

# National Developments in Cooperative Automated Transportation

**Preparing for AV requires a  
CAT perspective**

Roger Millar, Secretary  
Washington State Department of Transportation

Washington State Transportation Commission Meeting  
July 15, 2020

# Presentation Overview

## 1. The CAT vs AV Perspective

## 2. CAT Policy Development in WA state

## 3. National CAT Initiatives

### ➤ **CAT Coalition** (AASHTO, ITE and ITS America) with USDOT&FHWA

- Organization/Structure
- CAT Guiding Principles for Infrastructure Owners & Operators (IOOs)

### ➤ **ITS America**

- Fast Act Reauthorization Platform and Recommendation's
- MOD Alliance – Advancing Seamless Mobility in the United States

### ➤ **Mobility Data Specification**

## 4. How Other States and Local Agencies are Preparing

# Presentation Overview

## 5. How WSDOT is Preparing

- WSDOT and Increasing Telework
- WSDOT Mobility on Demand
- Public Records Act Study
- Automated Shuttles
- Active Transportation
- Broadband Accommodation
- Automated Enforcement
- Roadway Striping and Pavement Markings
- Connected Traffic Signals
- Automated Work Zone Safety and Data Partnerships
- Electric Vehicle Charging Infrastructure

## 6. Conclusion

# How Does AV Relate to CAT?

# What is a Connected Automated Vehicle?

## Connected Vehicle

Communicates with nearby vehicles and infrastructure; Not automated



**Connected Automated Vehicle**  
Leverages autonomous automated and connected vehicles



## Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



# What is Cooperative Automated Transportation (CAT)?

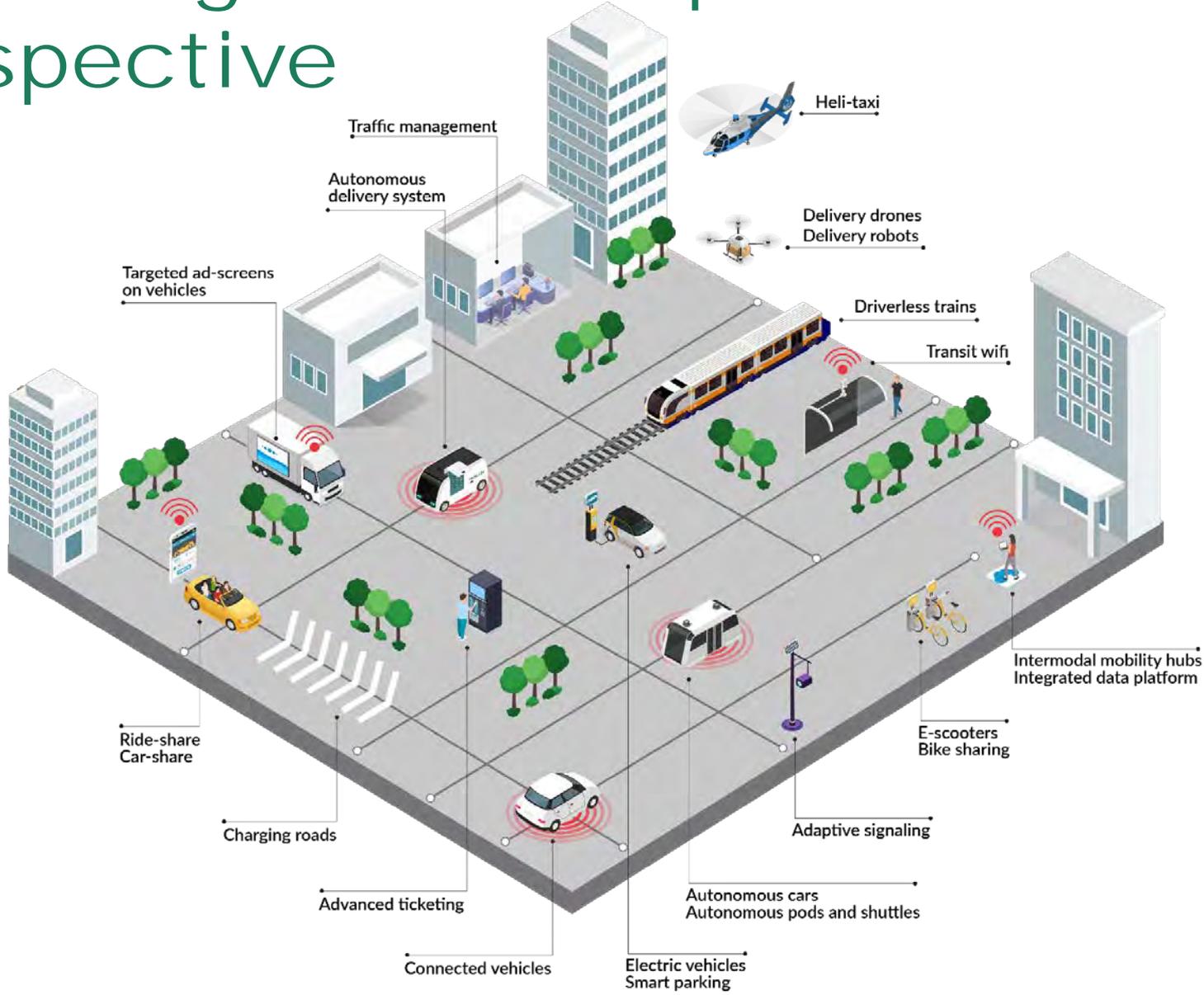
**Cooperative:** Deploying technology to encourage all modes of transportation to work in concert

**Automated:** Automating functions (*traffic management systems, fare collection, trip planning and scheduling, etc.*)

**or access to various vehicle types** (*automobile, van, plane, truck, bus, rail, ferry, bicycle, scooter, etc.*)

**Transportation:** The entire transportation system working together (*vehicles, infrastructure, modes, services, etc.*)

# Preparing for AV requires a CAT Perspective



# CAT Policy Development in Washington state

# 8 CAT Policy Goals Endorsed by the WSTC in October 2019

- #1 Organize for Innovation:** Enable organizational change that empowers officials to be flexible, accelerate decision-making, and adapt to changing technology.
- #2 Shared Mobility:** Encourage and incentivize shared mobility, including an emphasis on high occupancy and shared modes for moving people and goods.
- #3 Economic Vitality and Livability:** Create resilient and efficient regional networks and empower local agencies to create resilient, multimodal local networks.
- #4 Infrastructure and Context Sensitive Street Design:** Promote durable, physical and digital networks that accommodate the movement of people and goods in ways that are appropriate for the context.
- #5 Land Use:** Encourage land use development patterns that support multimodal connectivity to efficient local and regional networks.
- #6 Equity:** Work with marginalized communities to increase access to desirable mobility options.
- #7 Safety:** Increase the safety of transportation systems and infrastructure to support the safe movement of people and goods.
- #8 Environment:** Reduce the local and cumulative environmental impacts of mobility to improve air and water quality, energy conservation and mitigate climate change.

# Using the 8 CAT Policy Goals as the Framework for Action



## AV Work Group Executive Committee

- Governor
  - Four members from Senate
  - Four members from House
  - Insurance Commissioner
  - DOL Director
  - WSDOT Secretary
  - WSP Chief
  - Traffic Safety Commission Director
  - State Chief Information Officer
  - Transportation Commission Member
- Government and Private Sector Representatives from:
- Data, Technology & AV Testing
  - Shared, Electric, TNC & Transit
  - Automakers
  - Local Governments
  - Consumers/Traveling Public
  - Environment
  - Academic
  - Underrepresented Communities
  - Freight
  - Labor

## Subcommittees

### Licensing

2 Co-Chairs  
DOL Support  
Lead

### Safety

2 Co-Chairs  
WTSC and WSP  
Support Lead

### Infrastructure & Systems

2 Co-Chairs  
WSDOT Support  
Lead

### System Tech & Data Security

2 Co-Chairs  
State CIO  
Support Lead

### Liability

2 Co-Chairs  
Insurance  
Comm. Support  
Lead

### Health & Equity

2 Co-Chairs  
DOH Support  
Lead

### Workforce

2 Co-Chairs  
ESD and L&I  
Support Lead

# National CAT Initiatives

# CAT Coalition

# CAT Coalition

## AASHTO, USDOT, ITE, ITS America

### Purpose and Membership

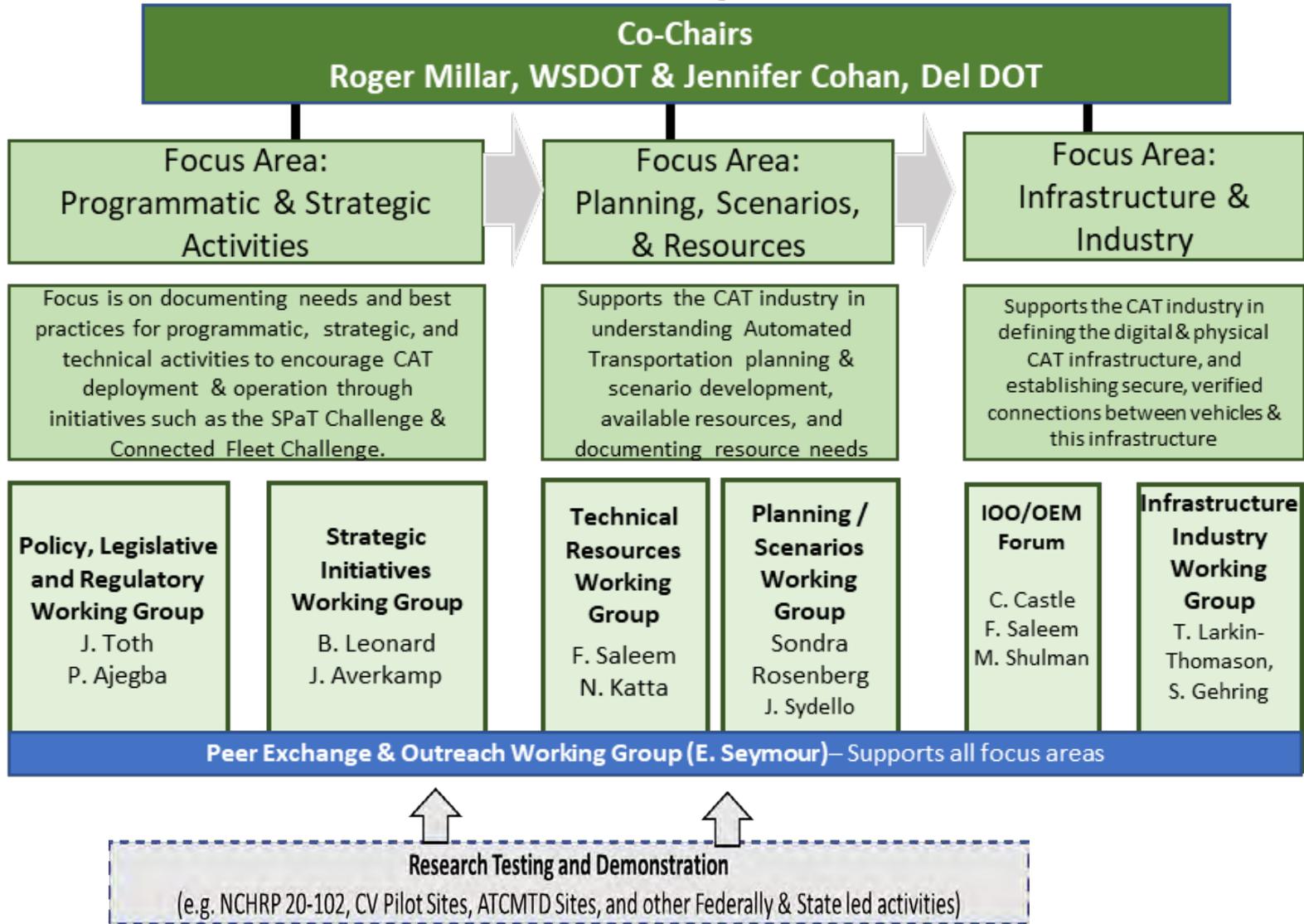
---

Joint Cooperative Effort between USDOT and AASHTO, ITE and ITS America

Formed to serve as a collaborative focal point for federal, state and local government officials, academia, industry and their related associations to address critical program and technical issues associated with the nationwide deployment of CVs and AVs.

