MARYLAND DEPARTMENT OF TRANSPORTATION

Welcome!

MARYLAND CONNECTED & AUTOMATED VEHICLES WORKING GROUP

December 8, 2022

WORKING GROUP LEADERSHIP

Maryland CAV Working Group Co-Chairs

Chrissy Nizer
Administrator
MDOT MVA

Jim Ports
Secretary
MDOT

MARYLAND CONNECTED

& AUTOMATED VEHICLES

CAV.mdot.Maryland.gov

Maryland Transportation Authority

Maryland CAV Working Group

December 8, 2022

William Pines, P.E.

Executive Director

MD CAV Working Group

2022 CAV Accomplishments in Maryland

MDTA

Traditional Toll Plaza

Mixed Use Toll Plaza

All Electronic Toll Plaza

MDTA

https://mdta.maryland.gov/About/Strategic_Plans.html

- Adopted CAV Plan in October 2018
- Vision: MDTA will support a framework for CAV transformative technologies to improve customer experience and provide access to safe and reliable transportation solutions.
- Goals:
  - Maximizing customer experience with the latest vehicle technology.
  - Improving safety and travel time reliability.
  - Seeking opportunities to partner with technology providers and automakers.
  - Preparing the MDTA workforce for the technology of the future.
  - Communicating with customers on the use of CAV technologies on MDTA facilities.

MDTA

https://mdta.maryland.gov/About/Strategic_Plans.html

MDTA

CAV futures cannot be described as a singular outcome but rather in terms of use case scenarios.

Data show that there are roughly 20 top skills/specific jobs in high demand related to CAV technology

Milestones do not yet exist in the CAV sphere for this analysis to rely upon

Though CAV technologies may still be emerging, job opportunities are available now

Skill sets MDTA may need to add to its workforce in the near future could be achieved by upskilling current employees, through new hires or contract support.

Maryland Transportation Authority

https://mdta.maryland.gov/

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Save up to 77% on every trip

https://www.driveezmd.com/

Thank you

MDOT STATE HIGHWAY ADMINISTRATION

Tim Smith, PE
Administrator
Maryland Department of Transportation
State Highway Administration

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STATE HIGHWAY ADMINISTRATION

Maryland CAV Working Group

December 8, 2022

Tim Smith, PE
MDOT SHA Administrator

How MDOT SHA Established the CAV Program

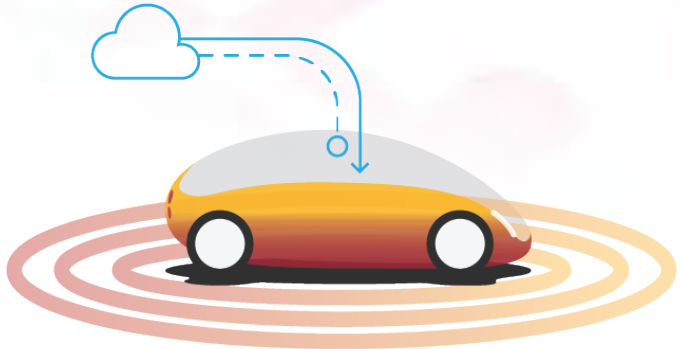
2015-2017

BREAKING NEWS!

New CAV Program Manager

MDOT STATE HIGHWAY ADMINISTRATION

2019



Broad agency integration of CAV

2022

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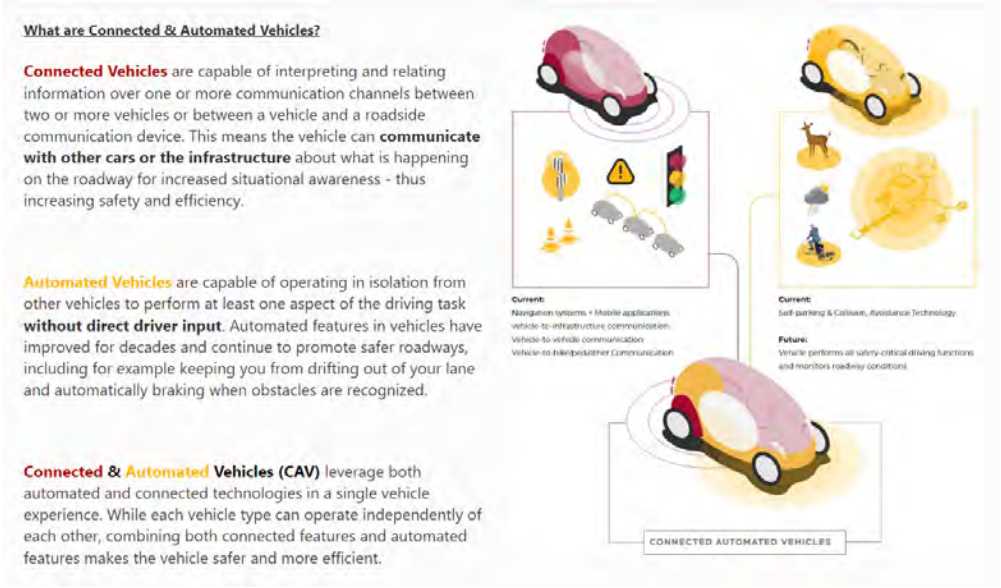
Internal MDOT SHA Staff Resources

- Lunch & Learns annually since 2019
- CAV 101 Training Module on our Online Training Center
- Internal website with resources, definitions, meeting minutes, presentations, recommended standards and other helpful tools



What are Connected & Automated Vehicles?

