

MAY 21, 2020

CAV AND SMART MOBILITY: A MINNESOTA CASE STUDY

Kristin White, Executive Director, Minnesota Office of Connected and Automated Vehicles (CAV-X) and Destination CAV

TennSMART Intelligent Mobility May Virtual Meeting

HISTORY

What causes states and regions to develop connected and automated vehicle programs?

1

WHY ARE WE WORKING ON THIS?



MINNESOTA GOALS



**GREATER
MOBILITY &
EQUITY**



**WORKFORCE
IMPACTS**



**TRAFFIC
OPERATIONS**



**ECONOMIC
DEVELOPMENT**

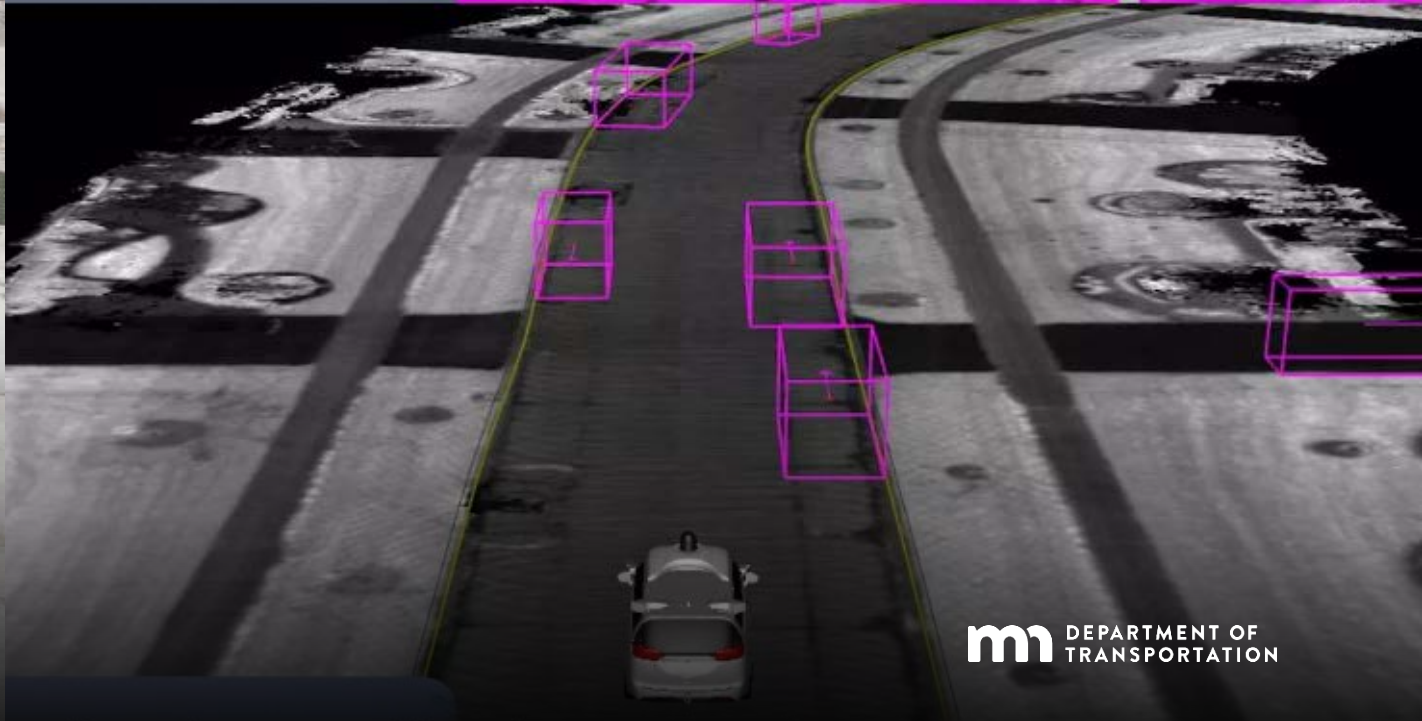


INFRASTRUCTURE



**HEALTH &
ENVIRONMENT**

2018 RESEARCH



PUBLIC SAFETY CHALLENGES



EXECUTIVE ORDER TASKS

CAV
ADVISORY
COUNCIL

1. Quarterly meetings
2. Review developments in CAV & ITS
3. Explore partnership opportunities
4. Propose testing & deployment policies
5. Review and implement Executive Report
6. Consult with communities experiencing transportation barriers
7. Annual report to Governor by February 1st
8. Advise and support DOT & Public Safety to test/deploy CAV

STATEWIDE VISIONING WORKSHOP

Strategic Visioning Workshop for Automated Vehicles in Minnesota

June 25–26, 2018
Graduate Hotel, Minneapolis

Summary Report



Sponsored by: Minnesota Department of Transportation, McKnight Foundation, Hennepin County, Metropolitan Council, and Center for Transportation Studies

Convened by: Center for Transportation Studies



1. What are the problems we're trying to solve?
2. Human-centered design and planning
3. Demo and deploy AVs
4. Foster collaborative partnerships
5. AVs impacts of transportation funding
6. Public engagement and education
7. Develop the future's workforce

EXECUTIVE REPORT ON LAW & POLICY

“ Authorize testing without human drivers ”

“ Invest in fiber, signals, pavement markings and smart signs ”

“ Create a public engagement plan ”



“ Conduct pilot projects in urban, suburban, rural areas to public can see the tech and guide policy ”

“ Prioritize safety for all users: pedestrians, cyclists, people with disabilities, transit, and others ”