Coalition membership includes representation from infrastructure owners and operators (IOOs), original equipment manufacturers (OEMs), technology and service providers, academic researchers, consultants, and internet of things (IOT) suppliers.

# CAT Coalition – Organization



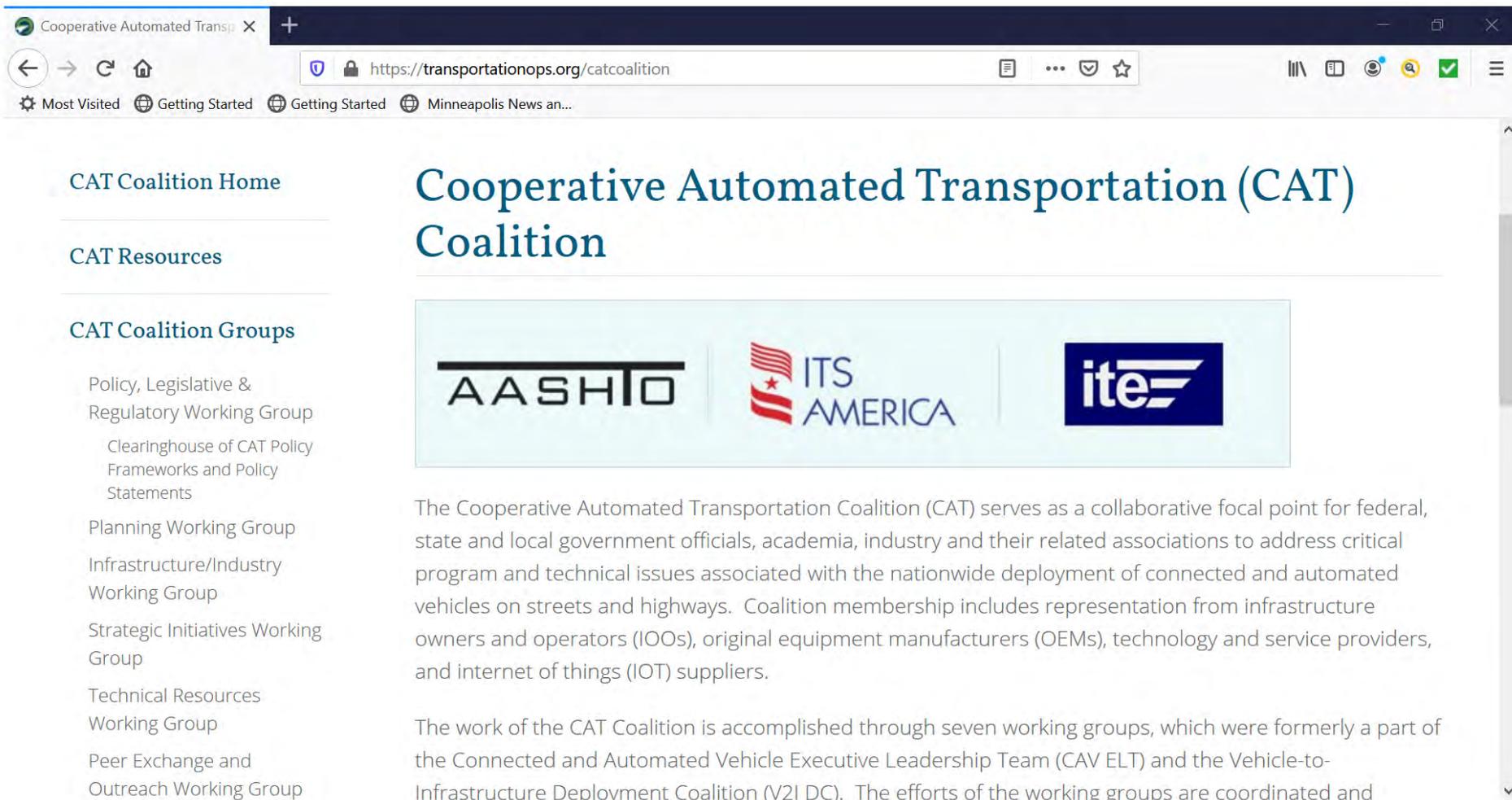
# CAT Coalition: Phase 2 Year 2 Accomplishments Overview

## Examples:

- Supported initiation of the National Strategy on Highway Automation
- Ongoing support of SPaT Challenge / Fleet Challenge
- Supported a dialogue regarding the wireless spectrum
- Helped members understand and benefit from USDOT activities and deliverables
- Expanded coalition membership (500+ members)
- MaaS/MOD Introduction (across all working groups)
- Clearinghouse of CAT policy frameworks

# CAT Coalition Online: Resource

<http://www.transportationops.org/catcoalition>



Cooperative Automated Transportation (CAT) Coalition

**AASHTO** **ITS AMERICA** **ite**

The Cooperative Automated Transportation Coalition (CAT) serves as a collaborative focal point for federal, state and local government officials, academia, industry and their related associations to address critical program and technical issues associated with the nationwide deployment of connected and automated vehicles on streets and highways. Coalition membership includes representation from infrastructure owners and operators (IOOs), original equipment manufacturers (OEMs), technology and service providers, and internet of things (IOT) suppliers.

The work of the CAT Coalition is accomplished through seven working groups, which were formerly a part of the Connected and Automated Vehicle Executive Leadership Team (CAV ELT) and the Vehicle-to-Infrastructure Deployment Coalition (V2I DC). The efforts of the working groups are coordinated and



# Infrastructure Owner Operators' Guiding Principles for Connected Infrastructure Supporting Cooperative Automated Transportation (AASHTO, ITE, ITS America)

**GP1—Automation:** Support increased vehicle automation to improve traveler safety, mobility, equity, and efficiency.

**GP2—Data:** Achieve a connected vehicle ecosystem that enables reliable, secure V2I data exchanges in order to support cooperative automated transportation to improve traveler safety, mobility, equity, and efficiency.

**GP3—Telecommunications:** Protect and utilize the 5.9 Gigahertz (GHz) spectrum designated for “operations related to the improvement of traffic flow, traffic safety, and other intelligent transportation service applications.” (FCC)

**GP4—Operations:** Develop CAT strategies that enhance existing transportation system operational capabilities to improve traveler safety, mobility, equity, and efficiency.

**GP5—Collaboration:** Collaborate and communicate with OEMs and mobility service providers in the planning, testing, and demonstrations of CAT applications to support eventual interoperability and to achieve positive impacts.

# New Supporting Technical Concepts Document

- **Overview of CAT** (Stakeholders and Their Objectives, Applicable Modes, Vehicle Automation, Roadway Automation, Technology and Communications, Applications)
- **IOO Guiding Principles (GP) for CAT Infrastructure**
  - The Need and Basis for GPs
  - Objective of the GPs
  - GPs and Concepts (Automation, Data, Telecommunications, Operations, Collaboration)
- **Applying the CAT Infrastructure GPs**
  - CAT and IOO Processes
  - Preparing for CAT Infrastructure
  - Future Efforts



<https://systemoperations.transportation.org/iao-guiding-principles-for-cat/>

# ITS America: FAST ACT Reauthorization Policy Platform

# ITS America Board Members

**Public, Private, Academic, Associations, Consultants across the Nation**

AAA, AECOM, Arizona Department of Transportation, California State Transportation Agency, California PATH University of California Berkeley, Central Ohio Transit Authority, Cisco, Cubic, Delaware Department of Transportation, District of Columbia Department of Transportation, Econolite, Florida Department of Transportation, Ford Motor Company, General Motors, PrePass Safety Alliance, HNTB, Iteris, Los Angeles Department of Transportation, MCity, Michelin, Michael Baker International, Michigan Department of Transportation, New York City Department of Transportation, San Francisco Bay Area Metropolitan Transportation Commission, National Renewable Energy Lab, Panasonic North America, Qualcomm, San Francisco County Transportation Authority, State Farm Insurance, Toyota, Texas Department of Transportation, Texas Transportation Institute, Virginia Department of Transportation, Washington State Department of Transportation



# **FIXING AMERICA'S SURFACE TRANSPORTATION (FAST) ACT REAUTHORIZATION**

## **PLATFORM AND RECOMMENDATIONS**

**Moving People, Data, and Freight: Safer, Greener, Smarter.**

ITS America's vision is "A better future transformed by intelligent mobility – one that is safer, greener, and smarter." Our mission is to advance the research and deployment of intelligent transportation technologies and solutions to save lives, improve mobility, promote sustainability, and increase efficiency and productivity.

# Moving People, Data, and Freight: Safer

1. Increase Investments in Research and Deployment of Intelligent Transportation Technologies
2. Safeguard Critical Transportation Infrastructure from Cybersecurity Threats
3. Prioritize the 5.9 GHz Spectrum for Vehicle-to-Everything (V2X) Public Safety Transportation Communications and Grow Investments in Vehicle-to-Infrastructure (V2I) and V2P Technologies
4. Expand Investments in Advanced Mobility Improvements
5. Plan for Transformative Transportation Technologies
6. Deploy Broadband to Support Intelligent Transportation Technologies

# Moving People, Data, and Freight: Greener

7. Increase Buildout of Alternative Fuel Vehicle Infrastructure to Support Zero Emission Vehicles
8. Build Transformative and Adaptive Infrastructure for Deployment of Intelligent Transportation Technologies to Mitigate Climate Change

# Moving People, Data, and Freight: Smarter

9. Establish A Mobility-on-Demand Program for the New World of Mobility
10. Invigorate the ITS Program Advisory Committee
11. Strengthen the University Transportation Centers Program

# ITS America: Mobility on Demand (MOD) Alliance

ADVANCING  
SEAMLESS  
MOBILITY  
IN THE  
UNITED  
STATES



Mobility on  
Demand Alliance

[www.modalliance.org](http://www.modalliance.org)

# ALLIANCE FOCUS AREAS

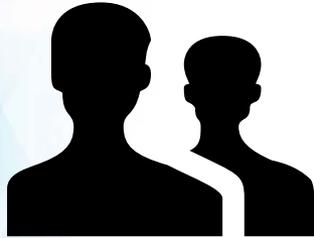


Mobility on  
Demand Alliance

- ✓ **POLICY | Federal Reauthorization**
  - MOD definition and amendments in code - Transit, STBG, CMAQ
    - Shared mobility program such as bicycles, micromobility, microtransit, ridesourcing, shared automated services
  
- ✓ **PARTNERSHIPS | MOD/MaaS Alliance Partnership**
  - MOD/MaaS Markets – Bookend events discussing key MOD/MaaS issues
    - Insurance (September 2019/March 2020)
    - Infrastructure Services (TBD)
  
- ✓ **PROGRAMS | State of MOD Study**
  - Public and Practitioners annual national surveys to assess awareness of mobility on demand, customer understanding and adoption of MOD and its elements