Connected Vehicles are capable of interpreting and relating information over one or more communication channels between two or more vehicles or between a vehicle and a roadside communication device. This means the vehicle can **communicate with other cars or the infrastructure** about what is happening on the roadway for increased situational awareness - thus increasing safety and efficiency.

Automated Vehicles are capable of operating in isolation from other vehicles to perform at least one aspect of the driving task **without direct driver input**. Automated features in vehicles have improved for decades and continue to promote safer roadways, including for example keeping you from drifting out of your lane and automatically braking when obstacles are recognized.

Connected & Automated Vehicles (CAV) leverage both automated and connected technologies in a single vehicle experience. While each vehicle type can operate independently of each other, combining both connected features and automated features makes the vehicle safer and more efficient.

Current:
Navigation systems + Mobile applications
Vehicle-to-infrastructure communication
Vehicle-to-vehicle communication
Vehicle-to-pedestrian Communication

Current:
Self-parking & Collision, Avoidance Technology

Future:
Vehicle performs all safety-critical driving functions and monitors roadway conditions

CONNECTED AUTOMATED VEHICLES

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Impacts to Maintenance Workforce

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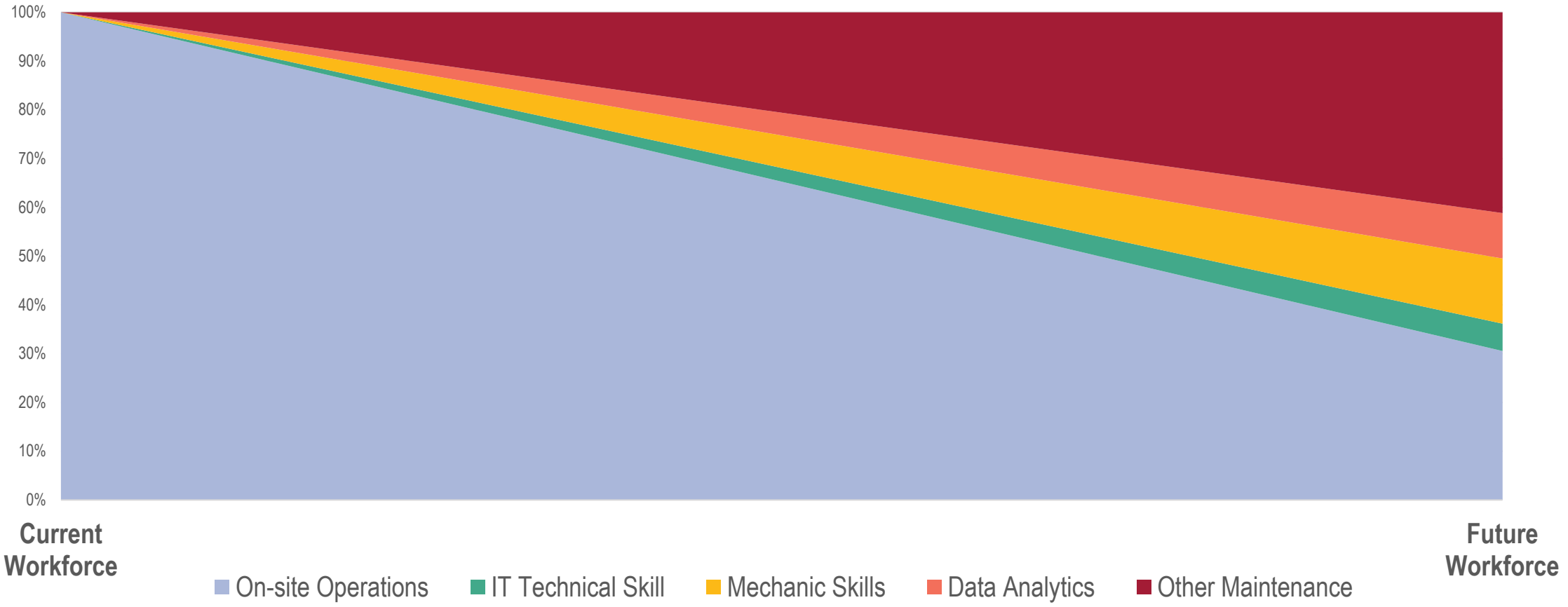
Impacts to Maintenance Workforce



