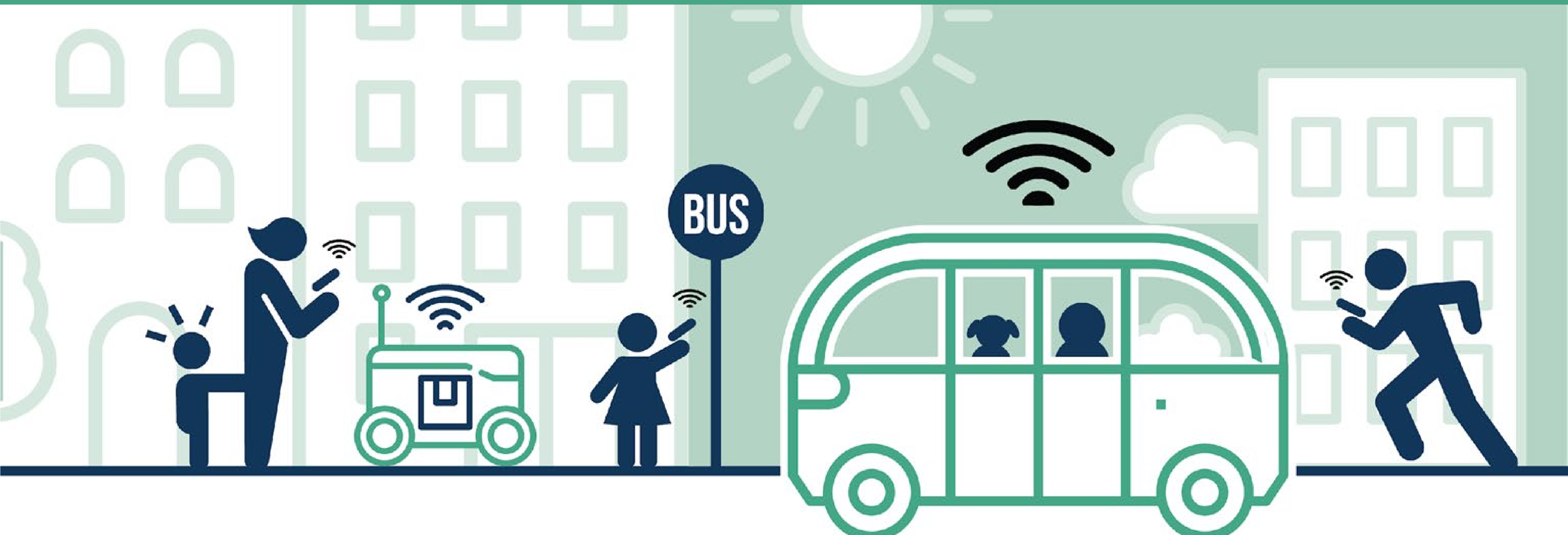




**BALTIMORE
METROPOLITAN
COUNCIL**

Connected and Automated Vehicle (CAV) Integration for Local Governments



CAVs are here now

Over 140 automated vehicle pilots have been completed or are planned across 29 states.¹

Existing Maryland CAV Plans include:

- *MDOT SHA CAV 2021-2025 Implementation Plan*
- *MDTA 2020 Planning for CAV Readiness*
- *MDTA 2018 CAV Strategic Plan*
- *MDOT CAV Toolkit for Local Jurisdictions*



AV shuttle tested at National Harbor, MD (Source: Olli)



AVs tested in parking lots of Odenton and Dorsey MARC stations (Source: MDOT)



Westminster's Autonomous Corridor Project Planning (Source: Magic)



Personal Delivery Devices at Morgan State University (Source: WBAL-TV)

Project Need

Provide guidance on planning for Connected and Automated Vehicles (CAVs) specific to the Baltimore region



Impacts of CAVs



**Best practices in
CAV planning**



**Actionable
recommendations for
local agencies to
prepare**

Stakeholder Input

- Steering Committee meetings, reviews, and input
- Interviews with local, regional, state, and industry partners