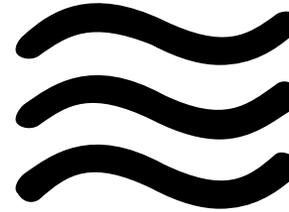
# MOD Supply & Demand

Treats transportation supply and demand as commodities



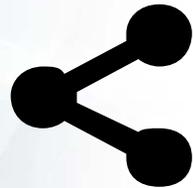
## CONSUMER-DRIVEN

Focused on traveler and personal choice



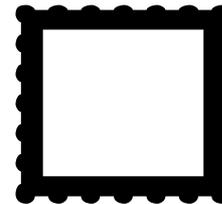
## MULTI-MODAL

Mode agnostic and focused on trip satisfaction



## DATA-DRIVEN

Depends on connected data rather than on a particular technology



## MANAGEMENT FRAMEWORK

Framework for aggregating and managing supply and demand

# MOD Around the US

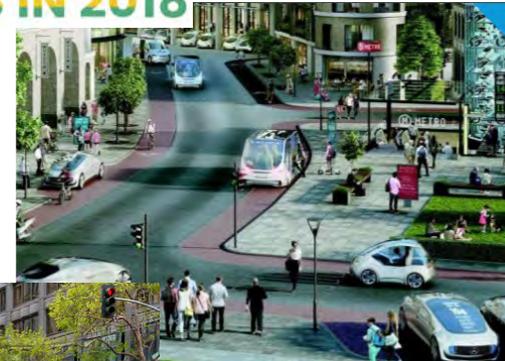


# Building Blocks of MOD

## Mobility Services

Transit | Micro Transit | Ride Sourcing | Bicycle | Scooter  
Personal & Shared Vehicle

  
**84 MILLION**  
SHARED MICROMOBILITY  
TRIPS IN 2018



Mobility on  
Demand Alliance

# Building Blocks of MOD

## Mobility Services

Freight Delivery | Emerging  
Automated/Autonomous



Mobility on  
Demand Alliance

# Building Blocks of MOD

## Infrastructure Services

Roadway | Mobility Hubs  
Parking & Curb | ITS | Fiber  
Tolling | CV/AV/Traffic Data  
Platforms | Electrification



Mobility on  
Demand Alliance



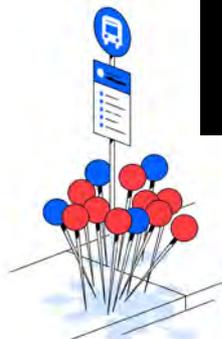
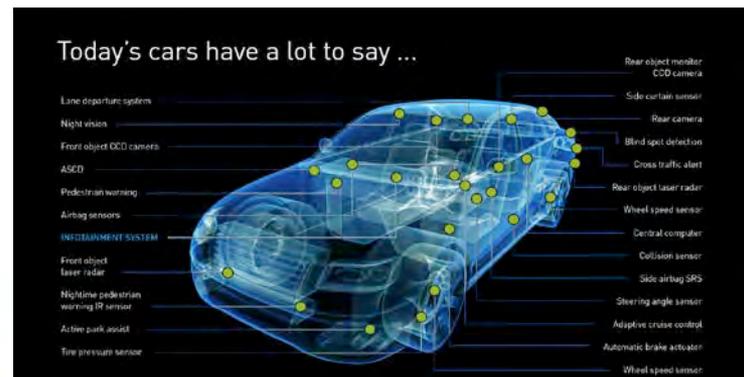
# Building Blocks of MOD

## Data Services

High Quality | Dynamic Shared  
Standardized | Portable  
Incentivized



Mobility on  
Demand Alliance



The City of Detroit, SharedStreets, and NACTO to Pilot  
New Data Standard for Dockless Mobility

# Building Blocks of MOD

## Operator Services

Dynamic System Planning  
Operations Management |  
Fleet Management | Market  
Growth



Mobility on  
Demand Alliance



# Building Blocks of MOD

## Pricing/Payment Services

Integrated Trip Payment  
Parking & Curb Use  
Electrification



Mobility on Demand Alliance

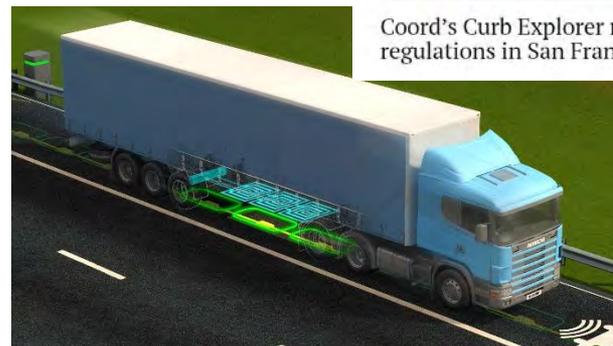


UbiGo

HANNOVERmobil  
Das kombinierte Mobilitätsvergnügen



Coord's Curb Explorer map color codes curb access regulations in San Francisco.



# Building Blocks of MOD

## Pricing/Payment Services

Congestion Pricing | Road Usage Charge | Wi-Fi | Data Services



Mobility on Demand Alliance



**Tier 1: States with Policy Enacted to Implement RUC Programs**

- Oregon

**Tier 2: States Testing RUC Pilot Programs**

- California
- Colorado
- Hawaii
- Washington
- Utah

**Tier 3: States Researching RUC**

- Arizona
- Idaho
- Montana
- Nevada
- New Mexico
- North Dakota
- Oklahoma
- Texas



**New York City drivers will soon have to pay for the privilege of sitting in traffic**

The Associated Press Published 7:55 a.m. ET April 3, 2019 | Updated 8:41 a.m. ET April 3, 2019

**Metro directors order congestion pricing study**

Congestion pricing could alleviate traffic in the region—but some board members are skeptical.



Connected and automated vehicles:  
The role of toll road operators

# Mobility Data Specification

# Mobility Data Specification

## THE FUTURE OF MOBILITY

Municipalities across the country have joined together to create a new global non-profit organization called the Open Mobility Foundation to support the development of open-sourced software that provides scalable mobility solutions for cities.

LEARN MORE



OPEN  
MOBILITY  
FOUNDATION



Governed by cities, the Open Mobility Foundation develops and promotes technology used in commercial products that either use the right-of-way or that help government entities manage the public right-of-way.

# Mobility Data Specification

Establishes data standards that encourage data sharing, fare payment integration and competition



# How Other States and Local Agencies are Preparing

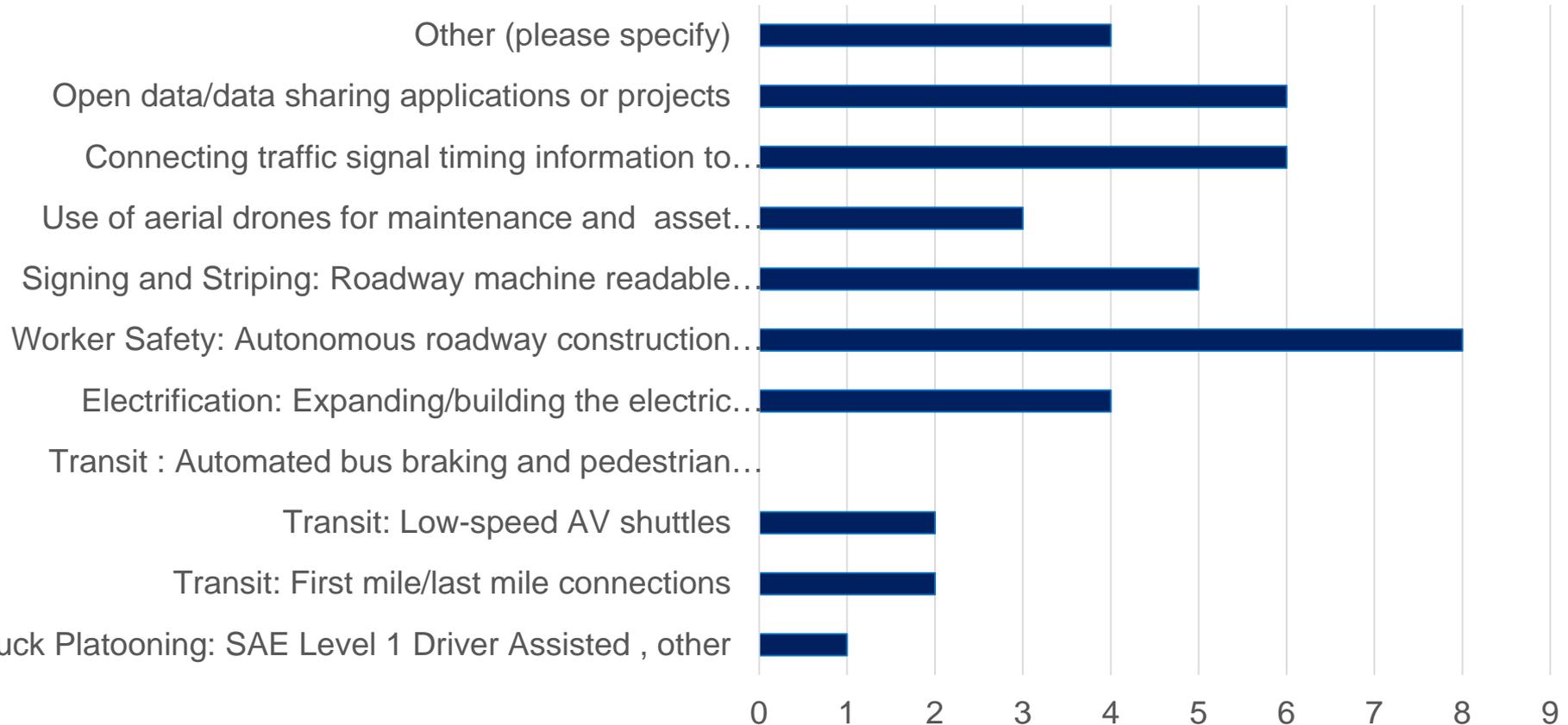
# Survey on CAT / CAV Capacity & Funding Approaches in the states

Survey conducted by the CAT Coalition Working Group on Policy, Legislation, and Regulation during April 2019

# 25 State DOTs and 2 Local Agencies responded to the survey (27 total)

1. AKDOT&PF Central Region
2. Arizona Department of Transportation
3. California DMV & DOT
4. City of Vancouver
5. Delaware DOT
6. Florida DOT
7. Georgia DOT
8. Idaho Transportation Department
9. Iowa Department of Transportation
10. Maine DOT
11. Maryland Department of Transportation
12. Maryland DOT-SHA
13. Michigan DOT
14. Minnesota DOT
15. Nevada Department of Transportation
16. NH DOT - TSMO
17. North Dakota Department of Transportation
18. Oregon Department of Transportation
19. PennDOT
20. RI Dept. of Transportation
21. Road Commission For Oakland County
22. Tennessee DOT
23. Texas Department of Transportation
24. Utah DOT
25. Virginia DOT
26. Wisconsin Department of Transportation
27. WSDOT

# Future near-term CAT/CAV Deployment priorities



# WSDOT and Increasing Telework

# Telework Initiatives

	All Workers	State Workers	WSDOT
Statewide	<p>Telework (TDM Exec Board + Tech Committee)</p>	<p>State Workers Telework (OFM, TRPC, WSDOT)</p> <p>Data for Governor Inslee (OFM)</p>	<p>Telework Transformation</p>
Local	<p>WorkSmart (King County Metro)</p>	<p>Telework Tuesdays (TRPC)</p> <p>Thurston TSMO (TRPC, WSDOT)</p>	<p>Goldsmith and WSF HQ</p> <p>ORMAF (Olympic Region)</p>