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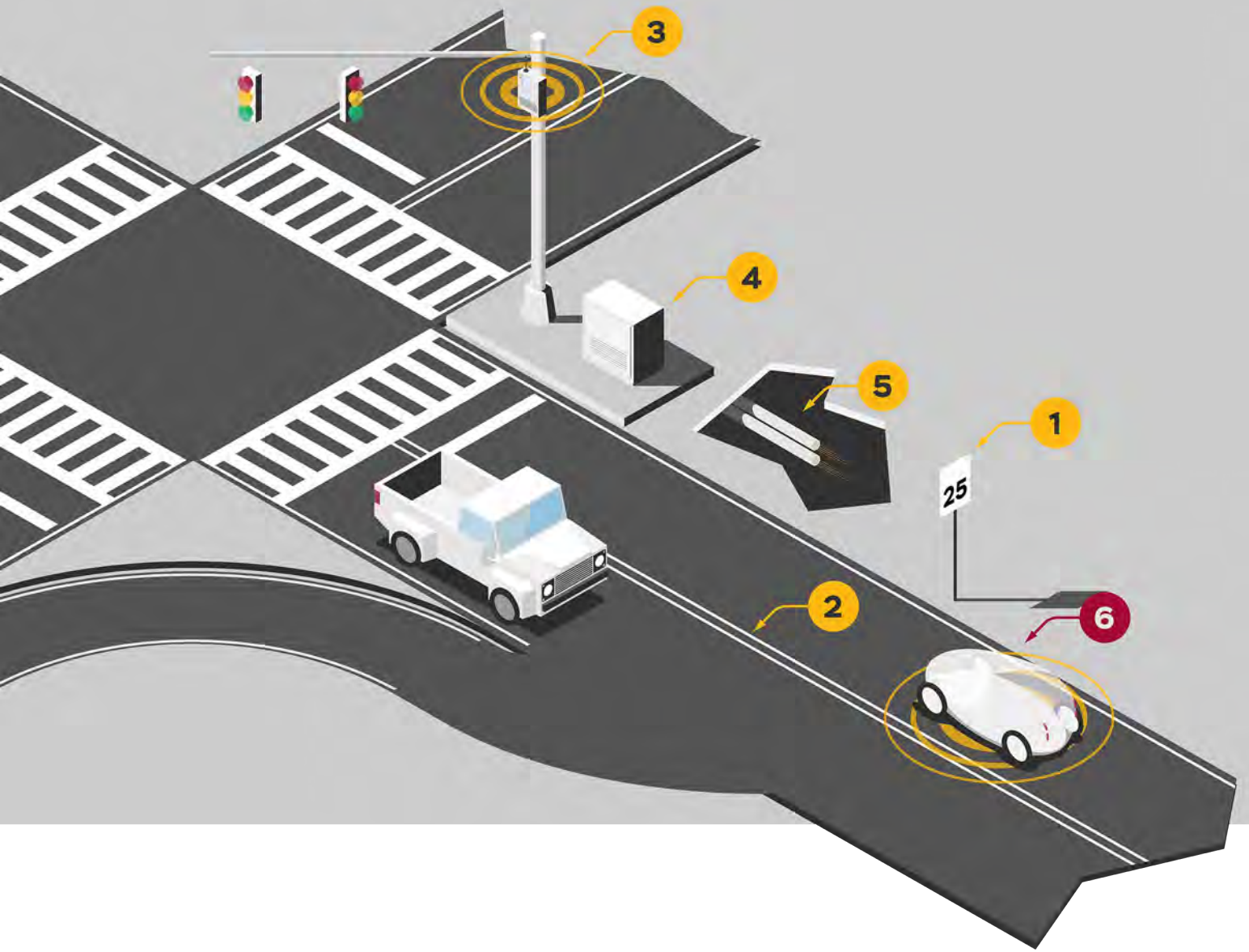
Asset Management & Maintenance



