Cooperative Automated Transportation Systems - Observations and Trends

Article #1: State of the Art Review of CAT

Technology, mobility, and societal trends are evolving rapidly, in particular as they relate to transportation. The emergence of automated vehicles, connected vehicles, electrification, and mobility as a service are changing the landscape faster than most state and local DOTs can keep up.

The exchange of information between infrastructure owners/operators (IOOs), private companies, and academic research organizations traditionally occurs through indirect linkages such as professional committee meetings, conferences, and other ad hoc encounters of individuals. However, another more immersive approach for information sharing is the scan tour. {Insert Name, title, organization] along with several State and Local DOT leaders joined a team of experienced agency staff members to visit with private companies, counterparts in other agencies, and research institutions to learn about their experience with new procedures and practices, and exchange that information in depth.

Organized through the National Cooperative Highway Research Program (NCHRP), a panel of state DOT and senior transportation leaders set about the task of capturing recent lessons learned about Cooperative Automated Transportation (CAT) Systems - both domestically and internationally.

Two multi-day trips were conducted in 2019 - in the metropolitan areas of Las Vegas (NV) and Phoenix (AZ). The team began with the premise that we would have great interest in four key issue areas:

1. Partnerships and Coordination
2. Technology and Planning
3. Institutional Issues
4. Data

Early observations confirmed the value of those areas, and emphasized that partnerships represent a broader cross-cutting issue that requires significant emphasis even more than the other topics. It was in Phoenix that our panel first heard the phrase “cooperation is the new competitive advantage,” which has been repeated in other settings since that visit.

In addition to partnerships, the need for more exploration concerning “organizational readiness” for CAT was also uncovered through those initial visits.

Before the panel could begin its next set of tours, the COVID-19 pandemic changed our world and the concept of in-person scan tours was temporarily suspended. Instead, the team continued its fact-finding through a condensed set of periodic virtual meetings - often targeting a specific organization or a topic area.

After executing several virtual sessions since COVID grounded travel, the core topic areas of technology/planning, institutional issues, and data continued to be filled in, and the topic of “people” and “COVID” were more regularly addressed. Many great lessons and ideas were shared during those sessions. For example:

* We don’t have to solve every problem for every scenario - a narrow use case can still produce significant benefits and results.
* Government agencies need to be more specific in identifying their data needs - don’t just ask for everything when approaching a partnership.
* Need to articulate the value provided by CAT - the public has to be comfortable with the technology and see the benefits.

And while partnerships and organizational readiness continued to come through as important cross-cutting issues, a third area of multi-disciplinary emphasis also began to appear: vision

We as a country do not have a national vision for AV. Several industry leaders have previously suggested a comparison to the "moon-shot" mission to land a man on the moon, but through exploration and dialogue our panel observed two big hurdles:

1. Complexity. There are many different stakeholders involved in automating transportation, more than there were for the moon-shot. Hundreds (thousands?) of state, regional, and municipal departments of transportation, transit operating agencies, metropolitan planning agencies (MPO’s), toll agencies, and more make up the public sector. There are likewise hundreds (or more?) of private companies engaged currently in some aspect of developing AV. Many (if not most) have different approaches, business models, and goals. It’s incredibly complex.
2. Scope. There are so many different aspects of transportation that are evolving at the same time, and not always on the same path. Connectivity, automation, electrification, shared mobility - it’s an extremely broad scope of changes all going on, and impacted in different ways depending on the specific use-case you’re looking to explore. When mapped across the complexity of stakeholders - and mixed with ever-changing politics and socio-economic factors - the scope is very difficult to narrow in focus.

In the coming weeks and months our panel will continue its virtual exploration of CAT, while preparing for an eventual return to in-person scan tours. And in an effort to help further disseminate some of the great lessons learned, we will publish additional posts highlighting different aspects of our knowledge gathering activities.

*This article is part of a series covering high level observations and trends that have emerged as part of NCHRP 20-24(128). Future articles will cover topics such as Partnerships, Organizational Readiness for CAT, Data, Technology & Planning, People, and more. The opinions and conclusions expressed or implied are those of the panel members or research agency that performed the research and are not necessarily those of the Transportation Research Board or its sponsoring agencies.*