

# Synthesis of CAT Planning Experiences and Lessons Learned

## A Synthesis of CAT Planning Presentations of the CAT Coalition's Planning Scenarios Working Group

### 1. Introduction

Between November 2019 and July 2021, a combined working group consisting of the CAT Coalition's Planning Scenarios Working Group and the AASHTO Committee on Planning CAT WG met by webinar eight times. During this process, there were multiple presentations and group discussions that specifically addressed how best organizations at the state, regional and local level might plan for Cooperative Automated Transportation (CAT).

This document summarizes the presentations and group discussions where CAT planning was specifically discussed and identifies any common points or recurring themes expressed across the presentations.

This summary is not a recap of all the discussions or activities of this joint working group, as some webinars consisted of other working group business activities or other updates on activities of CAT groups that did not focus on planning. For example, this working group received a briefing and provided input to the FHWA Highway Automation ConOps, received updates on NCHRP CAV activities, was briefed on progress of the National Strategy for Highway Automation and a variety of CAT activities of member agencies. For a full recap of the CAT Planning Scenarios WG activities, all webinar summaries and supporting slide decks are available at the [CAT Coalition Planning Working Group Webpage](#).

### 2. Summary of Key Points or Recurring Themes

Some findings that were either emphasized by the presenters, reinforced by participants, or were noted in multiple presentations include the following:

1. **Scenario planning is an effective tool** when there is uncertainty about the future travel patterns and especially when there are unreliable predictors or when agencies are preparing for multiple potential future scenarios. Given that each of these parameters describes the current status of CAT, scenario planning is recognized as a valuable tool for planners to consider.
2. AMPO has developed a [National Framework for Regional Vehicle Connectivity and Automation Planning](#). A key goal of this framework is to **incorporate vehicle connectivity and automation into metropolitan transportation planning processes** and work to guide its deployment to help meet regional transportation needs and goal.
3. The MetroPlan Orlando [CAV Readiness Plan](#) includes a series of recommendations that could serve as input to other local or statewide planning efforts.
4. **Several tools were mentioned repeatedly as critical to support CAT planning**, including:
  - Simulation;
  - Engagement;
  - Demonstrations (e.g., proving grounds, pilots, etc.); and
  - Integration with real-world use cases.

5. **The importance of data to frame the utilization and impact of automated vehicles** (e.g., data reported by AV industry, data collected by infrastructure providers, etc.) was noted and discussed during multiple presentations. In addition to the critical value data offers, the challenges with getting access to data was also noted. Planning activities may consider emphasizing the need for data and point to efforts by Zenic in encouraging data sharing.
6. **CAT planning in relation to CAT readiness** was discussed multiple times, describing its important role in planning to support readiness activities and that what is learned during readiness preparedness can help support planning efforts.

### 3. Highlights of Planning Presentations and Discussions

#### 3.1 *MnDOT's CAT Scenario Planning*

During the November 2019 webinar, state official Philip Schaffner presented MnDOT's CAT scenario planning. Key points of the presentation included:

- The motivation for MnDOT's CAT scenario planning was that MnDOT had recently completed a CAV Strategic Plan and the CAT scenario planning built upon the findings of the strategic planning effort.
- Phillip noted that traditional forecasting works well when there is high certainty about the future and when past trends are likely to continue. CAV planning typically lacks both the certainty in the future and the understanding of past trends.
- Scenario planning is an effective tool when there is uncertainty about the future travel patterns and especially when there are unreliable predictors or when agencies are preparing for multiple potential future scenarios. Phillip presented a detailed summary of the CAV planning activities that MnDOT completed.

MnDOT's CAV Scenario Planning Report can be found at [this link](#).

#### 3.2 *AMPO Overview and Framework for Regional Vehicle Connectivity and Automation Planning*

During the January 2020 webinar, Bill Keyrouze presented a high-level summary of AMPO and the AMPO technical working groups, including the working group on Vehicle Connectivity and Automation.