1 2 TRAFFIC CONTROL DEVICES IN GOOD CONDITION

3 RSU ONLINE AND BROADCASTING

4 TRAFFIC CABINET EQUIPMENT MAINTAINED

5 COMMUNICATIONS INFRASTRUCTURE MAINTAINED

6 **CAVs BROADCASTING PAVEMENT CONDITIONS**

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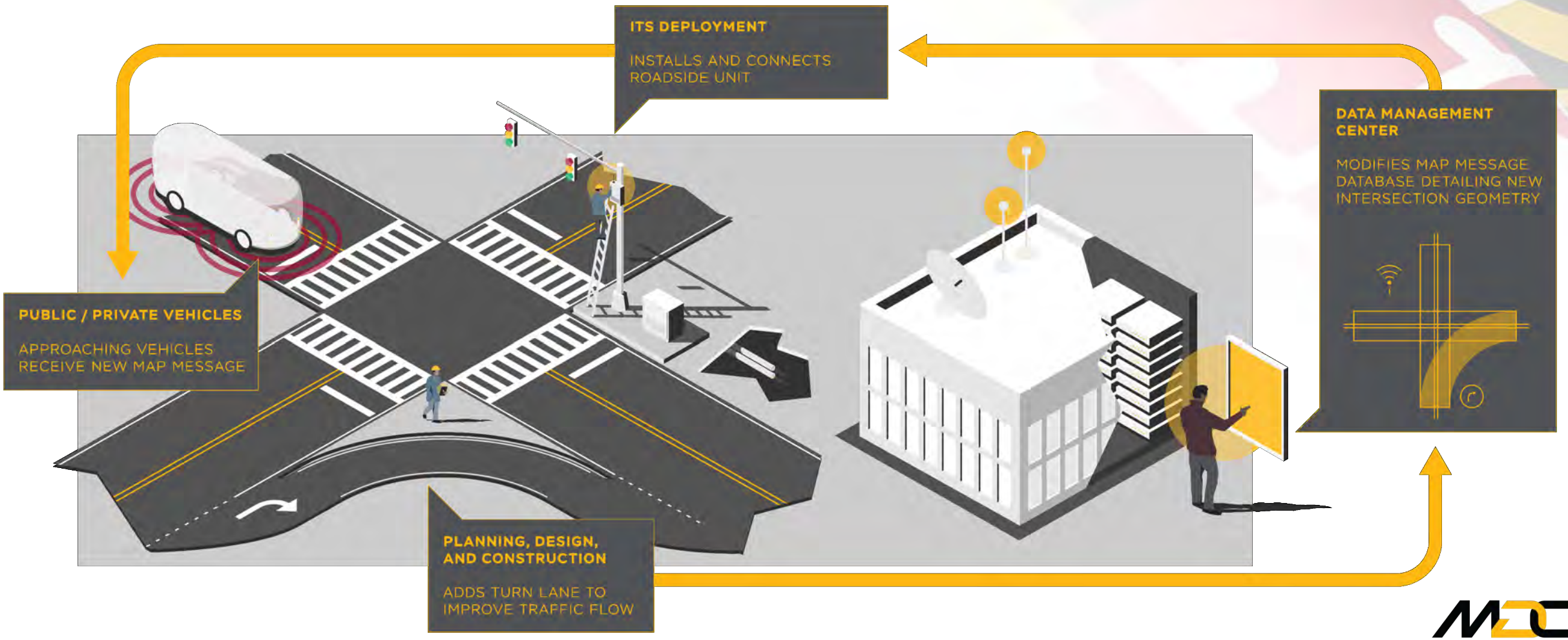
Example Change to Work Flow



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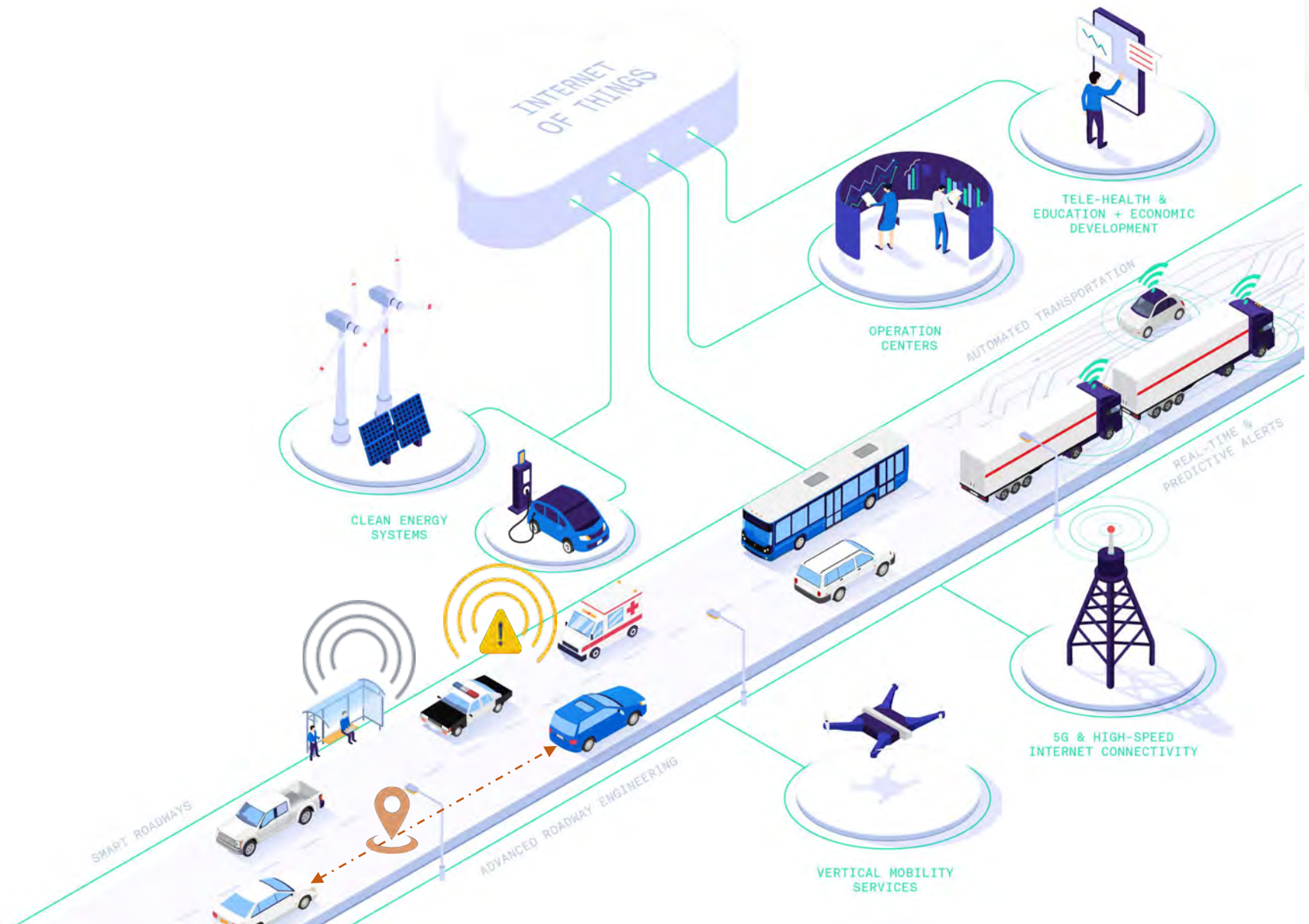
Digital Infrastructure