MINDOT CAV STRATEGIC PLAN

65 RECOMMENDATIONS OVER 5 YEARS IN 9 BUSINESS AREAS



 CAPITAL INVESTMENT

 RESEARCH

 PARTNERSHIPS

 REGULATION & POLICY

 OPERATIONS & MAINTENANCE

 MULTIMODAL

 STRATEGIC STAFFING

 COMMUNICATIONS

 LONG-RANGE PLANNING

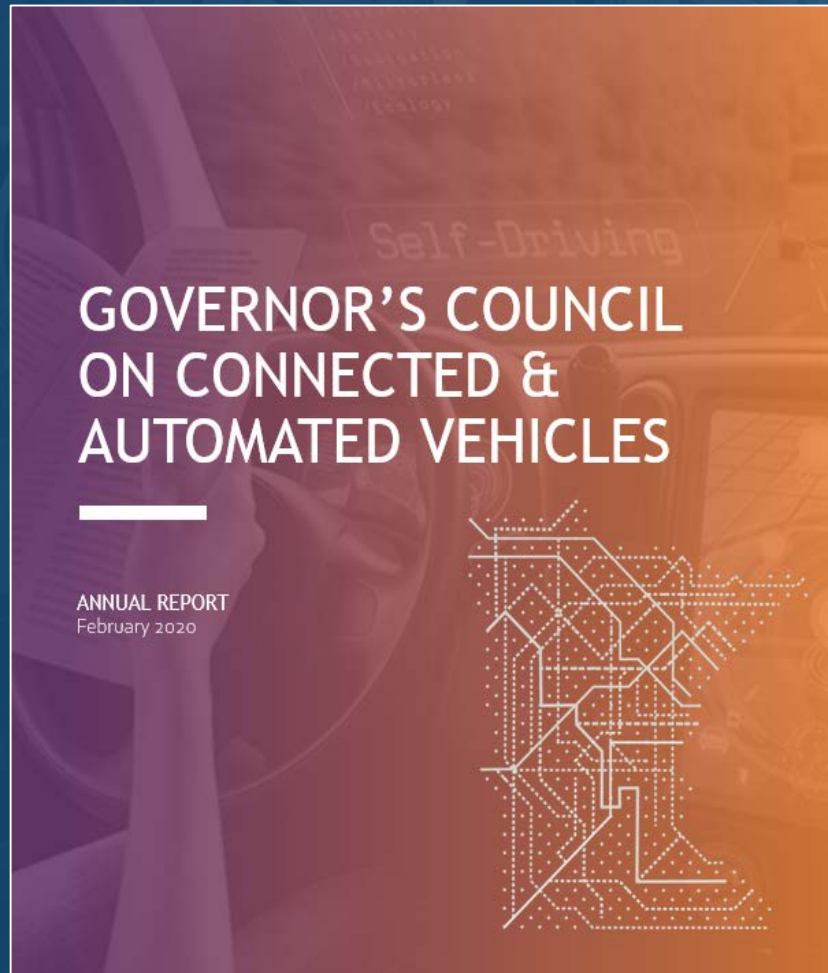
ANNUAL REPORT

Note from
Council chairs

Background:
What is CAV?

Council's mission,
vision and goals

How do we
prepare?



What are other
states doing?

State, Regional and
Federal Policy

How Minnesota
is preparing

Building an alliance

2020 activities

COUNCIL STRUCTURE

How is a successful program organized?



2



STATE AS CONVENER AND LEADER



ADVISORY COUNCIL

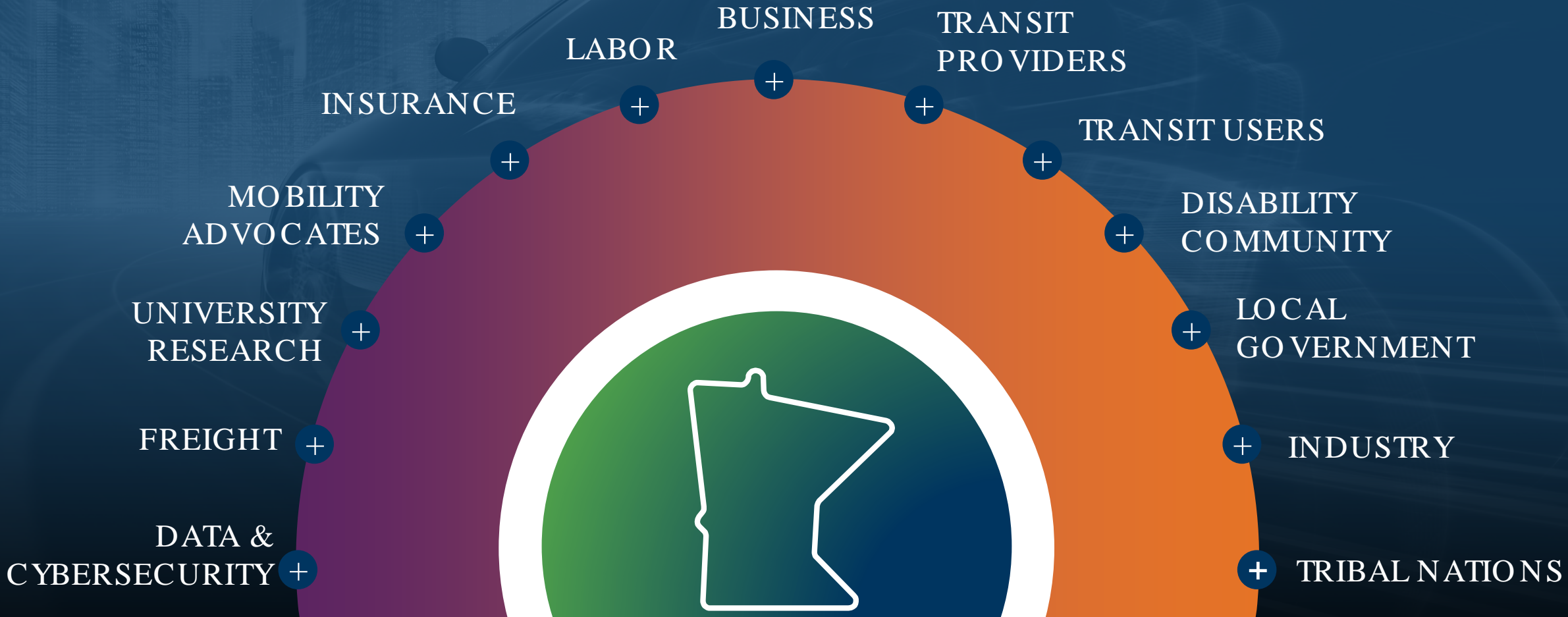
INTERAGENCY
CAV TEAM

POLICY
SUBCOMMITTEES





GOVERNOR'S ADVISORY COUNCIL



FORMING, STORMING & NORMING

What are your goals for CAV in Minnesota? (e.g. safety, equity)

Mentimeter



What priorities do you want the Council to focus on?