Local Role in CAV Planning



Set and enforce traffic laws as permitted by state



Update local street design standards



Update land use plans, codes, and land development regulations



Operate and maintain infrastructure



Update building codes



Proactively prepare for CAV impacts and use public policy to steer adoption to support local goals

New CAV Resources

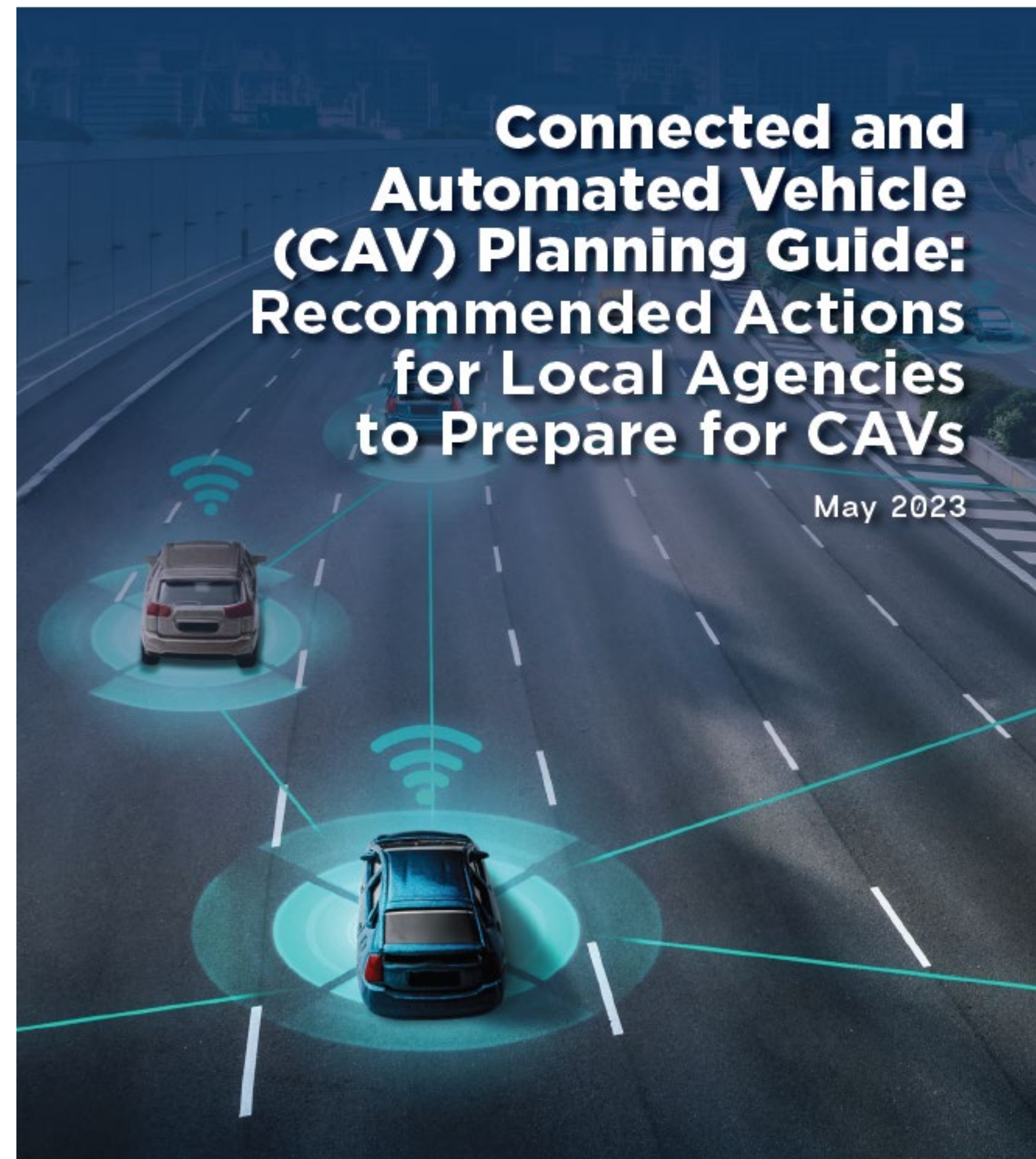
Literature Review

CAV Planning Guide: Recommended Actions for
Local Agencies to Prepare for CAVs

User Guide for CAV Planning

Executive Summary for Leadership

CAV Planning Guide



Available for download on the BMC website:

<https://baltometro.org/transportation/planning-areas/multi-modal-planning/emerging-technologies>



CAV Planning Guide Outline

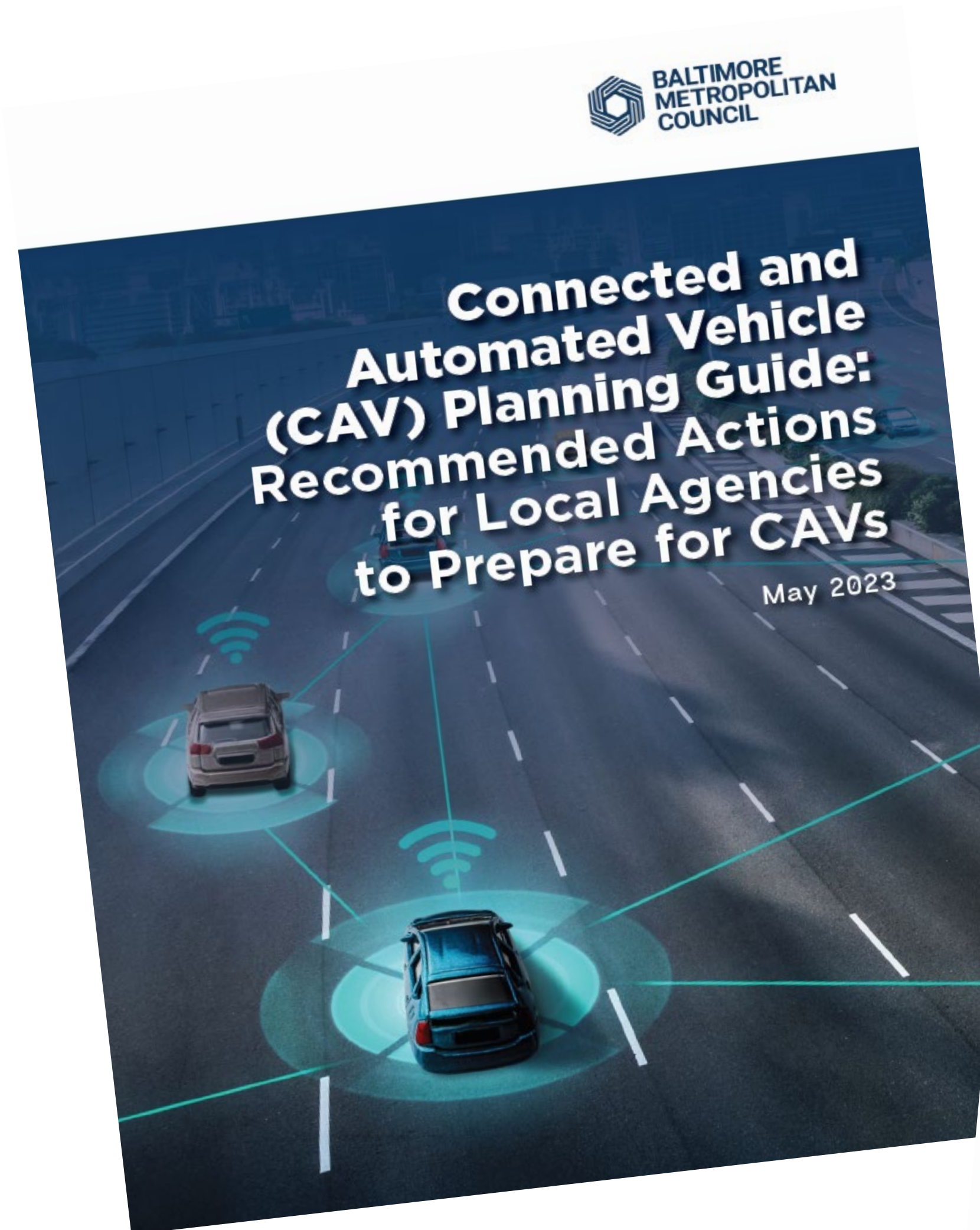
- CAV Definitions
- CAV Impacts
- Roles of Government and Industry in CAV Planning
- Recommended Actions for Local Agencies