WZDx
WORK ZONE DATA EXCHANGE

MDOT
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STATE HIGHWAY ADMINISTRATION

HOMELAND SECURITY PREPAREDNESS

WORK ZONE MANAGEMENT

TRAFFIC INCIDENT MANAGEMENT

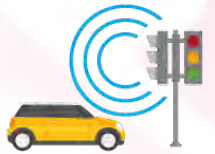
ELECTRONIC PAYMENT/ TOLL COLLECTION

TRANSIT PRIORITY/ INTEGRATION

EMERGENCY RESPONSE

FREIGHT MANAGEMENT

TRAFFIC SIGNAL COORDINATION



FREEWAY/ ARTERIAL MANAGEMENT

TSMO

MARYLAND TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

CONNECTED AND AUTOMATED VEHICLE (CAV) TECHNOLOGY

ROADWAY WEATHER MANAGEMENT

MAINTENANCE FLEET MANAGEMENT

OPERATIONS

PLANNING

PERFORMANCE MEASURES

COMMUNICATIONS

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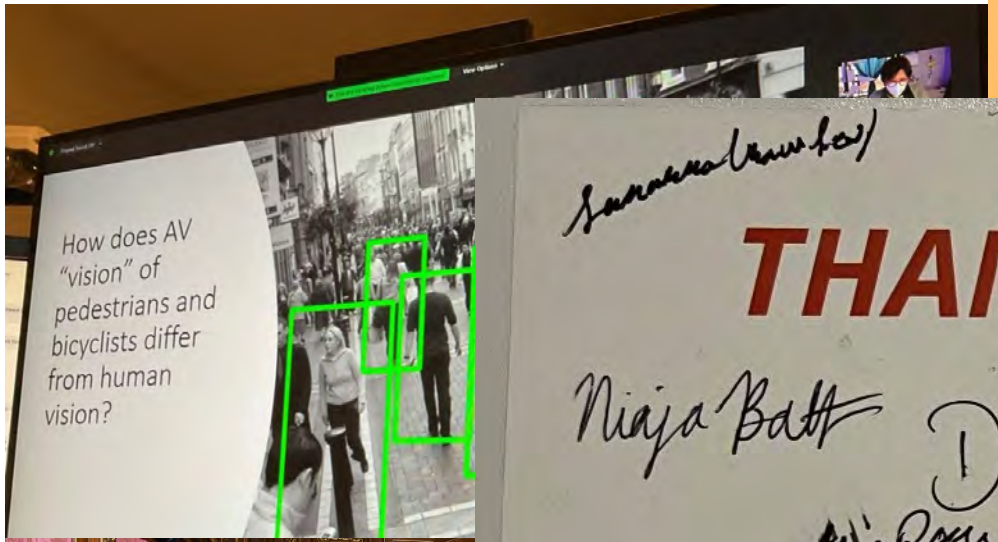
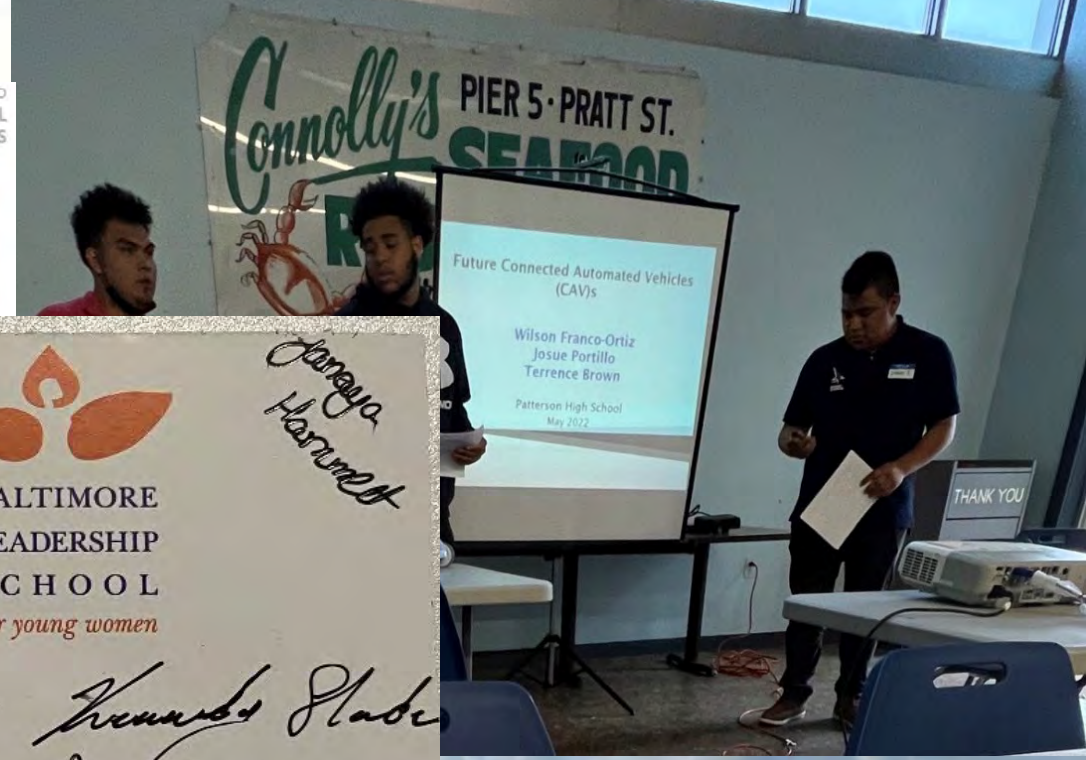
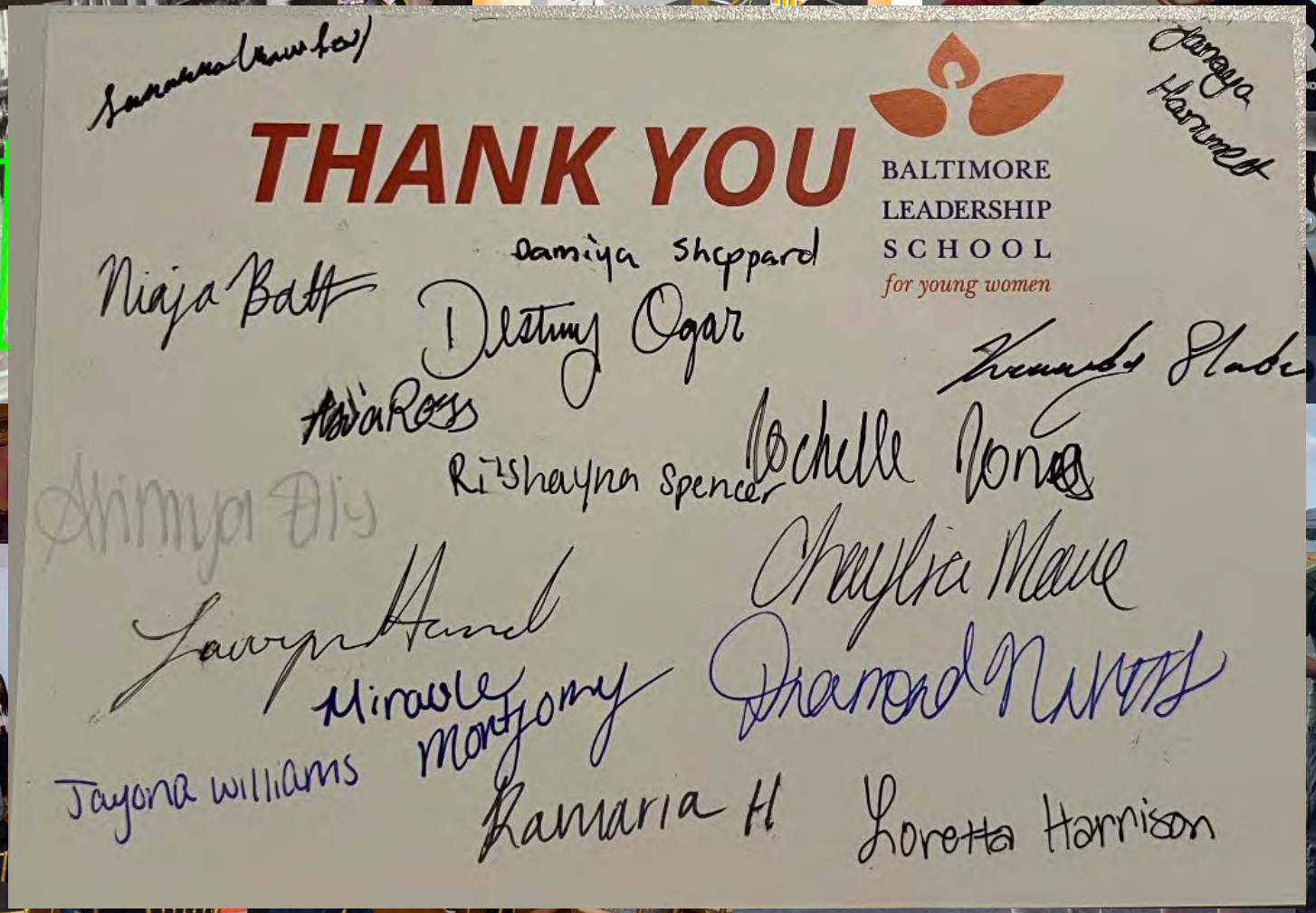
STEM Outreach