Mentimeter



COUNCIL'S VISION



Building a future of transportation that is safe, equitable, accessible, efficient, healthy, and sustainable.



COUNCIL'S MISSION

The Governor's Council on Connected and Automated Vehicles collaborates with stakeholders, partner with private industry, and engages communities to prepare Minnesota for a future with emerging transportation technologies.

GOALS & VALUES

CAV
ADVISORY
COUNCIL

Equity: Advance policies that promote transportation equity

Mobility and accessibility: Promote inclusive policies that meet the needs of all

Trust: Uphold the public's interest with clarity and transparency. Understand community concerns about CAV technology and incorporate feedback into policy

Public Health and Environment: Promote active transportation – like walking and biking – and healthy communities. Advance technology and policy that minimize environmental impacts

Multi-Modal Efficiency: Support transit, freight and other modes. Guard against increased congestion

Readiness: Prepare our workforce and businesses for the changes that technology will bring. Test and pilot technologies to ensure they meet the needs of all Minnesotans.

3-YEAR PRIORITIES

- 1. Equity, mobility, accessibility, public health and environment**
- 2. Industry and research partnerships**
- 3. Infrastructure investment**
4. Law for safe testing and deployment
5. Education, outreach, engagement and demonstrations
6. Economic and workforce development
7. Data privacy and cyber security
8. Insurance and liability
9. Alignment with other states/federal government
10. Human factors research of CAV impacts on users

CAV
ADVISORY
COUNCIL

POLICY & TECHNICAL AREAS

INFRASTRUCTURE

CYBER
SECURITY &
DATA PRIVACY

PLANNING
AND
LAND USE

ACCESSIBILITY

INSURANCE &
LIABILITY

EQUITY

VEHICLE
REGISTRATION,
LICENSING AND
TRAINING

ECONOMIC &
WORKFORCE
DEVELOPMENT

TRAFFIC
REGULATIONS



POTENTIAL SUBCOMMITTEES

FOCUS AREA	PRIORITIES	
SAFETY & LAW ENFORCEMENT	<ul style="list-style-type: none"> Public safety Law enforcement 	<ul style="list-style-type: none"> Emergency services Crash reporting
CONNECTIVITY & DATA	<ul style="list-style-type: none"> Data privacy Data sharing 	<ul style="list-style-type: none"> IT & architecture Datagovernance
INFRASTRUCTURE INVESTMENT	<ul style="list-style-type: none"> Curb space mapping Signals 	<ul style="list-style-type: none"> Pavement markings Signs Fiber optic
LABOR & WORKFORCE DEVELOPMENT	<ul style="list-style-type: none"> Operators mechanics & dealers Workforce development 	<ul style="list-style-type: none"> Educational partnerships K-12 pipeline
OUTREACH & EDUCATION	<ul style="list-style-type: none"> Public demonstrations Workshops & conferences Open houses 	<ul style="list-style-type: none"> Websites Surveys

INTERAGENCY CAV TEAM (I-CAV)



INNOVATION ALLIANCE

CAV
ADVISORY
COUNCIL

INTERAGENCY
CAV TEAM

SUBCOMMITTEES

- Infrastructure
- Vehicle Registration Driver Training & Licensing
- Equity
- Insurance & Liability
- Traffic Regulations & Safety
- Economic & Workforce Development
- Accessibility
- Planning & Land Use
- Cyber Security & Data Privacy

OTHER STATEWIDE ORGANIZATIONS

- GuidesBoard of Directors
- Twin Cities Shared Mobility Collaborative
- University of Minnesota Center for Transportation Studies
- County Engineers
- League of Cities
- ITS Minnesota

LESSONS LEARNED

TOP 10 TIPS ON HOW TO BUILD THE BEST PROGRAM

3

TOP 10 TIPS

- 1. Divide and conquer – Don't try to do it all**
- 2. Statewide coordination – Build an alliance**
- 3. Develop an innovation program**
- 4. Technology is a means to an end**
- 5. Create interdisciplinary teams**
- 6. Institutionalize knowledge**
- 7. Develop a business plan and work plan**
- 8. Regional and national coordination**
- 9. Use your time and money strategically**
- 10. Outreach and engagement**

DIVIDE & CONQUER

A

AUTOMATED

C

CONNECTED

E

ELECTRIC

S

SHARED

STATEWIDE COORDINATION

CAV
ADVISORY
COUNCIL

INTERAGENCY
CAV TEAM

FORMER COMMITTEES

- Infrastructure
- Vehicle Registration Driver Training & Licensing
- Equity
- Insurance & Liability
- Traffic Regulations & Safety
- Economic & Workforce Development
- Accessibility
- Planning & Land Use
- Cyber Security & Data Privacy

OTHER STATEWIDE ORGANIZATIONS

- Guidestar
- Twin Cities Shared Mobility Collaborative
- University of Minnesota Center for Transportation Studies
- County Engineers
- League of Cities
- ITS Minnesota

DEVELOP AN INNOVATION RFP

MINNESOTA CAV CHALLENGE RECEIVED NATIONAL RECOGNITION FOR GOVERNMENT INNOVATION



A large white circle containing the central logo for "Destination CAV" (The Future of Mobility is in Minnesota) surrounded by logos of various partner organizations and vendors. The logos include: POLARIS INDUSTRIES INC., wsb, AECOM, TRAFFIC CONTROL CORPORATION, iteris, VISION SYSTEMS INTELLIGENCE, EY, id8, HDR, plus.ai, applied INFORMATION, HNTB, KRATOS DEFENSE & SECURITY SOLUTIONS, First Transit, here, Athey Creek CONSULTANTS, wsp, THE EHRlichman GROUP, easy MILE, Center for Transportation Studies, ALLIANT, MobilityMania, and 3M.

