology and identified possible areas of standardization that would aid implementation and deployment. Many expressed the need for overarching guidance at the federal level to support consistent expansion of existing efforts across municipal and state borders and to help facilitate uniform, efficient, and effective C/AV deployment and implementation nationally. At the same time participants cautioned that flexibility in regulations, policy, and guidance must be provided to ensure that C/AV technology is not constrained by regulations, especially those that were developed for human-operated vehicles.

Because the full range of implications of C/AV technology is unknown, the participants posed questions and identified risks that need to be explored further. They suggested understanding societal adaptation to past technologies and examining what helped spur their widespread implementation. For example, what made communities give up parking to implement electric vehicle charging stations, airports to provide free cell phone charging stations, or businesses to provide free Wi-Fi in public spaces? Were there financial incentives, pressure relating to maintaining or creating a desired image, a desire to keep up with "cutting edge" technologies, or all of the above? Or in the case of cell phones, how was regulation handled in relation to earlier services such as land line phones, or earlier uses of the radio spectrum? Some of the specific risks explored include the following:

Safety – As discussed during the AMPO C/AV Working Group Meeting #1, while many predict that C/AV technology will dramatically improve safety, there are concerns with ensuring safety during deployment, especially under mixed fleet conditions. A further concern is maintaining security to prevent vulnerabilities and intrusions to vehicles and

¹ <https://ops.fhwa.dot.gov/publications/fhwahop09051/sec04.htm>

connected elements of infrastructure that could disrupt the transportation system. The participants also explored stakeholder acceptance and expectations related to safety. Will enough stakeholders trust (and continue to trust) the concept of C/AVs to carry through on the regulatory and system support required for full deployment? Since it is not realistic to expect an elimination of crashes and fatalities, how will stakeholders accept fatalities and serious injuries due to C/AV crashes where the cause is not human error or mechanical failure? What are the liability concerns related to such crashes?

Environmental Justice and Equity – The participants shared the concern of ensuring all transportation users, including youth, low income, minority, and elderly populations and individuals with disabilities are provided equal access to the transportation system and the benefits of C/AV technology, and do not receive a disproportionate share of any negative consequences as C/AVs are deployed and implemented. While C/AV technology could improve access for those currently unable to operate a motor vehicle, such as individuals with disabilities and seniors, there is concern regarding how implementation and deployment will be phased in to communities around the nation. To the extent C/AVs require public infrastructure investment and maintenance for deployment, it will be challenging to distribute resources and improvements equitably to ensure that all communities are capable of supporting C/AV use, and that lower income communities are not the last to receive access to the technology. By law, publicly supplied or subsidized C/AV services must be equally available to all populations. Private services supplied by C/AV operators must also be provided on a non-discriminatory basis. For example, how can equitable access be ensured in terms of cost structures and services provided by transportation service providers and other organizations whose core priority is profitability rather than provision of services? How can equitable access be ensured when access to the service happens through technologies such as cellular data services that may not be as widely available in lower income communities?

Vulnerable road users, including pedestrians, bicyclists and persons with disabilities may also be negatively affected by C/AV deployment, from the perspective both of equity and safety². For example, it has been predicted that the deployment of C/AVs may necessitate non-motorized modes to carry transponders to communicate with technology and ensure their visibility. While the transponder could be incorporated into something such as a cell phone or perhaps small standalone beacon devices, it remains a challenge to distributed such devices equitably, especially to youth, elderly, and homeless populations, and to ensure their use. It is not clear (as with many aspects of modern connected technologies) whether such devices would be accepted by the general population or whether they might be perceived as too invasive. These concerns could be significant enough to deter people from transitioning to C/AVs.

Stakeholder expectations, acceptance, and unpredictability – As discussed in the AMPO C/AV Working Group Meeting #1, stakeholders have a wide range of knowledge and views of C/AVs—including unrealistic expectations regarding C/AV technology as a

² <http://www.pedbikeinfo.org/topics/automatedvehicles.cfm>
http://www.pedbikeinfo.org/pdf/PBIC_AV.pdf

mechanism to solve all transportation problems. Through their existing processes, transportation agencies can assist in educating their stakeholders about the known and unknown characteristics of the new technologies, and in developing realistic expectations. Concerns were also raised that C/AVs will be used for illicit purposes or that some transportation system users will attempt to “game” the system by using the technology to behave illegally or in ways that enhance personal advantage at the expense of public safety and efficient system operation. For example, there are concerns with keeping the technology installed in vehicles and elements of roadway infrastructure secure from intrusions: even in the absence of malicious cyberattacks and intrusions, access to signal phasing and timing systems or “insider” knowledge of AV algorithms must be prevented. The participants also explored whether the safety expectations of C/AVs could promote unsafe pedestrian behaviors by giving pedestrians a false sense of security.

Data Sharing – The discussions also identified data sharing as both a risk and an opportunity. While data is essential to planning and operations for the public and private sector, sharing data can be a risk depending on its use, accuracy, and whether the user understands the limitations of the data and uses it appropriately. In addition, there is tension between data access, privacy, safety, and security concerns related to personal information contained in the data. The proprietary nature of private sector data sources also poses a challenge to public agencies that might benefit from access to such data for system management, and to private firms who fear the disclosure of trade secrets or market position as well as exposure to regulation. Agencies suggested it would be beneficial if the private sector (e.g., auto manufacturers, ride sharing companies, and providers of travel navigation apps) could assemble a scrubbed version of data for transportation agencies to use for planning purposes. Still, the allure of data collected in large quantities by the private sector is great. Current data resources used by planning agencies often include public surveys (e.g., household travel surveys, on-board transit surveys, and commercial vehicle surveys). But these surveys are costly and therefore may only be conducted every five to ten years (or even less frequently), and finding other more plentiful and less expensive sources of data is desirable.