- Bill described the effort to create the [National Framework for Regional Vehicle Connectivity and Automation Planning](#). This effort was completed in 2019 and the report is available on-line.
- Key outcomes of this effort include:
  - Input about how to incorporate vehicle connectivity and automation into metropolitan transportation planning processes and how to work to guide CAV deployment to help meet regional transportation needs and goals; and
  - Describing the potential impacts of vehicle connectivity and automation and their implications for the transportation system, its users, and the concept of mobility.

### ***3.3 Orlando MetroPlan CAV Readiness Plan***

During the January 2020 webinar, Eric Hill from the Orlando MetroPlan MPO presented the CAV Readiness Plan that was underway at the time of his presentation. Since the original presentation, the Final CAV Readiness Plan report is available at the Metro Plan website at [this link](#).

- Eric noted that MetroPlan is the MPO for the Orlando area, representing about 2 million residents, but with tourism the population increases to 5 million people on any given day.
- The purpose of the CAV Readiness Study is to assess the region's readiness for the arrival and integration of CAVs. Eric noted that community acceptance was an emphasis of the project. He noted that the outcomes of this project will feed into the long-range transportation plan.
- The published plan includes a series of recommendations for CAV preparedness that are divided into five categories:
  - Planning and Policy Recommendations
  - Infrastructure Guidelines
  - Data Collection and Management
  - Pilot Projects
  - Staffing and Training.

### ***3.4 Dallas / Ft. Worth – Planning for CAVs in Era of Wireless Uncertainty***

Tom Bamonte from the North Central Texas Council of Governments (NCTCOG) presented its efforts to plan for CAVs.

- Tom noted that in this era of uncertainty about communications, the NCTCOG policy board approved a three-part program to include:
  1. ***AV Planning*** – A comprehensive AV Planning process.
  2. ***AV Demonstrations*** – Pilots and tests of AV applications.
  3. ***Use Cases*** – Deployments for use cases not served by AV developers.

### ***3.5 WSDOT CAT Policy Framework***

During the July 2020 webinar, Kyle Miller and Daniela Bremmer updated on the WSDOT CAT Policy Framework.

- Kyle noted that WSDOT has an internal CAT Work Group that reports to the secretary and assistant secretary. In addition, they are positioned to contribute to and benefit from national CAT activities.
- WSDOT started the Policy Framework several years ago and released an early draft document as well as updated versions.
- The overall CAT Policy Framework Development Process was introduced as a four-step process:
  1. **Initiate.** A national scan of best practices and policy examples as well as internal discussions led to identifying eight policy goals.
  2. **Engage.** Between 2019 and April 2020, a series of illustrative strategies and actions were drafted and circulated for comment and additional input. At this point, public private partners were engaged for additional input and informational ranking.

3. Refine. In April 2020, a workshop was hosted to discuss the pre-workshop informational ranking, gather new information on strategies and actions, and develop a comprehensive list of strategies and actions.
4. Prioritize. Between June and December 2020, the strategies and actions will be presented to the Infrastructure and Systems Subcommittee (I&S SC) for ranking and prioritization before being presented to the AV Executive Committee and Washington State Transportation Commission for adoption.

### ***3.6 The Eastern Transportation Corridor (TETC) Planning Activities***

During the July 2020 webinar, Ginna Reeder introduced a planning effort for CAT readiness along the Eastern Transportation Corridor.

- Ginna noted the effort is exploring “How do we know if our infrastructure is ready for AVs”? With funding from FHWA and in partnership with NREL, this effort addressed what state DOTs need to think about and prepare for. The primary topics identified as priority include:
  1. Physical infrastructure and traffic control development
  2. Operations and multimodal
  3. Data and data infrastructure.

### ***3.7 Zenic AV Planning in the UK***

The October 2020 webinar included a presentation from Michael Talbot and Richard Porter on Zenic AV planning for the UK.

- A testbed included six public test environments was described as a tool that allowed organizations to conduct trials on public roads.
- The testbed findings are all connected through data capturing and data sharing.
  - To overcome challenges of sharing AV data, Zenic created a model for data sharing by demonstrating the value possible by the joint effort, and this helped to motivate the sharing of data.
- The importance of data was emphasized. Three areas that are critical to AV planning were described as:
  - Simulation;
  - Proving Grounds; and
  - Real-work operations.Data is at the center of all three and is the key to maintaining interoperability.
- The effort created a Safety Framework, now adopted as a UK standard and now working with government to bring it back in and determine how it will impact legislation re AVs
- Most all projects in recent years include simulation. Noted a challenge with stove piping of simulation. Noted they are trying proof of concept for coordinated simulation.