33
VENDOR MEETINGS

35
PROPOSALS SUBMITTED

12
AWARDED PROJECTS

TECHNOLOGY IS A MEANS TO AN END



LEADERSHIP



PROGRAMS



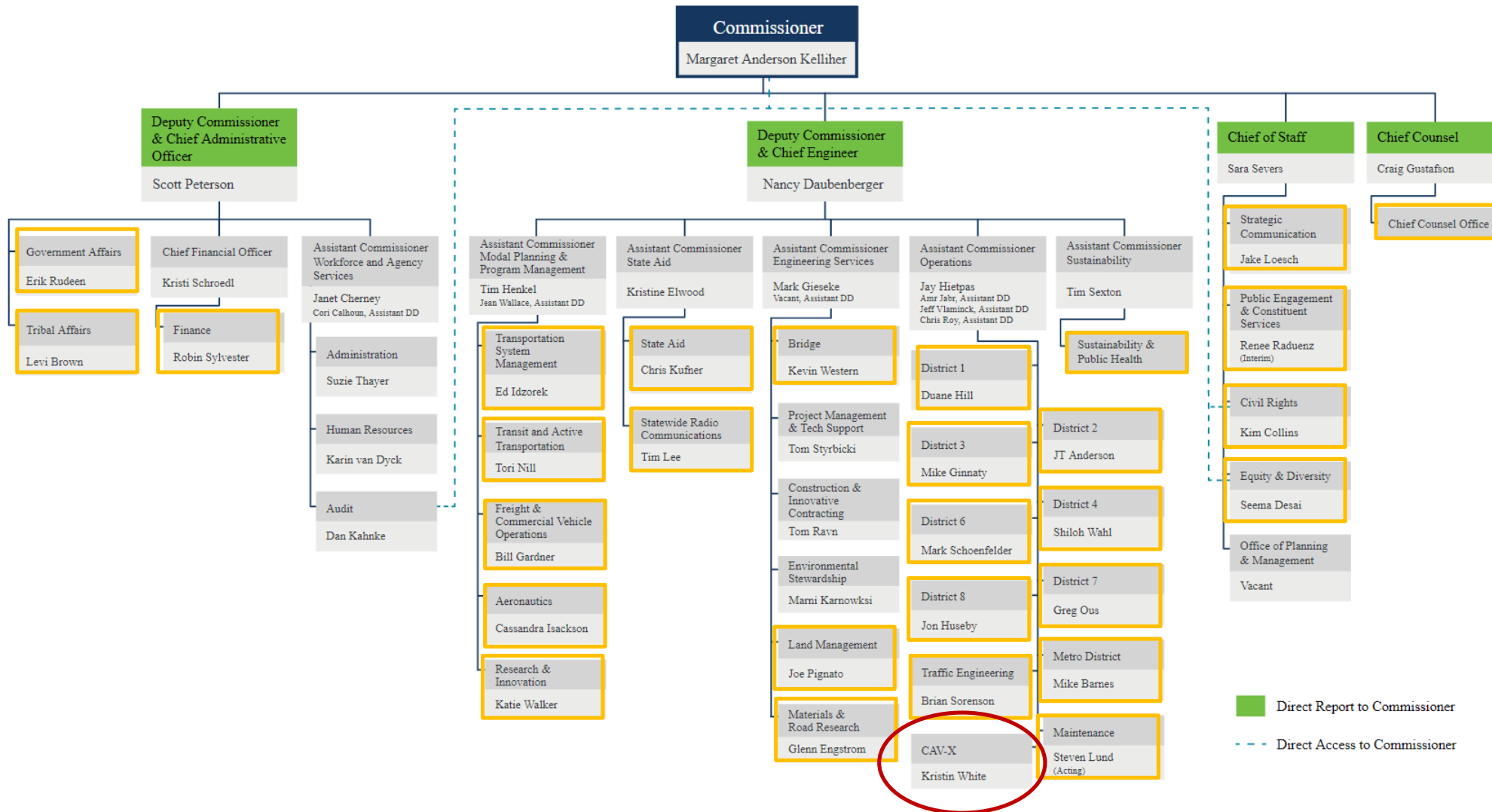
LAW & POLICY



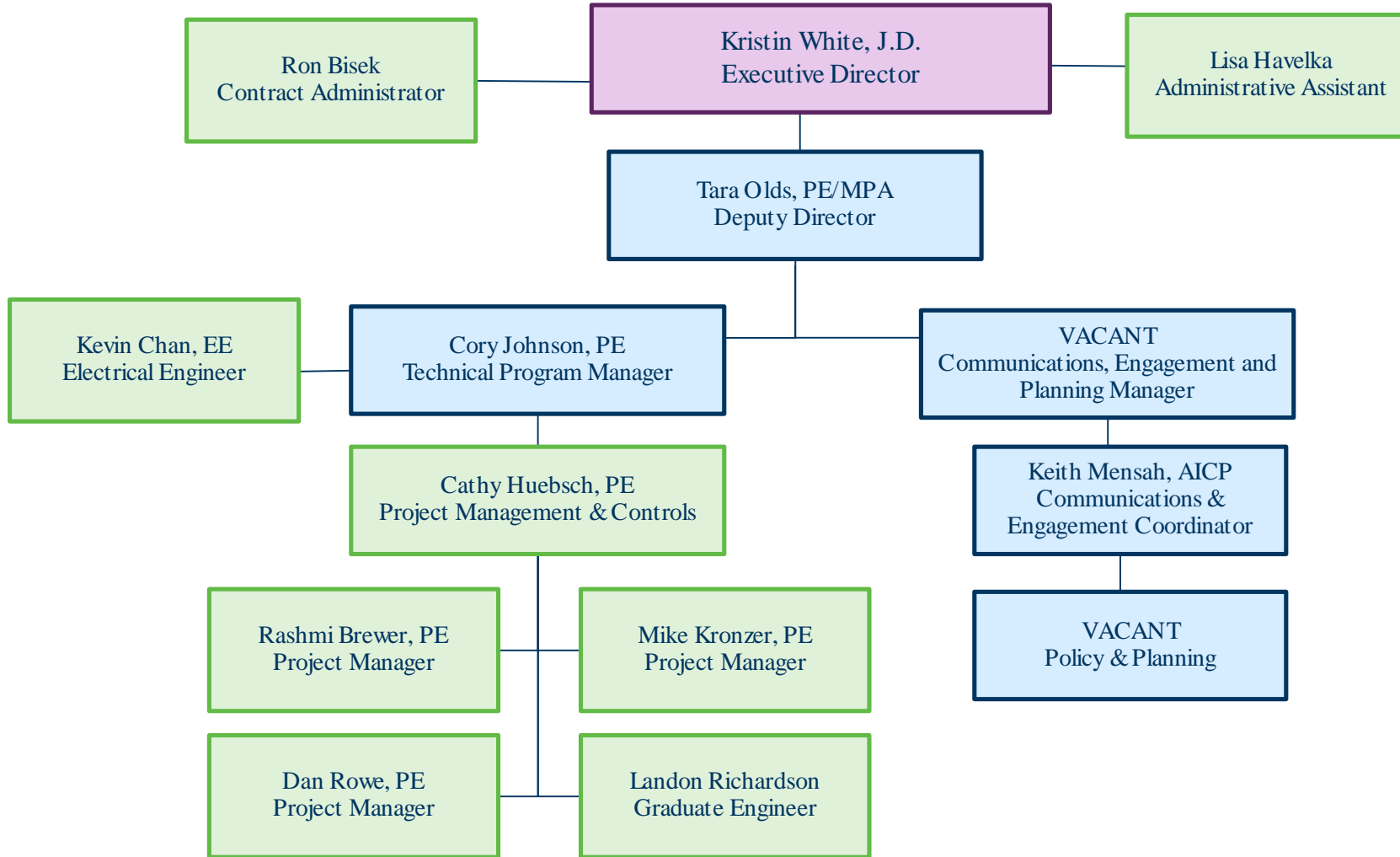
PLANNING



INSTITUTIONALIZE KNOWLEDGE



INTERDISCIPLINARY TEAMS





BUSINESS & WORK PLANING

FOCUS AREA	PROJECTS
COMMUNICATIONS	<ul style="list-style-type: none"> • Communication & engagement plan • Demonstrations • Pilots <ul style="list-style-type: none"> • Surveys • Annual conference
PARTNERSHIPS	<ul style="list-style-type: none"> • Minnesota CAV Challenge • Innovative Ideas program
CAPITAL INVESTMENT	<ul style="list-style-type: none"> • Connected Corridors program buildout • Pavement markings <ul style="list-style-type: none"> • Signals • Fiber optic
OPERATIONS & MAINTENANCE	<ul style="list-style-type: none"> • Automated truck mounted attenuator <ul style="list-style-type: none"> • Work zone data initiative • Centralized SPaT data
MULTIMODAL	<ul style="list-style-type: none"> • Automated bus consortium • Shuttle pilots <ul style="list-style-type: none"> • Autonomous freight