# WSDOT telework survey

## **Understanding remote working trends during the COVID-19 pandemic**

Prepared by the WSDOT Public Transportation Division

# Key Takeaways

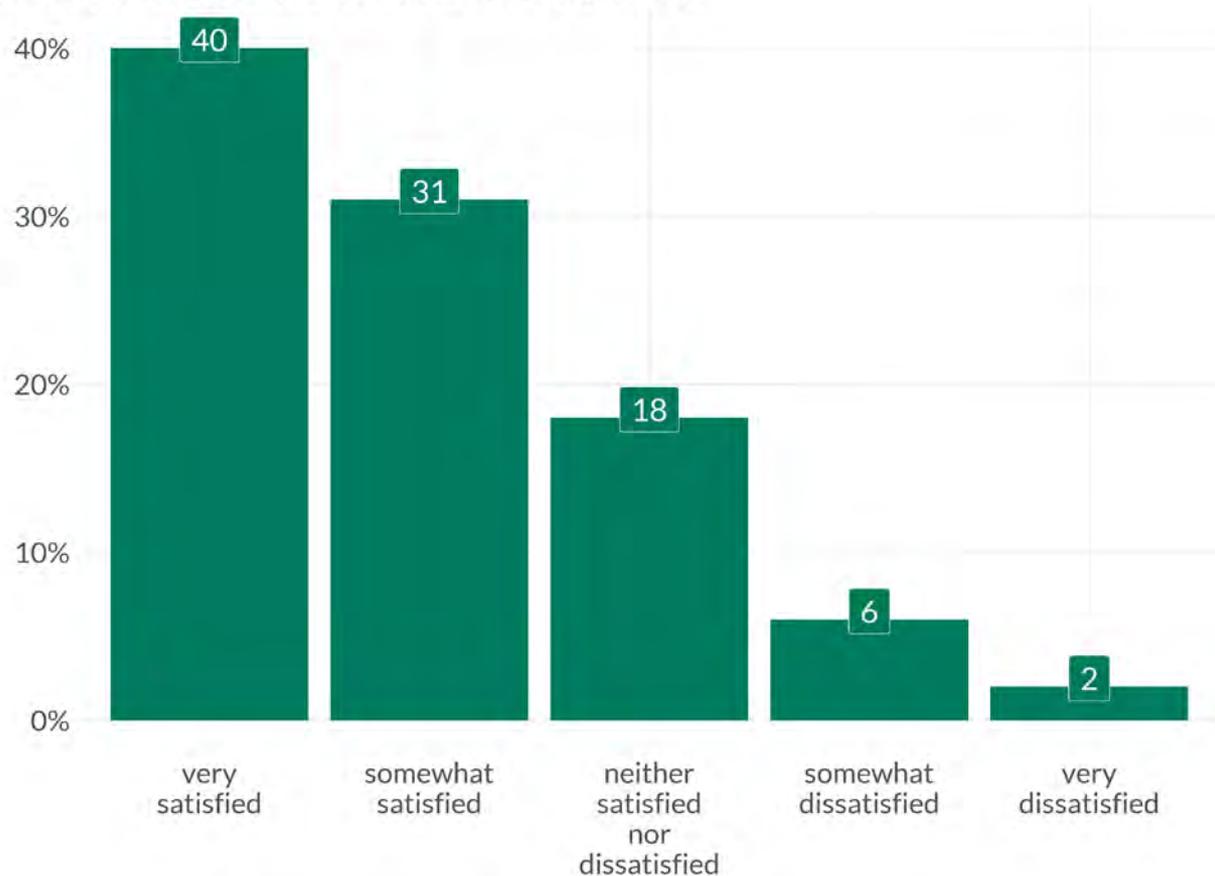
- The majority of WSDOT respondents (84 percent) never or rarely teleworked before the pandemic. WSDOT was able to convert over 93 percent of respondents' positions to telework to keep our employees at home and reduce their exposure to COVID-19.
- Telework satisfaction was very high even in less than ideal conditions.
- Overall productivity stayed about the same despite significant challenges.
- WSDOT is working to remove technology barriers to productivity; many of the other barriers people identified will be mitigated once we reach the “new normal.”

# Satisfaction with telework

## Satisfaction with telework was extremely high

- **more than 70 percent** of employees reported being at least somewhat **satisfied** with their telework experience, whereas only **8 percent** responded they were at least somewhat **dissatisfied**

How do you feel about your overall telework experience?

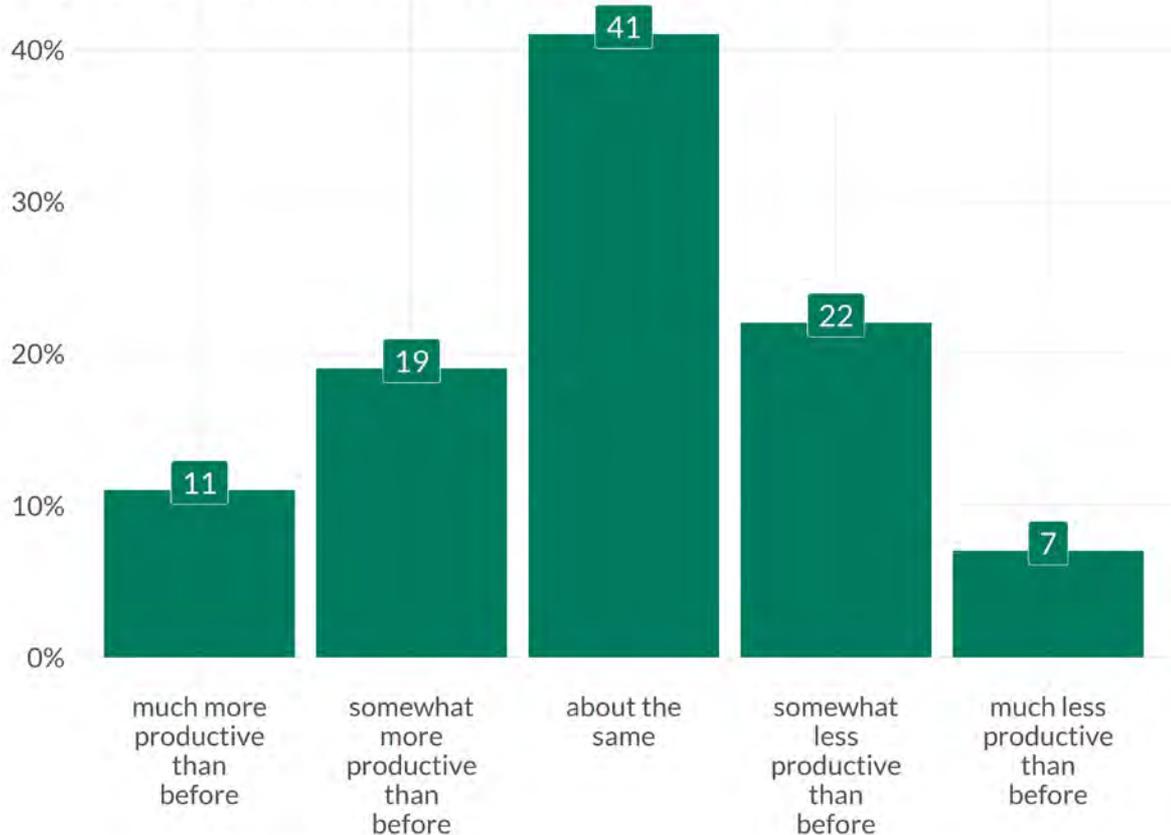


# Changes to productivity

**Productivity stayed roughly the same but was distributed differently**

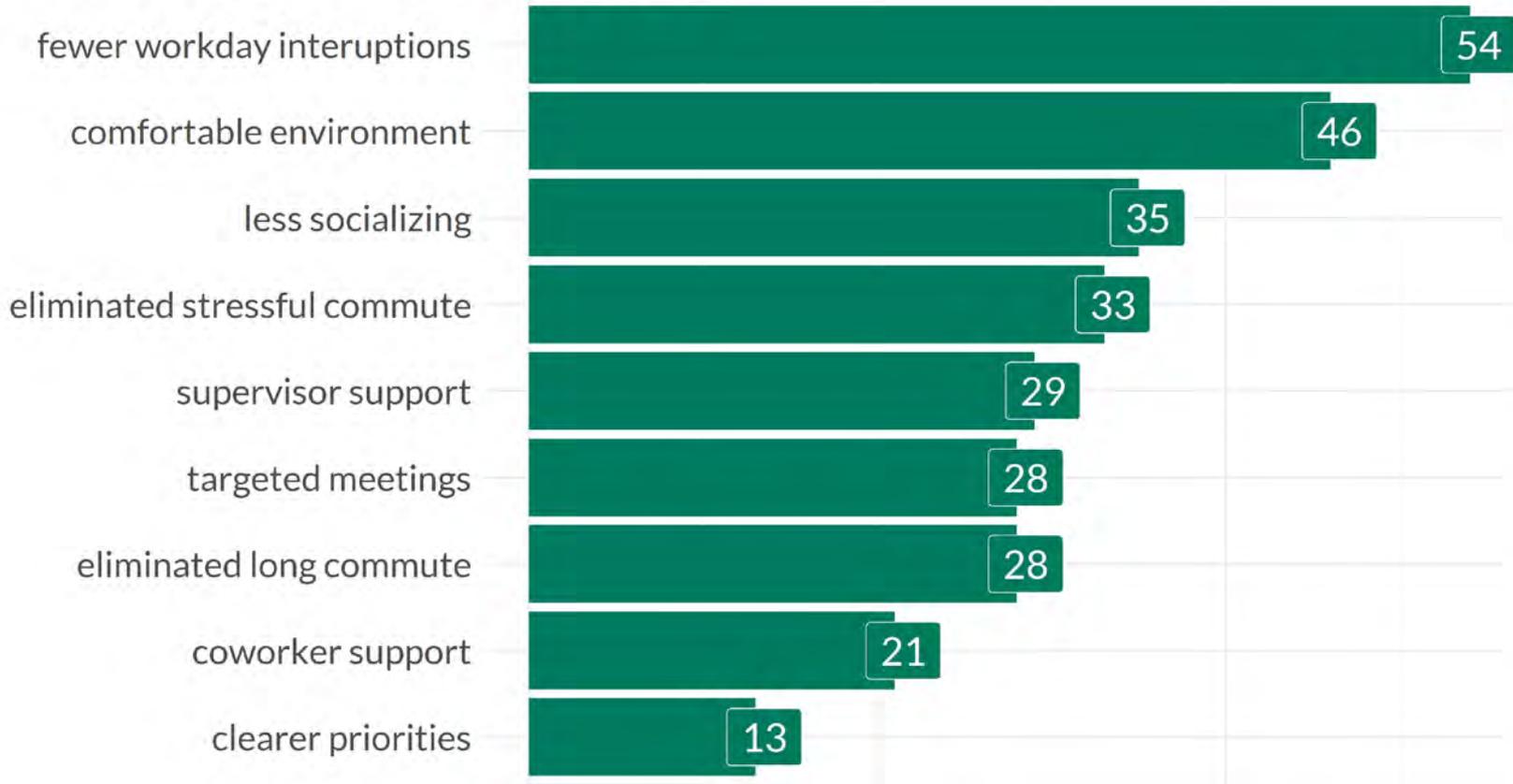
- **30 percent** of employees were at least somewhat **more** productive, while **29 percent** were at least somewhat **less** productive

During the past week, how productive have you been while working?