Key Near-Term Local Agency Actions

- Coordination
- Safety
- Freight & Goods Delivery
- Organizational Readiness
- Equity & Accessibility
- Planning & Land Use
- Funding, Financing, & Fiscal Health
- Travel & Mobility
- Workforce & Education
- Physical Infrastructure
- Data Privacy & Security

Proactive planning will help agencies maximize the potential benefits of CAV technology and minimize the potential negative impacts.

CAV Planning Guide



Preparing for CAV Impacts on Organizational Readiness

Local jurisdictions can get the expertise they need through training, partnerships, engagement, and organizational changes.

Local policies on emerging technologies need to promote equitable access to technologies so all communities can benefit from CAVs. Policy development should also be flexible to adapt to changes in technology adoption and development. Agencies should proactively plan to continually update policies as we learn more about how CAVs impact our communities.

How can local agencies prepare?

Recommended Actions for Local Agencies

Recommended Actions for Local Agencies	Staff Effort	Timeframe	Local Responsible Organization
Define the agency's vision for emerging technologies relative to agency goals. Set clear priorities and goals for multimodal transportation (like complimentary service for high-capacity transit), micromobility, electrification, broadband, and data management. Agencies should plan for applications of technology, rather than specific technologies, which may change over time.	Medium	Short	Transportation and Planning Departments
Nominate champions among agency management and elected officials who will support funding and decision making (vision, staff allocation, departmental responsibilities).	Medium	Short	All departments
Get a seat at the table and learn by attending the Maryland CAV Working Group meetings.	Low	Short	All departments
Invite diversity of experts to serve on advisory committees (ex: legal, data managers, electric utilities, emergency responders, micromobility vendors, microtransit providers, private developers, and accessible transportation experts).	Low	Short	Planning and Transportation Departments, BMC
Establish inter-office or inter-agency working groups to break down silos and work across offices or departments to share information, data, staff resources, and project updates.	Medium	Short	BMC, Transportation, Public Works, Information Technology (IT), Emergency Responders, Utilities, and Legal Departments
Use memoranda of understanding (MOUs) and other partnership strategies to accelerate technology deployment (like bringing ridehail to rural areas or building a public broadband network).	Medium	Medium	Transportation Department and their partners
Plan for multiple possible future scenarios during long-range planning. Monitor trends on how CAVs are being deployed, adopted, and used to understand regional impacts and which ones align with your goals.	Medium	Medium	BMC and Transportation Department
Facilitate regular meetings with deployers, agency staff, first responders, and community advocacy groups to share concerns and lessons learned. (Ex: City of Baltimore meets weekly with micromobility vendors and holds monthly meetings open to the public).	Medium	Short	BMC and Transportation Department

Where can I learn more?

- ## Where can I learn more?
- [NACTO Blueprint for Autonomous Urbanism, 2nd Edition](#) outlines actions for local agency offices and departments to prepare for CAVs in Section 1.3.
 - [NCHRP Report 924: Foreseeing the Impact of Transformational Technology on Land Use and Transportation](#) provides guidance in Chapter 8 on how to hire or train agency staff and how to form partnerships with other departments or agencies, with the private sector or outside experts, and with educational institutions.
 - [Automated Vehicle Hosting Handbook](#) is a guidebook created by the North Central Texas Council of Governments for their local agencies. See Chapter 4 on building partnerships.
 - Some conferences held in the region to learn more about CAVs include:
 - [Pennsylvania Automated Vehicle Summit](#) held each Fall is the largest annual AV-focused conference in the Northeast.
 - [Transportation Research Board \(TRB\) Annual Meeting](#) brings professionals across the transportation industry together in Washington, DC each January. There are a number of [TRB Committees](#) focused on CAV planning, policy, and integration.
 - Other national conferences include:
 - [Automated Road Transportation Symposium \(ARTS\)](#) is an annual, international conference on CAV research and policy development held each Summer.
 - [ITS World Congress](#) held every other year and the [ITS America Annual Meeting](#) sponsored by ITS America focus on intelligent transportation systems (ITS).
 - [Consumer Electronic Show \(CES\)](#) is the largest technology event in the US and is the home to many industry announcements and technology unveilings each January in Las Vegas.