Incorporation into Current Planning Process and Decision Making – The significant amount of uncertainty in exactly how C/AV implementation and deployment will occur and its implications for travel behavior and current funding and financing mechanisms makes it challenging for transportation agencies to incorporate C/AVs into long range planning. Travel behavior is likely to be different in ways we do not currently understand. Will we make more trips, longer trips, or trips to destinations different than those we frequent today? What might the cost structure be for C/AV trips? Tools such as scenario planning may help us frame the problems, but they cannot help with the key unknowns. Thus, a significant challenge is how transportation agencies can ensure that today’s investment decisions will remain useful in the future? How can transportation agencies position themselves to ensure future needs are met as land use, travel demand needs, and mode splits change?

The discussions at the joint AASHTO/AMPO workshop closed with the identification of actions transportation agencies can take now to prepare for C/AV technology and of resources to assist

transportation agencies moving forward. Participants concluded that it will be important to have discussions related to the overarching community visions and goals for each region. How do these visions and goals evolve with the introduction of C/AVs and the implications they have for human behavior? How can C/AVs support or impede these visions and goals? Based on these discussions, transportation agencies can identify policies and actions to encourage the positives and discourage the negatives. Although it will be impossible to fully assess the implications, these discussions can help identify critical elements and make near-term decisions that will remain relevant in the face of various possible future developments.

Internally, transportation agencies can conduct self-assessments to identify strengths and gaps related to C/AV implementation and deployment. They can also dedicate staff and restructure organizationally to ensure staff resources are allocated to monitoring status of C/AV technology, coordinating with government and nongovernment stakeholders, and including C/AV discussions in the State and MPO planning process and documents. Transportation agencies can continue to build and strengthen partnerships and become more proactive in areas where their existing core functions, roles, and responsibilities naturally allow them to do so. In this way, they can keep their stakeholders engaged and ensure C/AV technology is visible and effectively addressed on MPO agendas, in the planning process, and MPO products. MPOs can explore the application of C/AV technology in daily business practices and the transportation system, and the question of what technologies can be implemented today to facilitate the transportation system in meeting the needs of transportation system users and best advancing system efficiency and safety. Such decisions are not always grand in scope or scale. For example, applications of C/AV technology in enhancing work zone safety or connecting automated snow plows with detailed infrastructure awareness could improve safety and efficiency in operations and maintenance.

The continued use of scenario planning in transportation planning to explore levers of change and plausible future scenarios was emphasized as a valuable tool. Scenario planning and computer models do not show the future, but can help transportation agencies understand what might happen under various deployment scenarios, the risks associated with those scenarios, and through commonalities between scenarios and the present and future, the importance of specific technological and social developments in moving from the present to the various possible futures. The participants also suggested framing transportation planning in terms of creating access and mobility for people and goods, significantly enhancing mobility to those who have considerable limitations such as the legally blind or paraplegics, creating an environment that can evolve and change as C/AVs are implemented and deployed, and embracing C/AV incrementally as they are deployed, and as the benefits and challenges become clearer.

The participants identified many resource needs to assist MPOs as they incorporate C/AV technology into their planning process and products, including:

- A better understanding of infrastructure investment needs and costs;
- A “C/AV 101” template or toolkit that could be used to educate and share information with stakeholders. Several variations of the template or toolkit will probably be required to target different stakeholder groups, from board members and other decision and policy makers to members of the public, as well as for stakeholders interested in different issue such as cybersecurity or environmental justice;

- A template or framework for inclusion of C/AV considerations into MPO products and investment decisions. The participants suggested identifying key questions and considerations to include as discussion items in the metropolitan transportation plan;
- How to incorporate risk related to C/AV technology into transportation planning and investment decisions. The participants suggested identifying events, milestones, or other factors that can be used to foreshadow the course of future development, or as “triggers,” or leading indicators suggesting what actions should be taken in the planning process, as well as methods to identify strategies or products to manage those risks should certain types of development start to emerge;
- The option to include a shorter horizon for long range planning since the technology is moving quickly;
- Support from the federal government to promote data sharing among the public and private sector (with reasonable safeguards against the unauthorized release of personal or proprietary information) to assist transportation agencies in accessing data for planning and operations;
- Overarching guidance at the federal level that provides flexibility and supports expansion of existing efforts across municipal and state borders and to help facilitate uniform, efficient, and effective C/AV deployment and implementation nationally;
- Sharing of best practices as well as lessons learned among transportation agencies on topics including policies, partnerships, and data;
- Clarifying roles for federal, state, and local agencies and for the private sector in ensuring the safe and efficient operation of the transportation system; and
- Better venue for dialogue and coordination with technology drivers and companies.

This is the second in a series of four whitepapers that will be developed by the AMPO C/AV Working Group over the course of 2017-18. Each of the four whitepapers and related meeting materials will be made available on the AMPO website and can be found at www.ampo.org.