# Productivity boosters

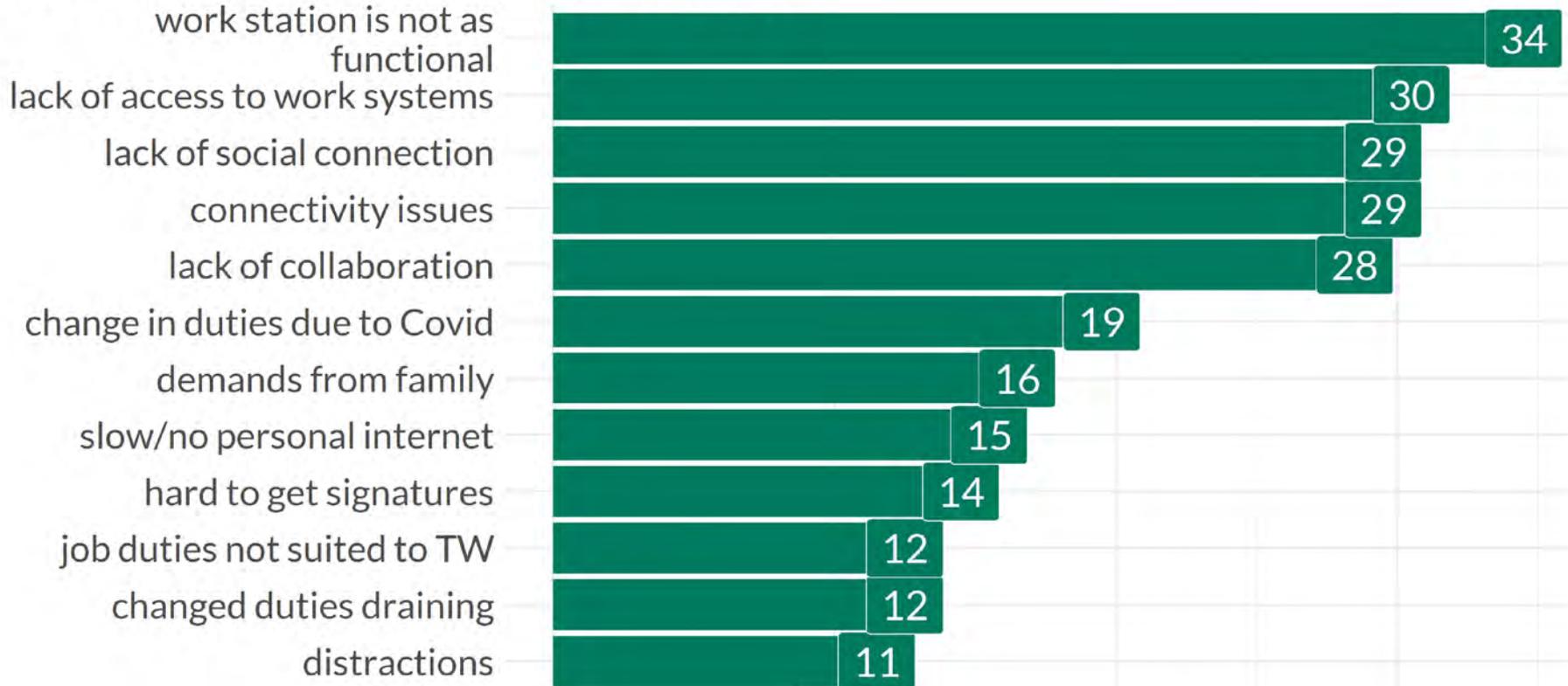
What, if anything, is helping your productivity?



**note:** this question allowed respondents to select **all** options that were applicable; only options identified as affecting 10 percent or higher of employees are shown

# Productivity Barriers

What, if anything, is a barrier to your productivity?



**note:** this question allowed respondents to select **all** options that were applicable; only options identified as affecting 10 percent or higher of employees are shown

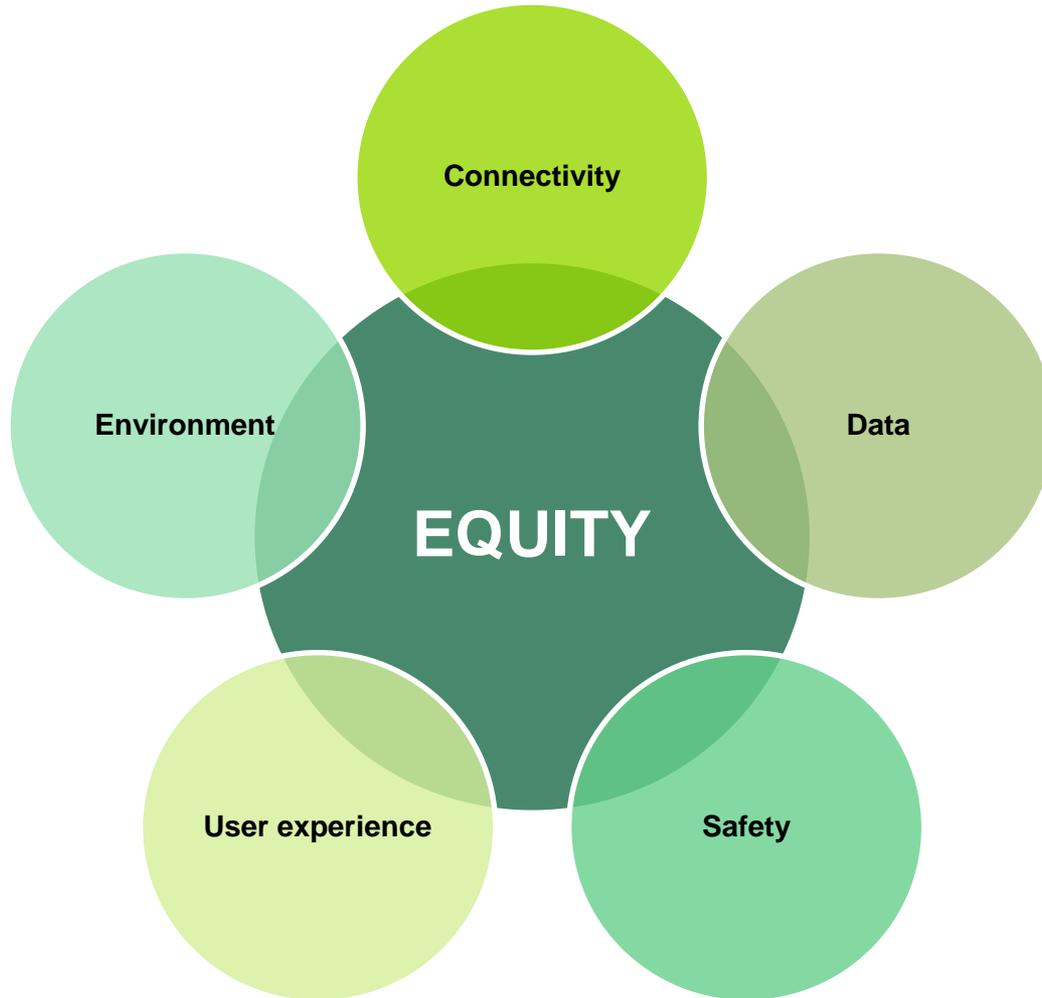
# Next Steps

- As part of the telework transformation initiative, we will recommend that the core team conduct a follow-up survey, with three main purposes:
  - Check on employees' telework experiences now that they have been teleworking longer and the IT infrastructure has been improved
  - Explore employees' ideal number of telework days in the future
  - Determine if employees' feelings about telework are shifting
- We are also working on determining realistic (post-COVID) telework targets and measurement techniques to help convert WSDOT to a telework-first agency\* and reinforce our status as an employer of choice.

\* For non-front line positions: of WSDOT's 7,000 statewide positions, approximately 3,000 work predominantly in the field and 4,000 work mostly in office settings

# WSDOT Mobility on Demand (MOD)

# Policy Development: Mobility on Demand core principles and emphasis areas



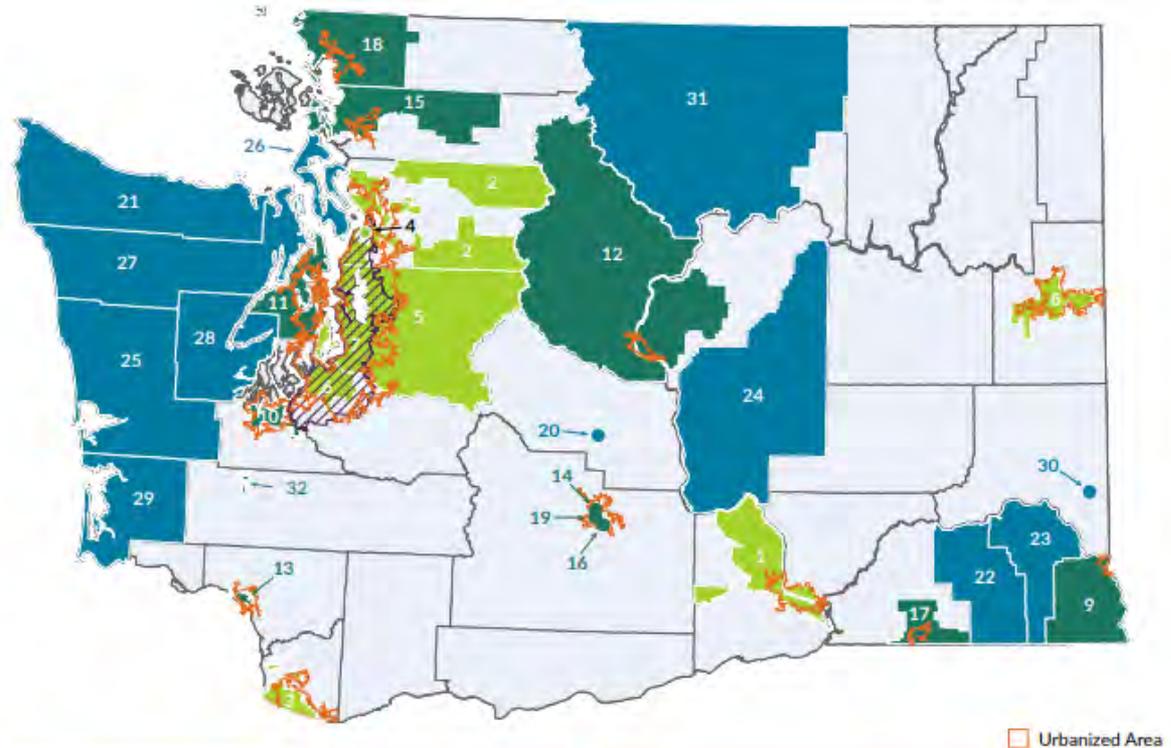
# Mobility on Demand key issues

- Reduce emissions
- Vulnerable populations
- One app to rule them all
- Funding needs
- Active transportation
- Physical infrastructure and right-of-way management
- Workforce development

# Regulate, support and pay for GTFS-Flex adoption

## Flexible transit service in Washington State

- 8 urban
- 11 small urban
- 13 rural
- 31 have flexible service



WSDOT is partnering with UW, Oregon State University, and King County Metro to advance the adoption of this standard in Washington state.