Organizational Readiness Case Studies

Organizational Readiness Case Studies

City Transportation Technology Policies and Actions. Los Angeles, California developed a [Transportation Technology Strategy](#) that identified goals, policies, and actions for planning for transformational technologies related to data-as-a-service (DaaS), mobility-as-a-service (MaaS), and infrastructure-as-a-service (IaaS). The city identified policies and actions (short-, medium-, or long-term) for each of their goals.

Public-Private Partnership. CAV communications, intelligent roadway infrastructure, and high-speed Internet access. The

Westminster, MD / Ting Public-Private Partnership. CAV communications, intelligent roadway infrastructure, and smartphone mobility apps will rely on cellular communications or high-speed internet access. The Westminster Fiber Network is the Mid-Atlantic's first community-wide gigabit fiber network, creating a competitive local marketplace for Internet services and providing community access to affordable gigabit Internet speeds. The City of Westminster constructs, owns, and maintains the dark fiber network. Under a lease agreement, a private partner (Ting Internet) installs equipment, lights the network, and provides service to customers. Westminster's approach to public-private partnership is detailed in [Successful Strategies for Broadband Public-Private Partnerships](#) and example Request for Proposal (RFP) language for the PPP can be found on the [City of Westminster](#) website.

Examples of Impacts

Impact Area	Opportunities	Challenges
Safety	<ul style="list-style-type: none"> • Faster reaction times than humans • Not distracted, impaired, or drowsy • Additional safety features with low-level automation features like Advanced Driver Assistance Systems 	<ul style="list-style-type: none"> • Crash exposure risks might increase if Vehicles Miles Traveled (VMT) and travel distances increase due to reduced driver stress and value of time • Drivers and other travelers might not understand capabilities and limitations of technology • CAVs might not detect vulnerable road users
Travel & Mobility	<ul style="list-style-type: none"> • Increased roadway capacity and throughput (reduced following distances, harmonized speed, and increased intersection efficiency) • Reduced delay from crashes if crashes decrease 	<ul style="list-style-type: none"> • Potential for reduced capacity if AVs cannot communicate with other vehicles and are more conservative or leave more space between vehicles than human drivers • Traffic and safety risks from unresponsive CAVs in rights-of-way • Increased competition for limited curb space
Equity & Accessibility	<ul style="list-style-type: none"> • Opportunities to meet transportation needs of people who do not drive, people with disabilities and older adults • Increase transit connections by reducing first/last mile costs or increasing accessibility in areas with gaps in the transit network 	<ul style="list-style-type: none"> • Availability and costs of CAVs sufficiently equipped to aid older adults and people with disabilities • Competitions with high-occupancy transit • Service areas may not include underserved communities or have lengthy wait times

Policy Approach

Reactive

No agency
intervention

What does a reactive
scenario look like?

Policy

State or municipal
policy to incentivize
CAVs to meet agency
goals

What are reasonable
policy levers? (CAV
use, land use, etc.)

High-Investment

Public infrastructure
investment to support
CAVs

What are reasonable
investment levers?
(CV communications,
striping, etc.)

Recommended Near-Term Actions



Coordinate with State and BMC



Identify safety partners and define safety goals



Plan for the different needs of automated freight or goods delivery.