REGIONAL & NATIONAL WORK



MAASTO
MID AMERICA ASSOCIATION OF
STATE TRANSPORTATION OFFICIALS

AUVSI
ALL THINGS UNMANNED

U.S. Department of
Transportation

Federal Highway
Administration

ITS AMERICA

TRB
Transportation Research Board

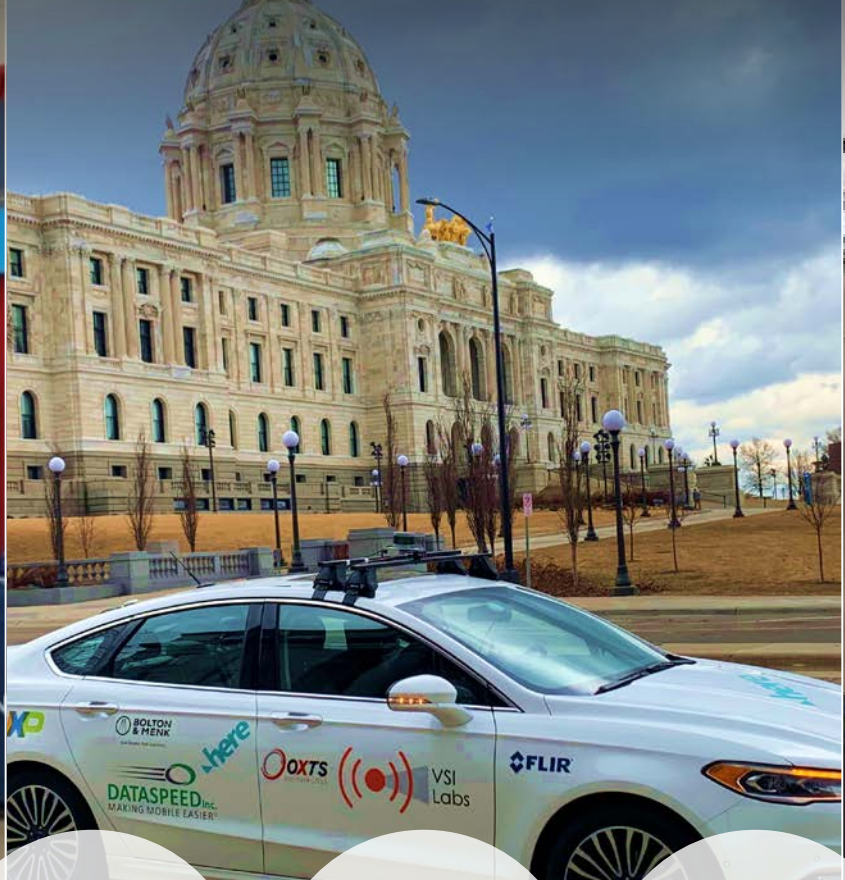
STRATEGIC INVESTMENT AND RESOURCING

STRATEGIC INVESTMENT

INNOVATION

COLLABORATION & KNOWLEDGE-SHARING

OUTREACH & ENGAGEMENT



Demos

Surveys

Workshops

Conferences

Resources

Website

Newsletter

THANK YOU

THE FUTURE OF MOBILITY COMES TO MINNESOTA

KRISTIN WHITE, J.D.
EXECUTIVE DIRECTOR
kristin.white@state.mn.us

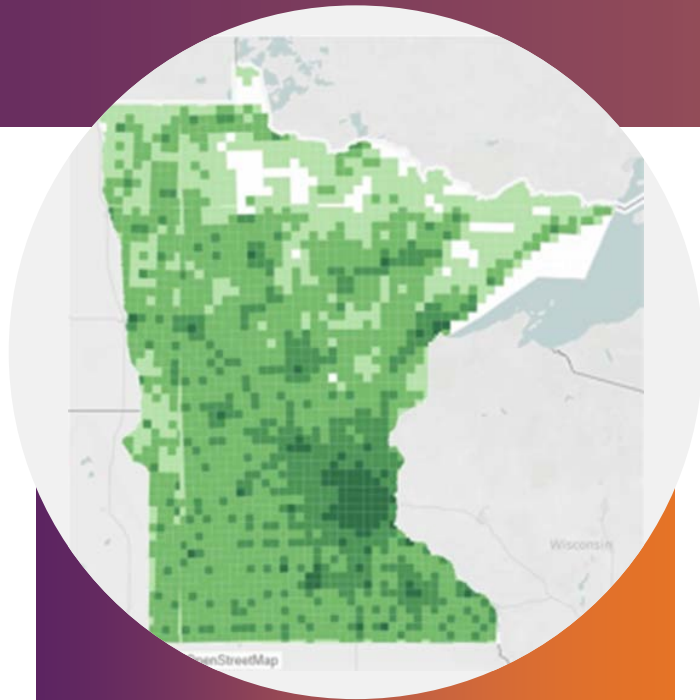


FIBER OPTIC PARTNERSHIPS & PLANNING

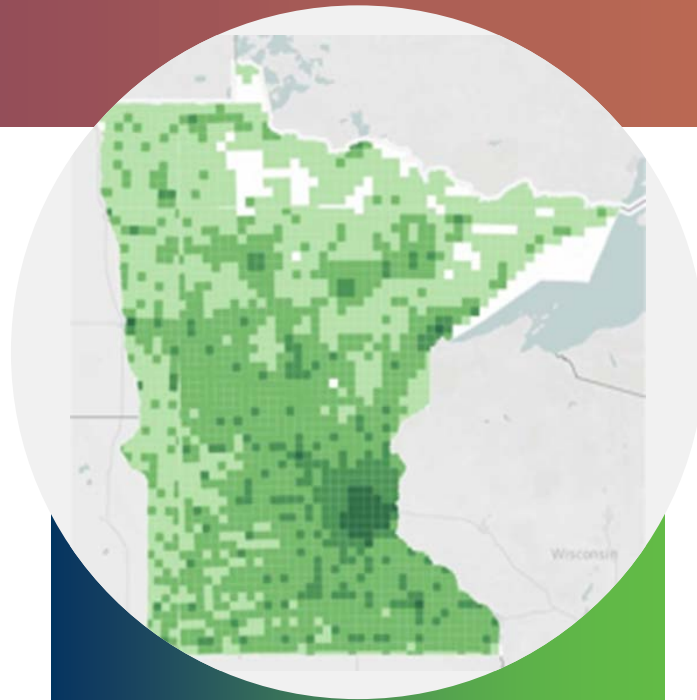
1. Expand telecommunications access

2. Support traffic operations and safety

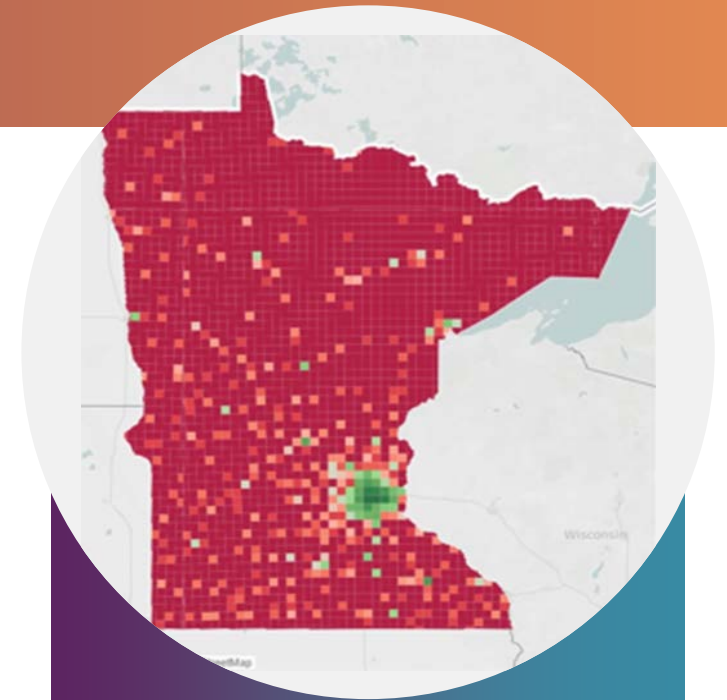
3. Plan for CAV



WHERE ARE THERE
GAPS?