Urban	Small Urban	Rural	
1. Ben Franklin Transit	9. Asotin County Transit	20. Central Transit	26. Island Transit
2. Community Transit	10. Intercity Transit	21. Clallam Transit System	27. Jefferson Transit Authority
3. C-Tran	11. Kitsap Transit	22. Columbia County Transportation Authority	28. Mason County Transportation Authority
4. Everett Transit	12. Link Transit	23. Garfield County Transportation Authority	29. Pacific Transit System
5. King County Metro	13. RiverCities Transit	24. Grant Transit Authority	30. Pullman Transit
6. Pierce Transit	14. Selah Transit	25. Grays Harbor Transportation Authority	31. TranGo
7. Sound Transit	15. Skagit Transit		32. Twin Transit
8. Spokane Transit Authority	16. Union Gap Transit		
	17. Valley Transit		
	18. Whatcom Transportation Authority		
	19. Yakima Transit		

# Next steps

- Conduct a Public Records Act research study
- Establish data standards that encourage data sharing, fare payment integration and competition
- Regulate, support and pay for GTFS (General Transit Feed Specification) -Flex adoption
- Test and pilot first and last mile program

# Public Records Act Study

# Public Records Act study

Considering a public-private partnership to support a research project that examines how the Public Records Act may be updated to:

- Protect trade secrets for private mobility providers
- Protect personally identifiable information for users
- Allow for data sharing between public and private entities that advances mobility, safety, equity and other public interest

## Uber and Lyft may have to disclose Seattle data they claim secret, Supreme Court rules

Originally published May 31, 2018 at 3:06 pm | Updated February 20, 2019 at 4:20 pm



# Automated Shuttles

# Connecting people to transit

- **Automated Shuttles (SAE Level 3 / 4)**
- **First Mile/Last Mile** connections to transit through partnerships with rideshare companies
- **40% of the trips we make every day are 1 mile or less** (60% of these trips are taken in a car)



# Grant Applications: Applied for, but did not receive, a FTA Grant for Low Speed Shuttle in Washington State

- Aimed at providing safe, regular, and on-time delivery of its riders.
- Help increase public confidence and acceptance of AV technology.
- Supported by Pierce Transit and WSDOT.
- ADA compliance will be provided by Virginia Tech Transportation Institute.



# Supporting local partners as they explore low speed shuttles

- At least 5 groups in Washington are exploring the use of low speed shuttles to meet transportation needs.
- These groups included, transit agencies, cities, and private businesses
- Funding for new pilot projects is challenging in this environment
- Shuttle pilot projects range in cost between \$250k - \$2.5 million



# Active Transportation

# Active Transportation: Automated bus braking and pedestrian detection

Pierce County, Wash., Transit Deploys System to Help Buses Avoid Collisions with Pedestrians, Bicyclists

Researchers at the University of Washington are compiling data on the system to help determine whether it is “as effective as claimed.”

BY ADAM LYNN, THE NEWS TRIBUNE (TACOMA, WASH.) / OCTOBER 18, 2016



Photo credit: Seattle Medium

FLICKR/SOUNDERBRUCE



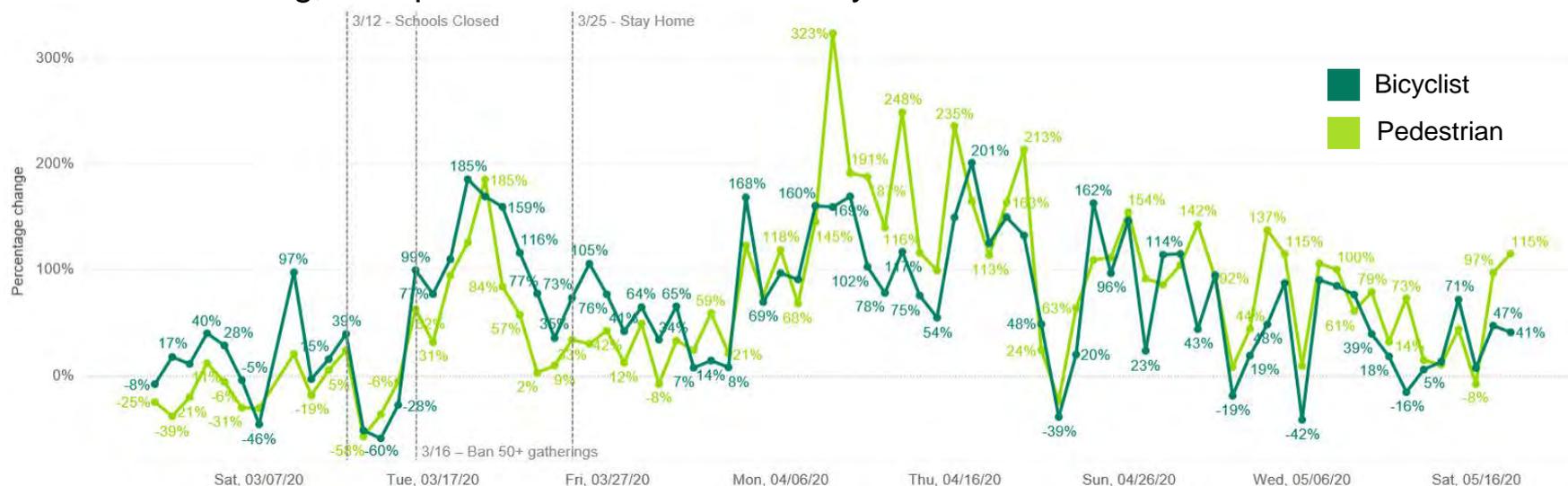
Photo credit: Pierce Transit

**Pierce Transit** has been piloting: Automated pedestrian detection which has reduced pedestrian-related crashes

# Active Transportation: Lessons from COVID-19

## I'm going for a walk: the importance of complete neighborhoods

- Stay Home, Stay Healthy – many see their neighborhoods in the daytime
- Mixed use neighborhoods provide food security, access to services
- Sidewalks and bikeways often don't exist, or too narrow for social distancing
- Need to do catch up on accessibility – for a person in a wheelchair, no curb cut means they aren't going anywhere
- People staying closer to home likely to influence/increase local active transportation investments
- Complete the state's active transportation system to complement/leverage affordable housing, transportation and telecommunity initiatives



# Broadband Accommodation

# Broadband and transportation

## **Far-reaching and high functioning broadband networks will:**

- Enable and enhance transportation choices
- Improve livability, access to jobs and education in rural and urban communities while decreasing travel demand
- Improve transportation system management and operations.
- Facilitate the deployment of connected automated transportation systems



# Department of Commerce

## Washington State's Broadband Office

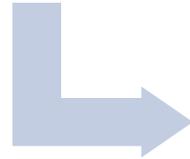
### Broadband Goals

- The legislation established aggressive goals:



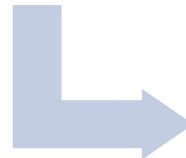
2024

- All residences and businesses will have 25/3 Mbps service



2026

- All anchor institutions will be served with a 1 Gbps connection



2028

- All residences and businesses will have symmetrical service at 150/150 Mbps



# Broadband infrastructure accommodation current policies

## **Utility Accommodation**

- RCW 47.44
- Permits and Franchises

## **Wireless Leasing**

- RCW 47.04
- Special Wireless Facility Leases and Access Permits

## **General Leasing Authority**

- RCW 47.12
- Highway Land or Airspace Lease

# WSDOT's current efforts

## Revising WSDOT policies

- Collaboration with the Department of Commerce Broadband Office to align state broadband policy goals

## Exploring opportunities with public agency broadband providers

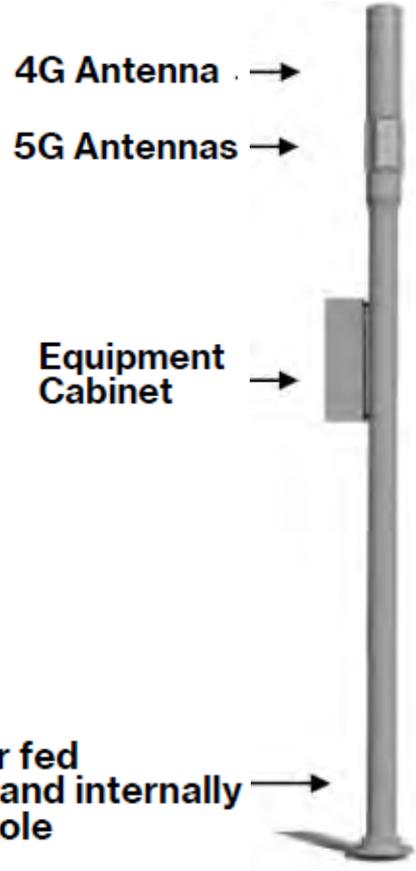
- Ports
- Public Utility Districts
- Tribes

**Focused on partnerships and collaboration** rather than traditional permitting or leasing.

### Examples

- Installing conduit for fiber as part of roadway and bridge projects
- Access to services in lieu of Fair Market Rent
- Road Weather Information Systems
- Access to Public Rights of Way for 4G / 5G Small cells

# Example: Providing access to public rights of way for 4G / 5G small cells



# Automated Enforcement

# Automated Enforcement

## Speed

## Other Opportunities

- HOV Lane Enforcement
- Tolling
- Red Light Running at Traffic Signals
- Congestion Management
- Road User Charging

# Automated Speed Enforcement:

## Potential concept of operations for Washington State

### **“Aircraft like” enforcement on the ground process.**

- Set a highway segment with license plate readers and cameras at the beginning and end of the segments.
- Vehicles exceeding a speed threshold (like 95% of all vehicles) have the rear of the car and license plate photographed and transmitted to a nearby trooper.
- Troopers stage at an area off the shoulder, providing the troopers a margin of safety from moving traffic and has less impacts on traffic flow
- The trooper searches for the vehicle, once the vehicle is spotted the trooper follows the vehicle until a safe stop can be made.
- Gives troopers some discretion in who to pull over
- The trooper can write an infraction, issue a warning or do other police investigations.

# Next steps toward automated speed enforcement:

- **Validate concept of operations** by identifying viable technology, equipment needs and potential cost to establish and operate the system. This will also include the identifying the number and location of potential enforcement zones.
- **Reached concurrence on concept of operation** with WSP, WTSC and WSDOT Leadership, [Winter 2020](#)
- **Refining proposed legislation with needed funding identified** [Spring-Summer 2020](#)
- **Contacting stakeholders and seeking Governor approval** [Summer 2020](#)

# Roadway Striping and Pavement Markings

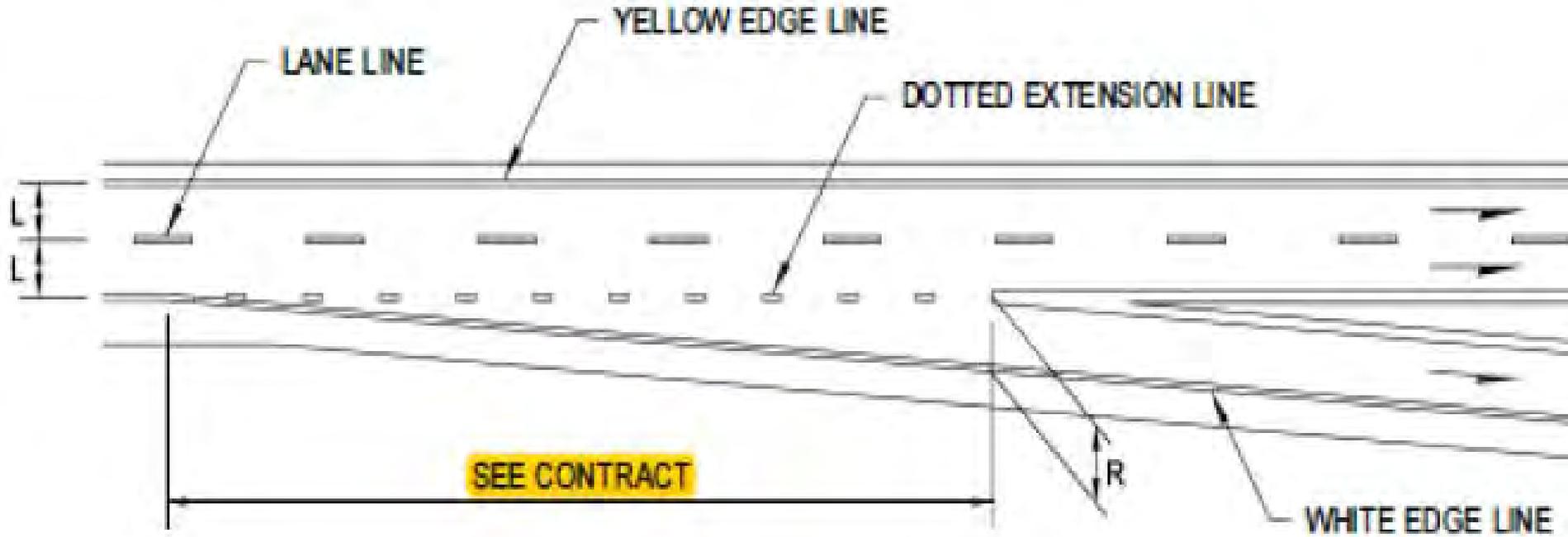
# Roadway striping and pavement markings