Define your agency's vision and nominate a champion



Include equity and accessibility partners in all projects and require service to underserved communities



Integrate CAVs and other emerging technologies into land use and transportation plans, travel demand models, codes, and design manuals



Plan for impacts on local fiscal health



Prioritize multimodal mobility and Complete/Slow Streets



Invest in people and the future of the workforce



Maintain infrastructure in State of Good Repair



Follow industry guidance on data collection, storage, and security

How to use the User Guide

For each topic area, the ***User Guide for CAV Planning*** includes:



The near-term recommendation



Why is the action needed?



Who is the lead agency or department?



A checklist of steps to take action




An editable worksheet to document and track progress

User Guide for CAV Planning



User Guide for Connected and Automated Vehicle (CAV) Planning

May 2023



Organizational Readiness: Coordinate across agencies

This is a cross-cutting overall recommendation. See: Organizational Readiness (Page 18 of the [CAV Planning Guide](#))

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
<p>Monitor and coordinate with Maryland's statewide guidance on CAVs. Coordinate local plans with BMC.</p> <p>Why? For successful sharing of best practices, securing funding, and avoiding siloed localized CAV planning efforts, it is critical to the extent practical to coordinate and align local preparedness actions with existing state guidance.</p> <p>Who? BMC, Transportation and Planning Departments</p>	<ul style="list-style-type: none"> ❑ Review existing State guidance on planning for CAVs ❑ Assign staff to participate in existing meetings to engage the State, BMC, and surrounding jurisdictions. Work with BMC to identify any additional opportunities and resources for collaboration not identified below. Examples of coordination meetings include: <ul style="list-style-type: none"> ❑ CAV Working Group ❑ CAV Emergency Responder Subgroup ❑ CAV Freight Subgroup ❑ CAV Policy Subgroup ❑ CAV Technical Subgroup ❑ Baltimore City Micromobility Committee ❑ Maryland Association of Counties (MACo) 	<p>Key state and BMC guidance to carry forward into local plans:</p> <div style="background-color: #e6f2ff; height: 150px; margin-top: 10px;"></div> <p>List staff who will participate in each meeting:</p> <div style="background-color: #e6f2ff; height: 150px; margin-top: 10px;"></div> <p>Identify industry contacts for additional local CAV planning or deployment meetings (if applicable):</p> <div style="background-color: #e6f2ff; height: 150px; margin-top: 10px;"></div>