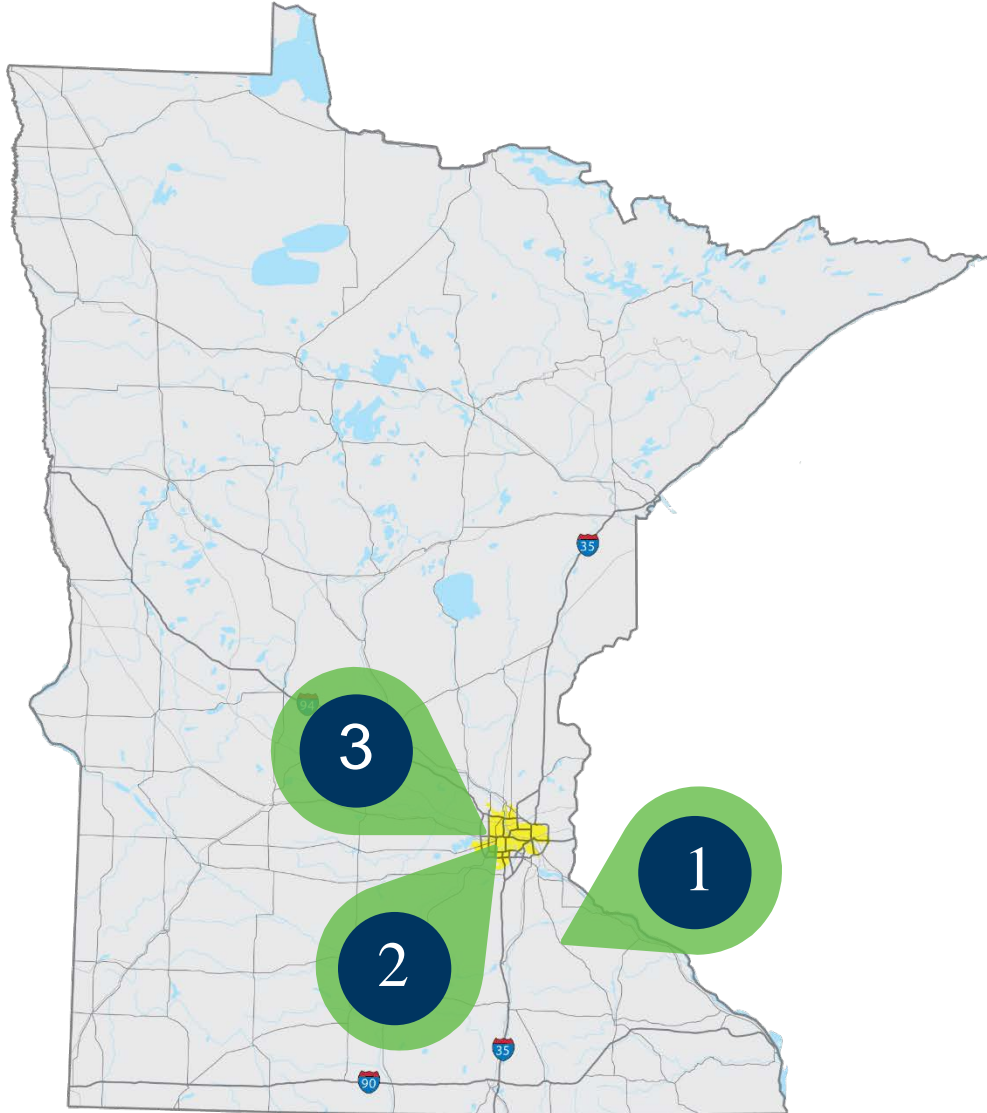


WHERE DOES
INDUSTRY PLAN TO
INVEST?



HOW CAN WE PARTNER
TO CONNECT
MINNESOTA?

MNDOT CORRIDOR PROJECTS



1 Rural Corridor

Enhanced traveler information from Rochester to St Paul



2 Interstate

Wider pavement markings
Better visibility for humans and AI
Exit ramps



3 Urban Connected Corridor

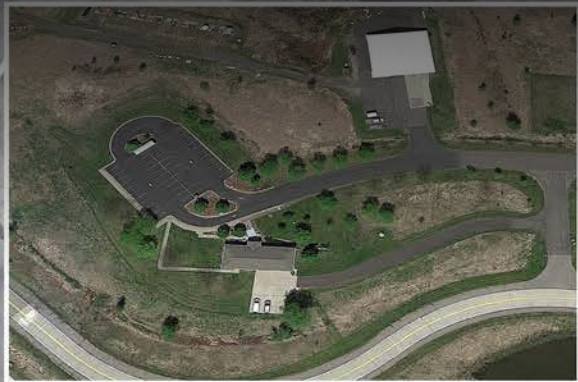
Signal phasing and timing
Secure data
Real-time monitoring