**Striping and marking investments are the least cost / highest return investments for keeping driven and automated vehicles safely on the road.**

**With aging drivers and automated systems, higher quality striping is now an operational need rather than a simple maintenance or preservation task.**



# Roadway striping and pavement markings



- SAE Level 1&2 vehicles, adaptive cruise control and/or lane keeping assist
- Dotted extension lines (edge)
- Without the dotted extension lines
- Vehicles can drift toward gore areas and/or follow the off ramp

# NCUTCD: Markings Committee Update

## MUTCD Recommendations Section 3A.06:

- A. Normal line — ~~4 to~~ 6 inches wide for Interstate, freeway, expressway and corresponding ramp interchange markings and for edge lines on all other roadways with posted or statutory speeds of 55 mph or more and an ADT of 6,000 vehicles per day or greater; otherwise, a normal line shall be 4 to 6 inches wide.
- B. Wide line—8 inches or more in width when used with 4 inch normal lines and 10 inches or more in width when used with 6 inch normal lines ~~at least twice the width of a normal line.~~ [Approved 06-28-2014, 14B-MRK-02]

**Note 1:** Proposed additions to the MUTCD are shown in blue underline

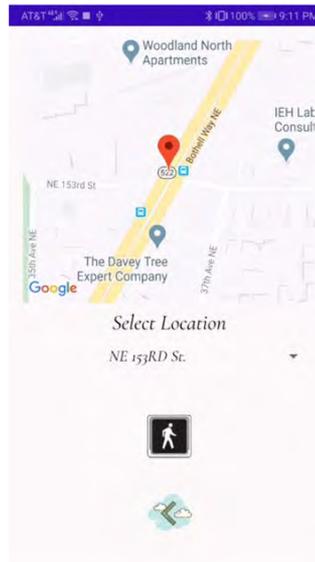
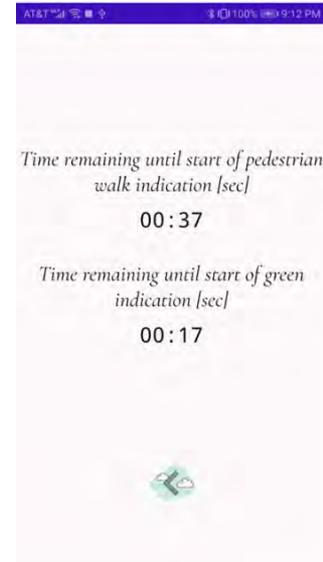
**Note 2:** Changes previously approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double underline for additions and green double strike-through for deletions.

# Connected Traffic Signals

# Traffic signal operations deployments and testing

**Communicating with the transportation infrastructure** – Dedicated Short-range Communications (**DSRC**) allows infrastructure and vehicles to share data

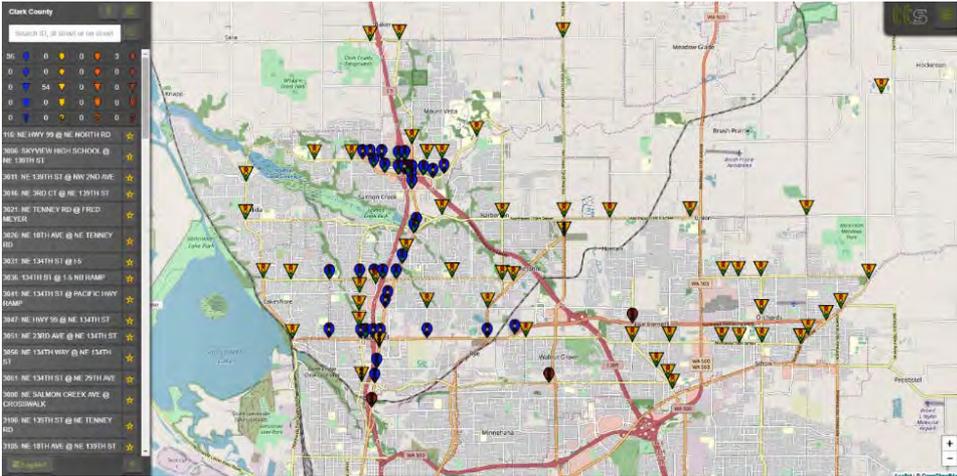
**Partnering with universities** – UW researchers are developing a mobile application to allow for pedestrians to request walk signal and additional sharing of Signal Timing and Phasing (SPaT) data



# Centralized platforms and Connected Vehicle (CV) readiness

**Cloud-based connectivity** – Signal Timing and Phasing (SPaT) data can be sent via cloud to be consumed by 3<sup>rd</sup> party

**CV-readiness and standards** – Agency standards are being updated to include advanced transportation controllers and cabinets in all new signal and ramp meter installations



Dashboard signal timing information (Audi)



3<sup>rd</sup> party data integrators /centralized system

# Automated Work Zone Safety/ Data Sharing Partnerships

# Autonomous Truck Mounted Attenuator (ATMA) Work Zone Safety

Low-speed  
striping  
operations



Photo credit: CDOT



Photo credit: CDOT



Photo credit: CDOT



Photo credit: CDOT



Photo credit: Royal Trucking

# WSDOT's Work Zone database

## Planning level data input:

What is the work?

When is it scheduled?

Who is responsible?

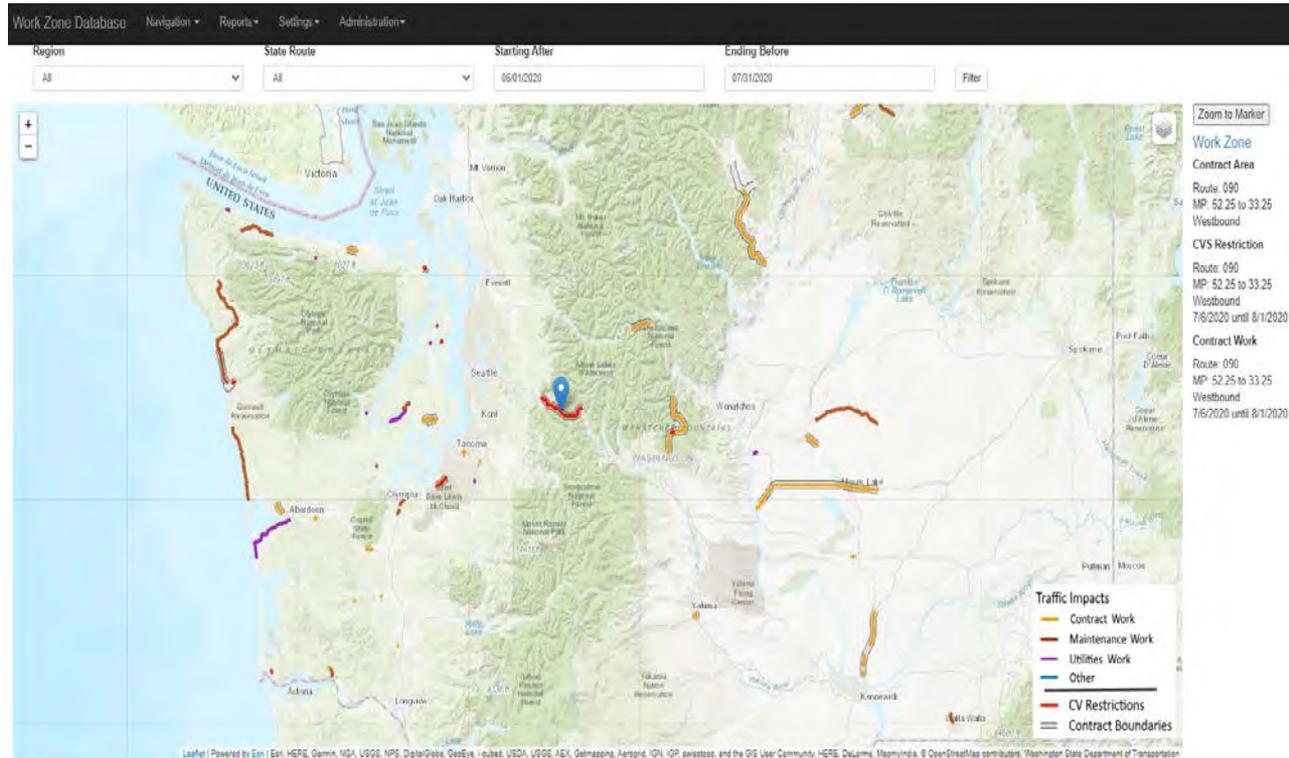
- Construction
- Maintenance
- Utilities
- Special Events, etc.

How can we contact them?

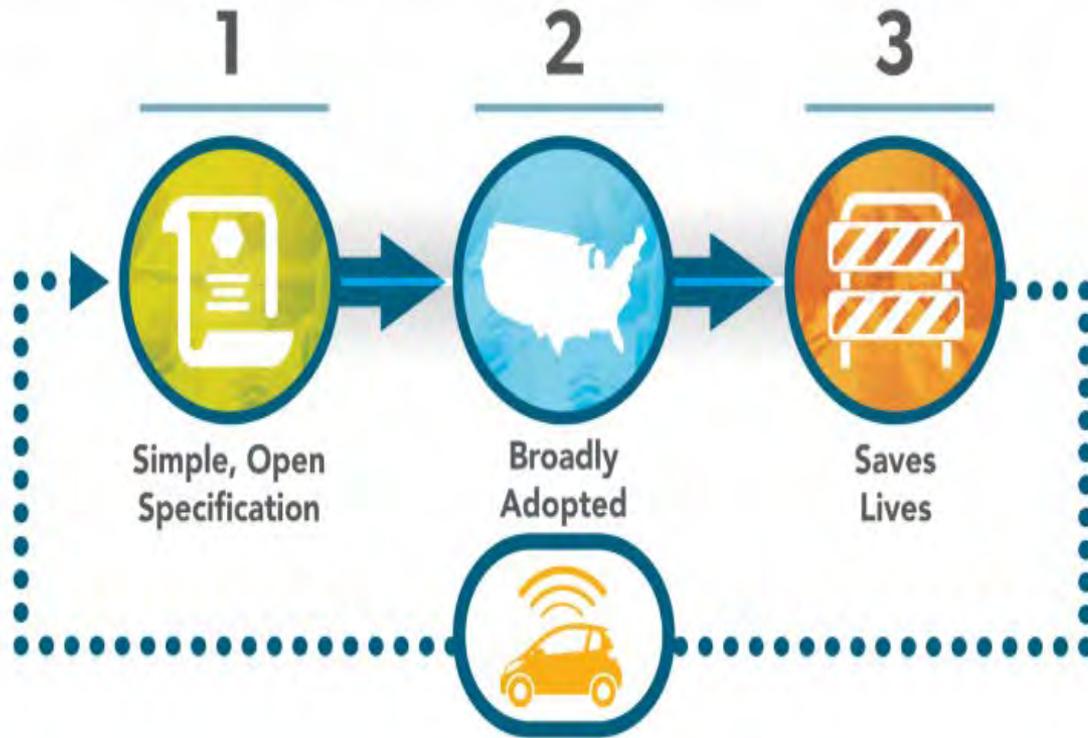
- Avoid conflicts
- Combine multiple
- Work zone activities?