The presentation and ensuing discussion then focused on the Zenic UK Connected and Automated Mobility Roadmap to 2030, highlighting aspects that include:

- The **benefits of connected and automated vehicles** are identified into four categories:

- Safety and security;
- Productivity;
- Access to transport; and
- Economic growth.
- The **four themes** that the 2030 Roadmap are built around include:
  - Society and people;
  - Vehicles;
  - Infrastructure; and
  - Services.
- A **one-page graphical representation** of a timeline from now to 2030 represents planned/anticipated progress in each of the four themes:
  - 2020-2024 is identified as the “Trials, Development and Enabling” phase;
  - 2024-2026 is identified as the “Transition” phase; and
  - 2026-2030 is identified as the “Scale-up and Realization of Benefits” phase.
- The speakers explained how the roadmap includes approximately **600 relationships** are expected to be formed and that the roadmap simplifies these into summary diagrams of relationships per theme.
- **Major deliverables, key enablers, and critical waypoints** expected during the phases of the roadmap are identified.

Finally, the **roadmap use cases** were presented for freight transport, identifying not only the use case but the anticipate order they are expected, as:

- Improved safety through assistive features – 2019;
- Highway automation – 2025;
- Automated hub-to-hub operation – 2027; and
- End customer unattended delivery – 2030.

The interactive 2030 Roadmap can be accessed online at <https://zenzic.io/roadmap>.

### **3.8 Washington State Scenario Planning for Emerging Technologies**

One of the July 2021 presentations was on the Washington State Transportation Commission (WSTC) Scenario Planning for Emerging Technologies. WSTC’s executive director Reema Griffith and CDM Smith’s Zubair Ghafoor presented the current scenario planning development process underway in Washington State to help understand the impacts of CAVs and other emerging technology trends on potential road usage charge (RUC) data collection.

- Reema provided background on the WSTC. The commission is appointed by the Governor to provide independent and objective guidance on transportation policy and finance to the Governor and Legislature. They also serve as the State Tolling Authority and conduct special studies, as needed.
- Reema described the AV Working Group’s activities to explore approaches to prepare for AVs in the future. Specifically, she noted that there is an expected increase in average mile per gallon (mpg) by 2035 to 35 mpg. With this increase, taxing fuel at the same rate is not a sustainable long-term revenue. She also noted that taxing by the gallon of fuel used has some fairness and equity challenges.

- Zubair Ghafoor presented on the scenario planning model used. The process started with an overall financial model with an established base vehicle miles traveled (VMT). They adjusted the VMT to remove heavy vehicles, adjusted for Covid impacted trips, applied technology effects to arrive at gross revenue estimates. They then adjusted for the costs of collections to arrive at net revenue estimates.
  - Zubair noted that one key question was how to quantify the potential impacts of telecommuting, noting that they addressed this by following a process to estimate the percentage of the workforce expected to continue working from home, post pandemic.
  - Zubair addressed the scenario planning findings related to electrification and AVs. He noted that electric costs are declining as there is a rapid shift to electrification. They averaged two nationally recognized projections to arrive at the projection used in their modeling.
  - Regarding AV, the question is not “if”, but “when”. Zubair reviewed three scenarios and discussed the estimated impacts on VMT:
    - Option A: Privately owned traditional vehicle – current situation with no change in VMT.
    - Option B: Private AV ownership with an estimated 50% increase in VMT.
    - Option C: Shared Mobility with an estimated 75% increase in VMT.Zubair cautioned that the emergence of shared mobility is still evolving and challenging to predict. These three scenarios were applied to the model to determine the financial projections. Zubair explained the process, explaining that scenario planning is trying to capture all plausible options for the future. Reema and Zubair offered these related links with additional details:
    - <https://waroadusagecharge.org/>
    - <https://www.wtp2040andbeyond.com/>