MNROAD TESTING

HIGH VOLUME I-94 SEGMENT

LOW VOLUME LOOP



MnROAD
Safer, Smarter, Sustainable Pavements Through Innovative Research



NORTH

AUTOMATED MAINTENANCE

NATIONAL COORDINATION WITH COLORADO AND MISSOURI

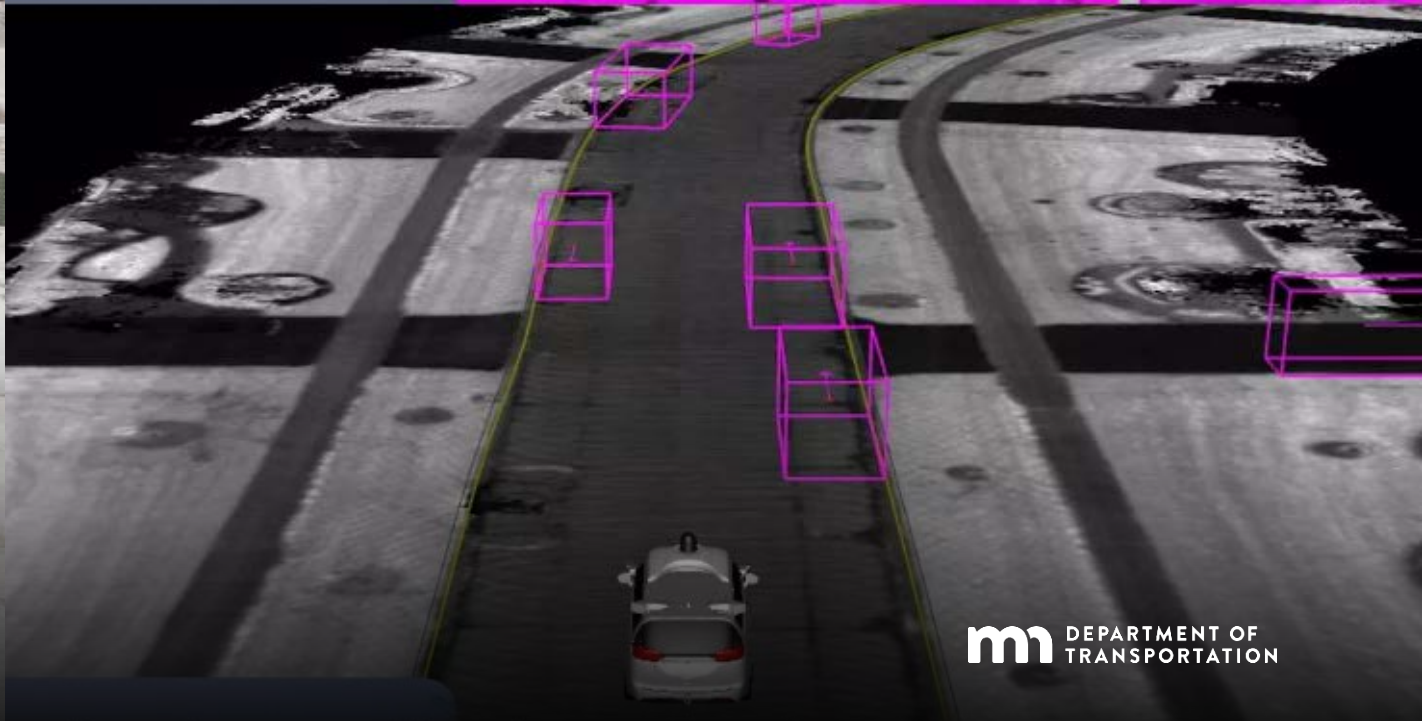
LEADER VEHICLE

WIRELESS "E-CRUMBS"

AMT



2018 RESEARCH





PEDESTRIAN DETECTION



WHEN IS IT COMING?

← NO AUTOMATION FULL AUTOMATION →



LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
No Automation	Driver Assist	Partial Automation	Conditional Automation	High Automation	Full Automation
Human operates everything	One piece of automation	Two or more	Not approved in U.S.	Geo-fenced Programmed stops Slow-speeds	No human driver

NOT JUST CARS

Self
Driving



PASSENGER

COMMERCIAL

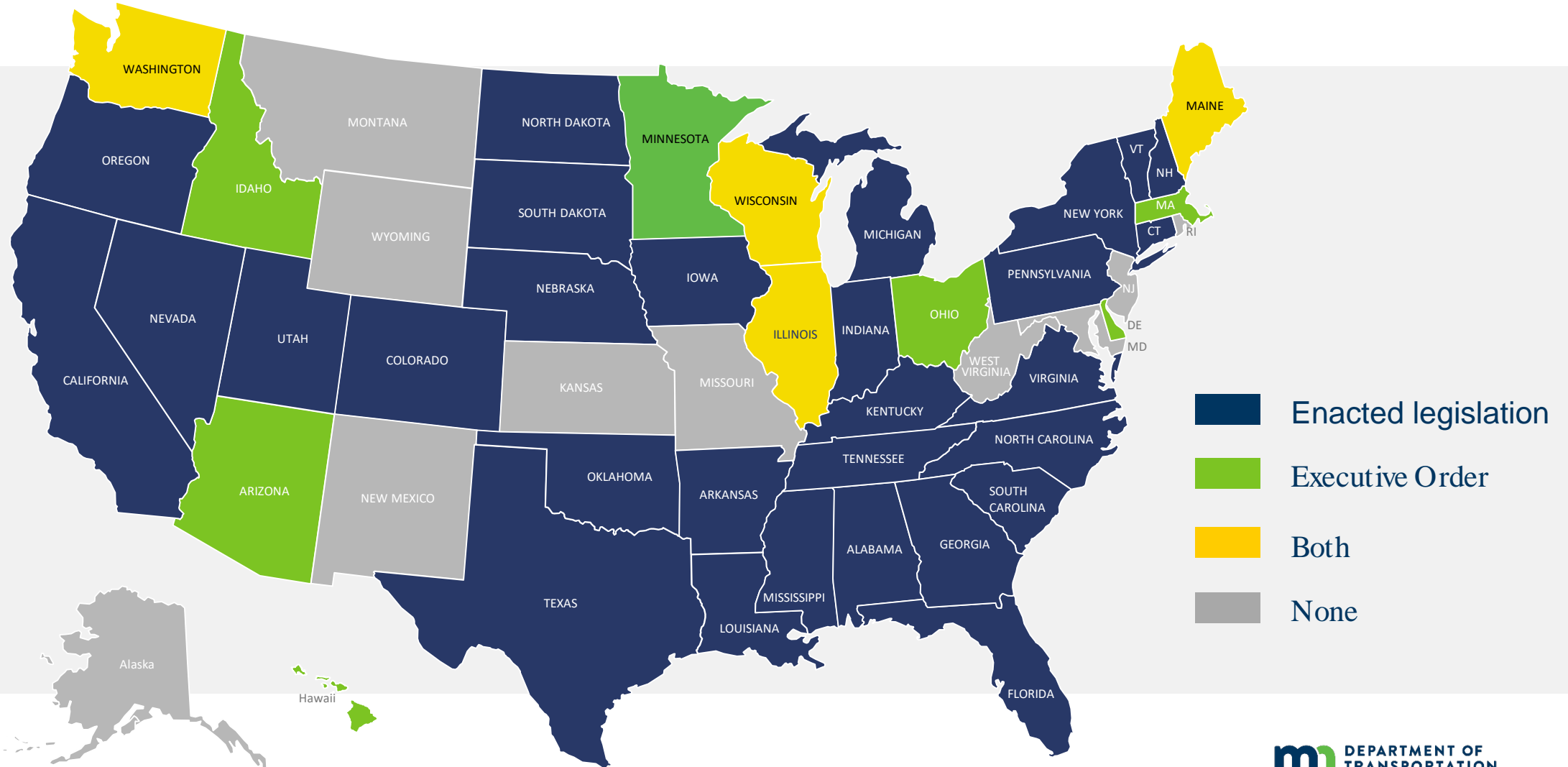
TRANSIT

BICYCLISTS

PEDESTRIANS

AUTOMATED VEHICLE BILL

SINCE 2012, AT LEAST 41 STATES AND D.C. HAVE CONSIDERED AV LEGISLATION



CONNECTED PLATOONING LAW

MINNESOTA NOW ALLOWS TRUCK PLATOONING CV TECHNOLOGY