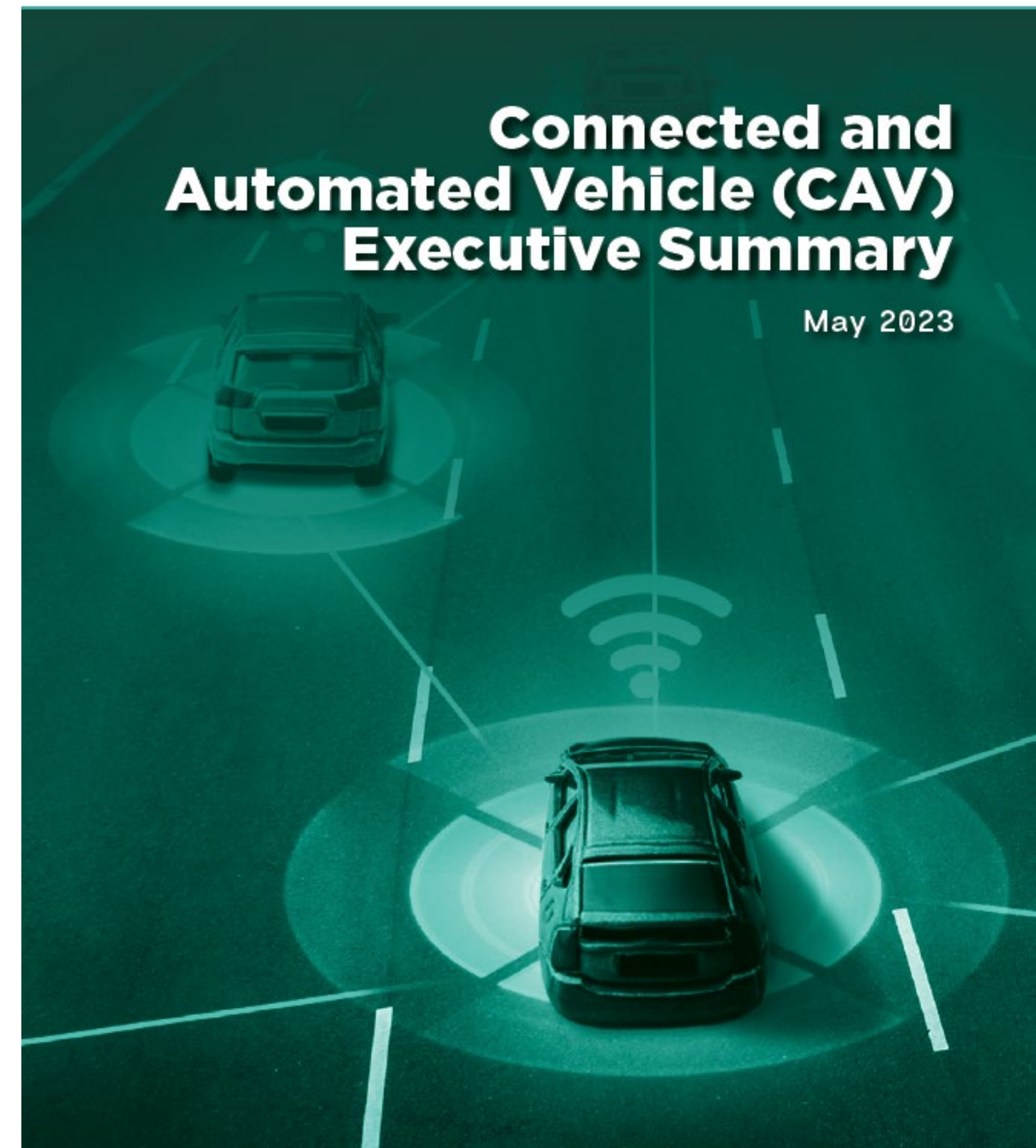
Page 16 provides space for additional notes, if needed.

Page 16 provides space for additional notes, if needed.

Organizational Readiness: Define your agency's vision and goals for emerging technology					
See: Organizational Readiness (Page 18)					
NEAR-TERM RECOM- MENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION			
<p>Define your agency's vision for emerging technologies relative to other agencies and existing state, regional, and local goals. Set clear priorities and goals for safety, efficiency, sustainability, equity, and reliability.</p> <p>Why? Maintain a clear overall vision for the adoption of transportation technology. Lack of clarity can lead to agencies getting distracted by new technological advancements and losing sight of the big picture.</p> <p>Who? Transportation Department</p>	<ul style="list-style-type: none">Define your agency's vision for emerging transportation technologies. Agencies should plan for applications of technology, rather than specific technologies, which may change over time.Set clear priorities and goals for emerging technologies, including safety, efficiency, sustainability, equity, and reliability.Assess alignment of existing plans with goals.	Enter your agency's vision and goals:			
		List potential performance measures and data sources (see Data Privacy and Security step below for additional details):			
		Plan	Aligns	Needs Work	Other
		Comprehensive Land Use Plan	<input type="checkbox"/>	<input type="checkbox"/>	
		Transportation Plan	<input type="checkbox"/>	<input type="checkbox"/>	
Active Transportation Plan	<input type="checkbox"/>	<input type="checkbox"/>			
Other:	<input type="checkbox"/>	<input type="checkbox"/>			

Executive Summary

- High-level talking points for agency staff and decision makers on the region's CAV planning efforts and needs
- Recommendations to proactively prepare for the impacts of CAVs



Where should you begin?



Share the **Executive Summary** with leadership



Read the **CAV Planning Guide**



Use the **User Guide for CAV Planning** to collaborate within your local agencies, BMC, and the State



Join **Maryland CAV Working Group**



Questions?

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BMC Principal Transportation Engineer

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Scan QR with
smartphone camera to
access documents