Deployment underway

- 4 of 6 regions to date



# National Work Zone Data Initiative (WZDI) engagement



FHWA National Work Zone Data Exchange (WZDx) Specifications Concept

## Future Intent:

- Both Planned Work Activities and Incident messaging sent to National WZDx

## Expected Benefits:

- Potential Reduction of Secondary Crashes

# Current WSDOT pilot: Transmit work zone data through roadside devices to WAZE



## Connected Arrow Board Kit:

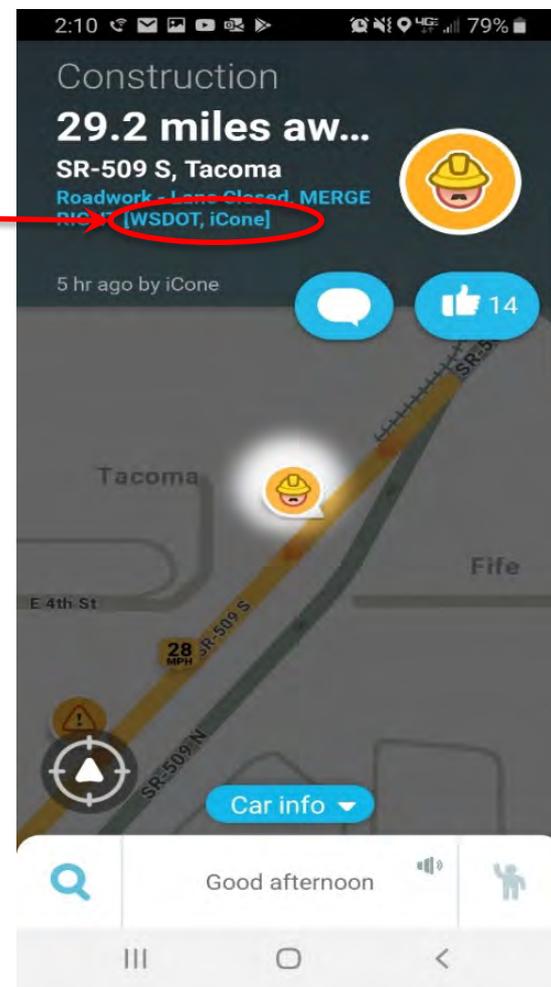
Two Each for Olympic and Southwest Region Dedicated Work Zone Crews

WSDOT Credited Work Zone in WAZE



## “iPin”

Marks End of Work Zone



Courtesy: [iCone Products](#)/Waze App

# Electric Vehicle Charging Infrastructure

# Response to challenges: Electrification & alternative fuels

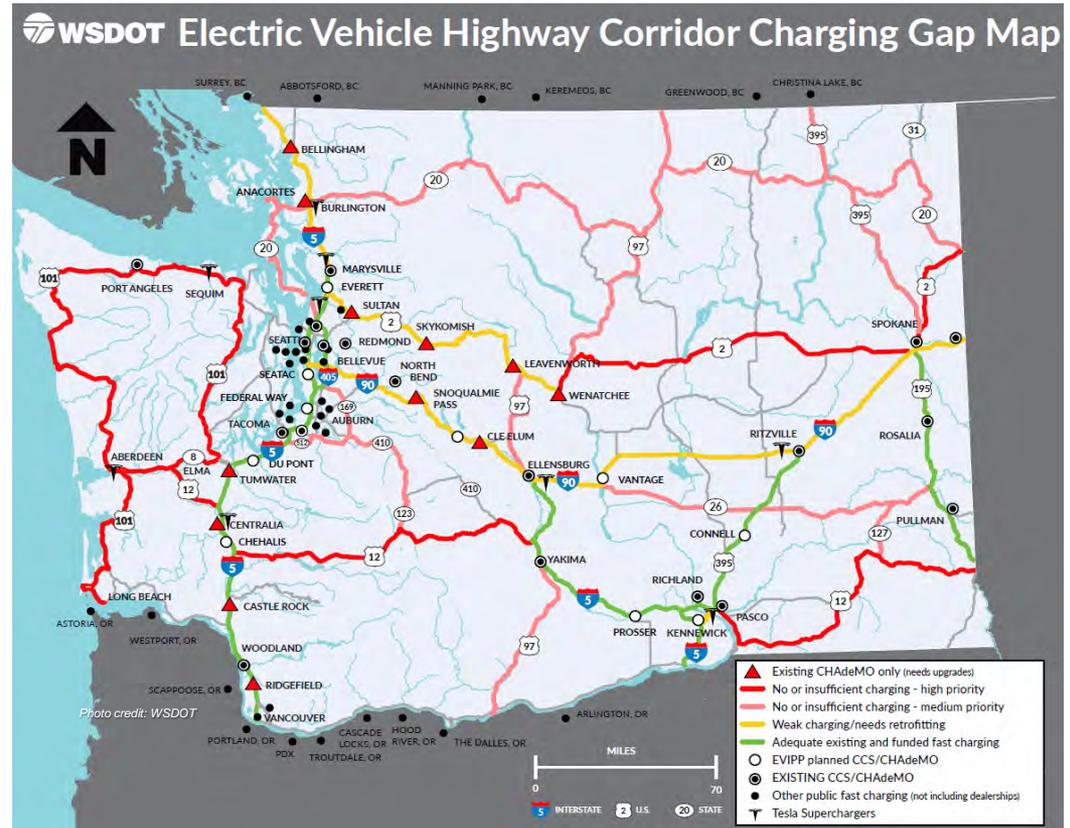


## Alternative energy

- [EV charging stations](#)
- [Ferry conversion, new vessels](#)
- [Fleet conversion](#)
- [Clean transit](#) – 386 electric buses in Washington (as of December 2018)
  - WSDOT working with local partners to obtain federal grants to replace diesel with alternative fuel vehicles
- [E-bikes](#), E-scooters

# Electric vehicle charging infrastructure

- Uses a portion of the annual electric vehicle registration fee to provide matching grants
- \$1 million in state funding used to encourage private sector investment for 15 new locations totaling \$2.5 million
- \$100M would complete the gap map with charging stations every 70 miles



# Electric vehicle charging infrastructure

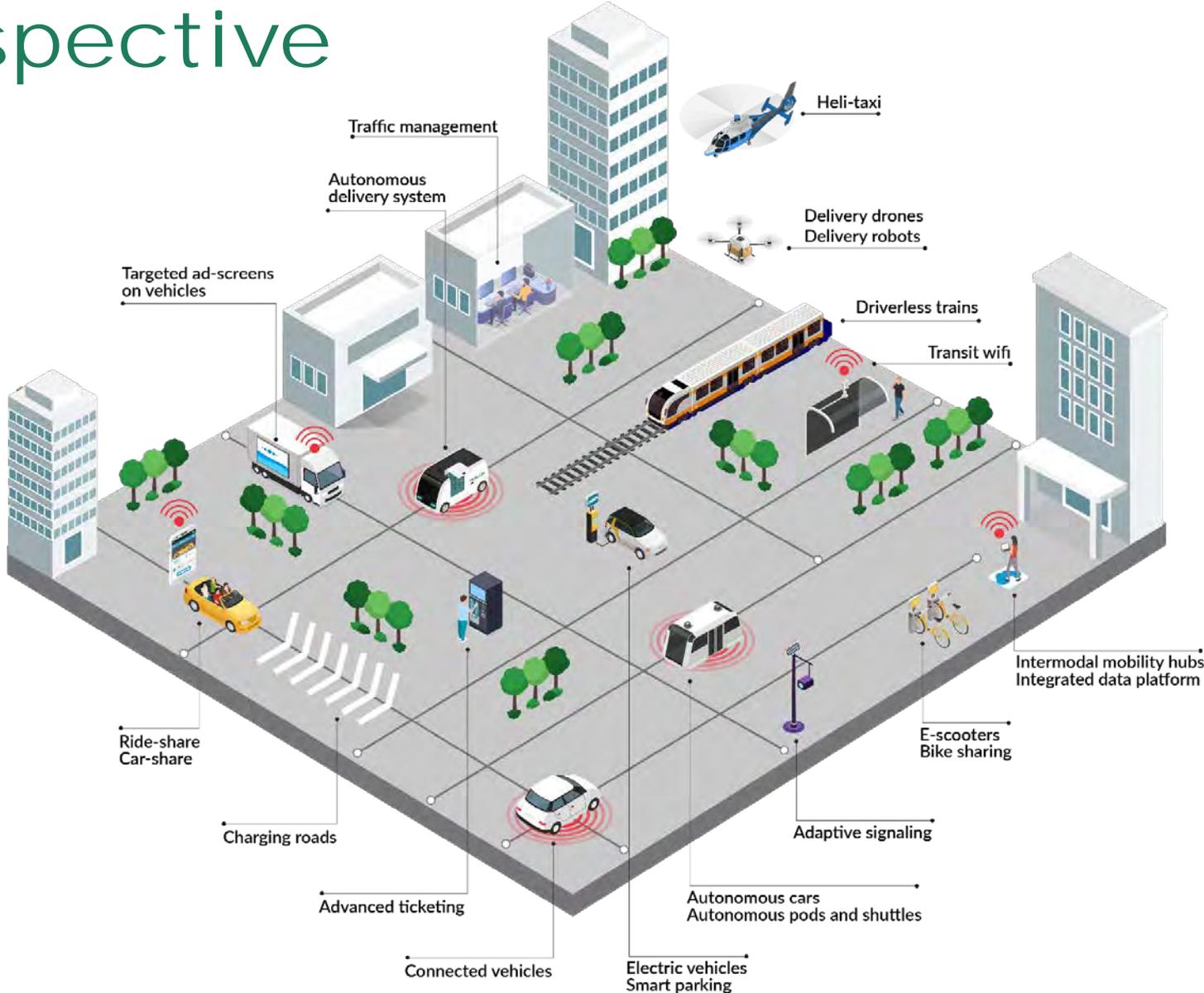
## Additional Efforts Underway

- **Coordination with other states (OR, CA) and province (BC) on the West Coast Electric Highway**
- **FHWA Designation of EV corridors: I-5 and sections of I-82, I-90, US 101**
- **Coordination with other organizations on EV charging investments**
  - Joint OR/WA Pacific Northwest ZEV Investment proposals to Electrify America
  - Ecology VW Settlement Investments in EV charging
  - Commerce Electrification of Transportation Systems Program - Clean Energy Fund (CEF)
- **Research with UW to prioritize investments in highway corridor charging**
  - Built an Electric Vehicle Infrastructure – Decision Support System (EVI-DSS)



# Conclusion

# Preparing for AV requires a CAT perspective



Questions?