Human Centric Design

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MDOT SHA Updates

- MDOT SHA (and technically MDTA) roadway closure feeds due to preplanned work zones are now officially adopted by the USDOT's WZDx
- Freight Data Exchange
- Freight AV Implementation Plan
- Inclusion of truck platooning algorithms in No Build and Future Alternatives Analysis

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Thank You.

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LIGHTNING ROUND

MD CAV Expressions of Interest

- DMI
- May Mobility
- Workhorse Group

DOE VECTOR PROJECT

Vision-based V2X communication that translates data into dynamic barcode on vehicle (alternative to DSRC & CV2X)

- ***Xianfeng (Terry) Yang, Ph.D.,*** Assistant Professor, Department of Civil and Environmental Engineering, University of Maryland College Park
- ***Tolga Ercan, PhD, PE***, Connected Wise LLC, Co-Founder & ITS Project Manager, Orlando FL
- ***Xiaopeng (Shaw) Li, Ph.D.,*** Associate Professor, Department of Civil and Environmental Engineering, University of Wisconsin, Madison

CAV & WORKFORCE – WHAT DO WE EXPECT FOR THE FUTURE WORKFORCE IN THE CAV ECOSPACE & HOW CAN WE PREPARE?

- Beverly Thompson Kuhn, Texas A&M Transportation Institute
- Thomas H. Jacobs, University of Maryland Center for Advanced Transportation Technology
- Jackie Beckwith, Stantec
- Chris MacLarion, Maryland Department of Labor
- Jennifer Griffin, Maryland State Department of Education

Ideas for Workforce Preparation

Ideas for Workforce Prep: Question Posed to Registrants for CAV WG Meeting 8 Dec 22	
Name of Organization	**How is your organization engaged to prepare for workforce changes in the CAV ecospace?**
AARP	AARP is building educational programs for older drivers to be aware of and comfortable using vehicles equipped with the latest safety technology.
Anne Arundel County	We will need to build internal staff knowledge/competence in relevant traffic signal/sign/marking infrastructure design, hardware, and maintenance.
Baltimore Metropolitan Council	that is a question we are considering in our current CAV project looking at how local jurisdictions and our agency should prepare for CAVs
Chesapeake Region Safety Council	As a National Safety Council Chapter, responsible for Maryland and surrounding states in our assigned territory, we are committed to sharing CAV info with our members and participating organizations.
Connected Wise LLC	As an R&D company in cutting-edge transportation technology development, Connected Wise has been developing vision based communication tools for CAVs in challenging environments.
Dimensional Products, Inc	We are a supplier of roadside hardware and are interested in technology to better help autos communicate with workzones
DMI	Our Automotive Division at DMI has been at the forefront of this tech change and have built up a team prepared to take on the CAV challenges. There is more to do and the war for talent is very real.
Gannett Fleming	We are positioned to support DOTs in their planning and implementation of CAV policies, pilots, and installations
Hunter Engineering Company	Hunter Design, manufactures and offer ADAS training and calibration equipment necessary to align and calibrate both static and dynamic ADAS systems.
IT CURVES	Our driver network is engaged with connected vehicle technology and understands the need for reasonable dispatch assistance for management on the road logistics, as a lacking workforce.
JHU/APL	Working to assure all autonomous operations
JMT	We currently participate in various workforce efforts with colleges and universities as well as engaging young people as part of STEM-related initiatives.
Johns Hopkins Institute for Assured Autonomy	As a University, we are focused on how to help train and educate the workforce for the changes that CAV will bring.
Juxtopia	Training underserved and disadvantaged youth in STEM skills to create CAV related Maryland companies.
Kimley-Horn	Actively training new and junior staff and investing in senior staff to participate in CAV activities and forums to have better understanding of changes and development in this emerging field.

Where do we go from here?

Ideas for Workforce Prep: Question Posed to Registrants for CAV WG Meeting 8 Dec 22	
Name of Organization	**How is your organization engaged to prepare for workforce changes in the CAV ecospace?**
Maryland Department Of Disabilities	Helping to encourage and shape policies to include people with disabilities, and the older age communities
Maryland Department of Labor	we would welcome the opportunity to support training efforts through Registered Apprenticeship and other workforce development strategies
Maryland Department of Transportation	MDOT is currently conducting seminars and lunch and learns to show the workforce the possibilities.
Maryland State Department of Education	Communicating innovative CAV ideas to local transportiaton directors in each public school system.
Maryland State Police	Law Enforcement
Maryland Transportation Authority	We started a CAV working group back in 2015 and it continues to expand today.
May Mobility	As we pursue collaborative workforce planning with local transit agencies, we are already seeing positive impact with our programs hiring and training workers to supervise, manage and maintain our fleets
May Mobility	May Mobility brings job opportunities to each local community that we deploy in. When we prepare for the opening of programs we staff our operations with local personnel, helping to promote to the communities that we do business in.
MDOT SHA	MDOT SHA as with all MDOT TBUs is continuing to adjust job specifications. We are also continuing to evaluate opportunities for increased training in the CAV ecospace at all levels of the organization.
MDOT SHA	We want to get our workforce prepared for CAV under the direction of TSO.
MDOT SHA Office of Policy and Research	At the Office of Policy and Research we are ready to embark in research projects involving all things CAV related.
MVA MHSO	Fleet changing to updated vehicles
Profile Partners in support of U.S. Army Research Lab	Internships, STEM events
Red Hat	Red Hat helps Governments address workforce challenges by implementing automation and advanced technology where possible
University of Maryland	Supporting CAV research initiatives to identify potential impacts on local, regional, state, and national workforces.
University of Maryland UAS Research and Operations Center(UROC)	I am attending this event to help define ways to engage us for the near-term future. We want CAV and MDOT informed with the effort we are leading in Southern Maryland that will ultimately affect the Chesapeake Bay area and ultimately the state of Maryland!

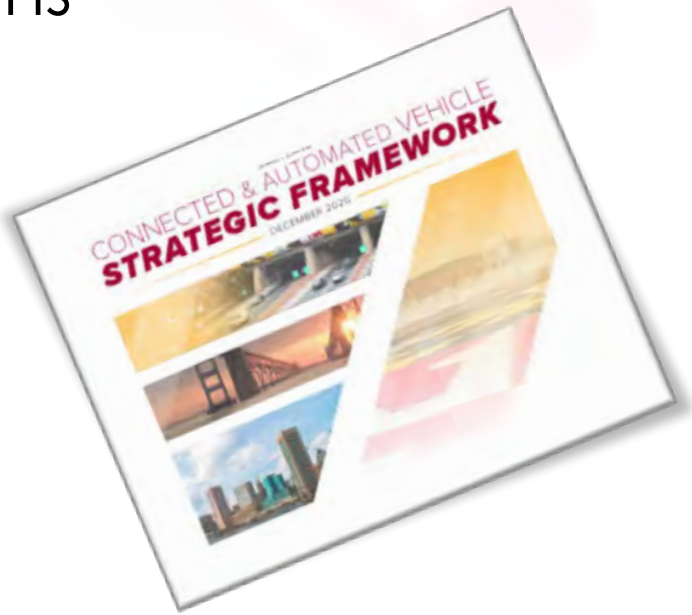
BRIEF CAV UPDATES

CAV Subgroups

- Policy Subgroup
- Emergency Responders Subgroup
- Tech Subgroup
- Freight Subgroup

BRIEF CAV UPDATES – PARTNER ANNOUNCEMENTS

- Industry
- Academic
- Regional / National Organizations / Associations
- Government
  - Surrounding States
  - Local government
  - State government
  - Federal partners



CAV Demonstrations: 3:15 pm to 4:00 pm

- **DOE Vector Project**: Vision-based V2X communication that translates data into dynamic barcode on vehicle (alternative to DSRC & CV2X)
- **AASHTO CAV program**: implementing CAV lesson plans for middle and high school students
- Zupnik Hall @ University of Maryland and including the new 3,000 square foot **Connected Autonomous Vehicle Lab**
- **Showcase Tables**
  - Maryland Department of Labor
  - DMI
  - May Mobility