



Michigan DOT Connected & Automated Vehicle Support Activities

Collin Castle (MDOT)

2017 Wisconsin ITS Forum • November 8th • 2017

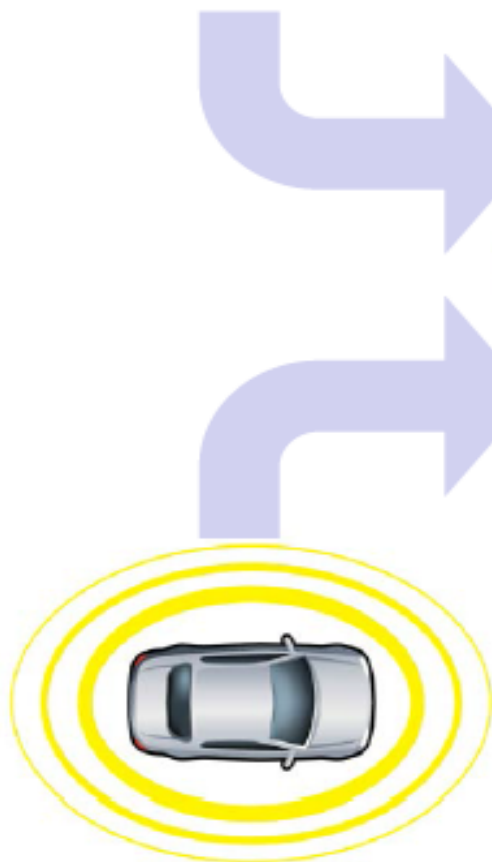
Michigan Traffic Fatalities



Connected Automation for Greatest Benefits

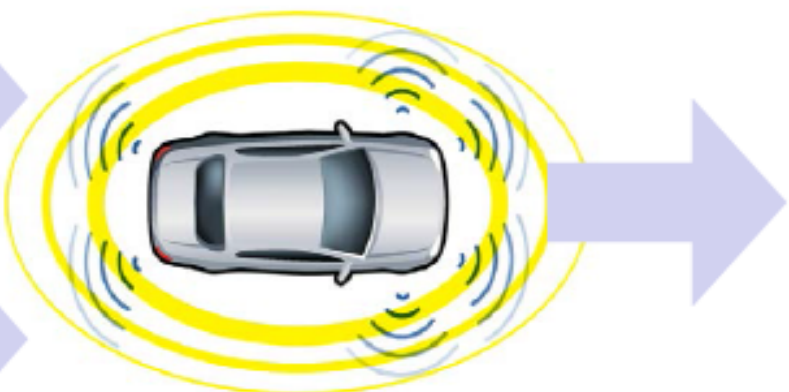
Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities



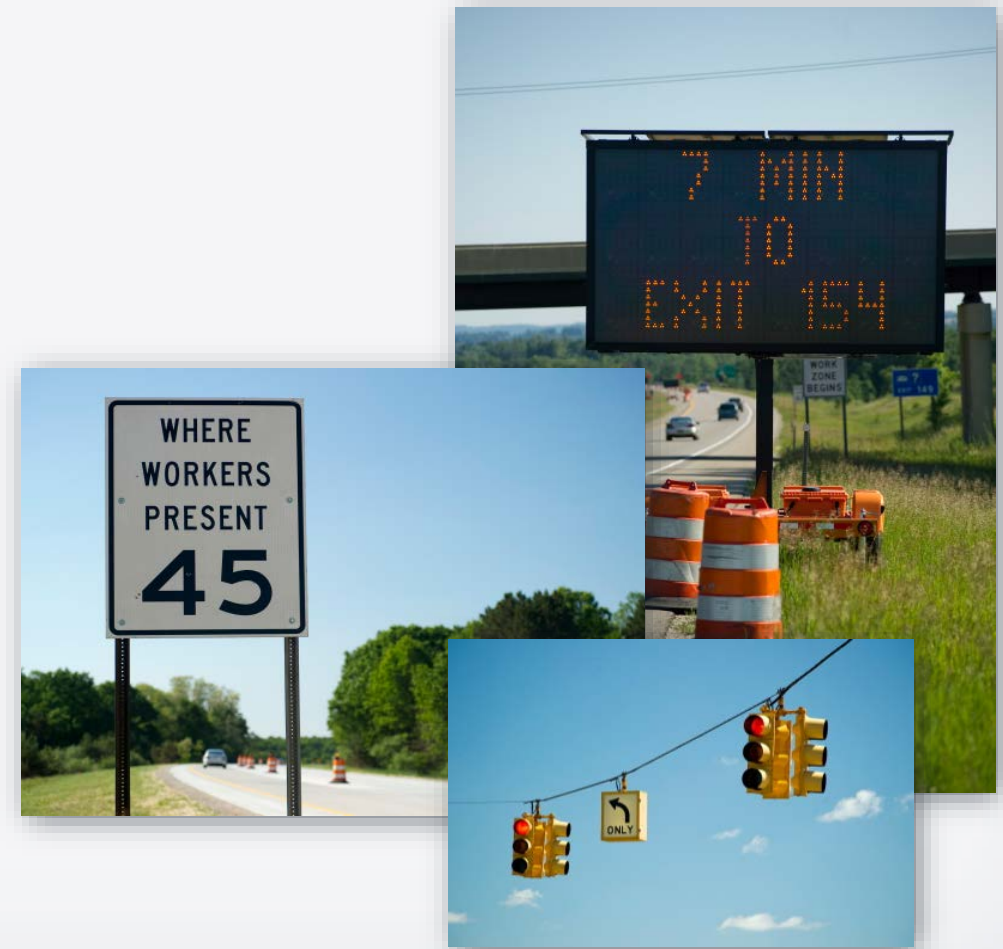
Connected Vehicle

Communicates with nearby vehicles and infrastructure



Infrastructure Support of Automated Vehicles

- ❑ Digital Infrastructure
 - ❑ Surveying / Digital Mapping
 - ❑ Vehicle-to-Infrastructure Connection
 - ❑ SPaT
 - ❑ Traveler Info
 - ❑ V2I Applications
- ❑ Physical Infrastructure
 - ❑ Pavement Markings
 - ❑ Roadway Signage
 - ❑ Geometric Design
- ❑ Regulatory Frameworks
 - ❑ Senate Bills/Public Acts



MICHIGAN DEPARTMENT OF TRANSPORTATION

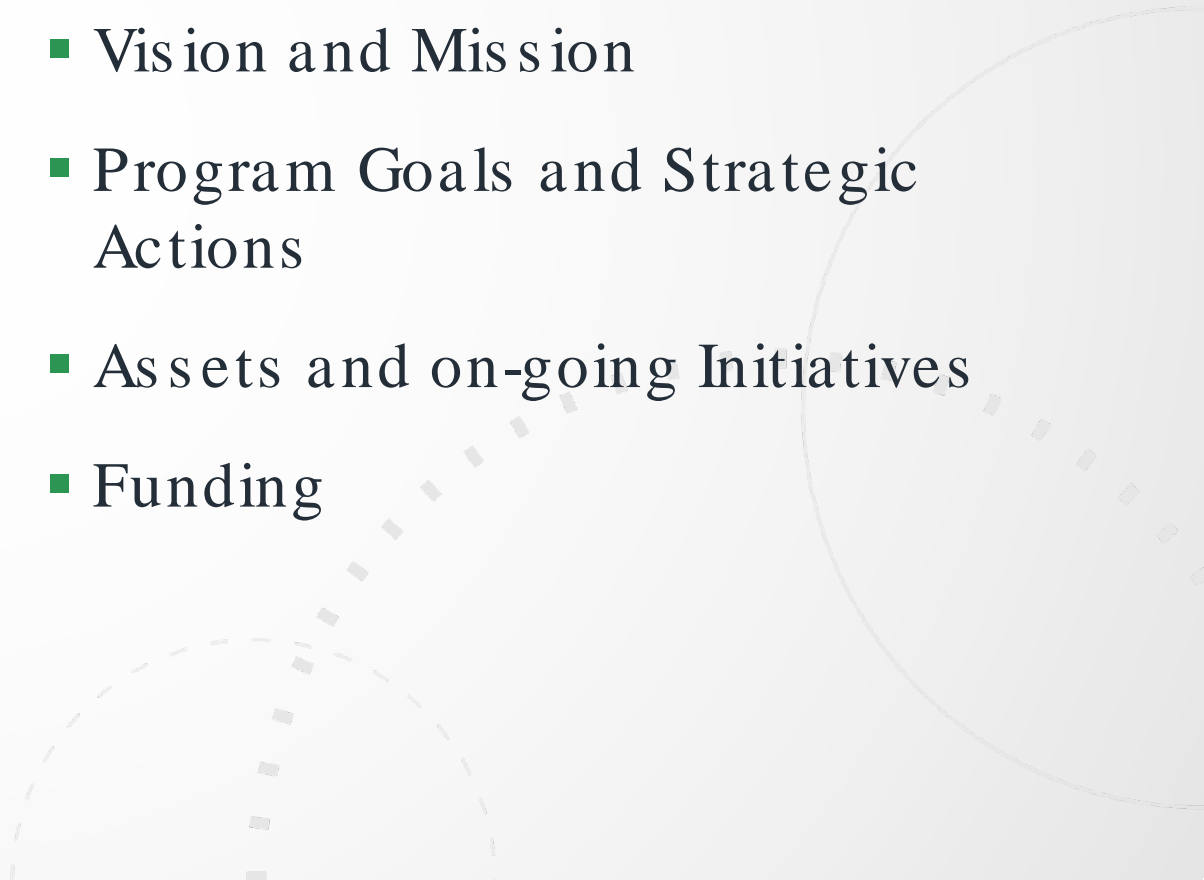
2017 Connected and Automated Vehicle Program Strategic Plan



Strategic Plan Overview



PLAN OUTLINES

- Introduction to CAV technology
 - Vision and Mission
 - Program Goals and Strategic Actions
 - Assets and on-going Initiatives
 - Funding
- 

VISION

MDOT's CAV Program will be recognized as a progressive and innovative leader, driving national efforts to explore and implement emerging mobility technologies.

MISSION

MDOT will work to ensure Michigan remains the national leader in the evolution of CAV technologies, to deliver enhanced transportation safety and reliability, providing economic benefit and improved quality of life.

MICHIGAN FOCUS AREAS

1

Infrastructure

2

V2I
Applications

3

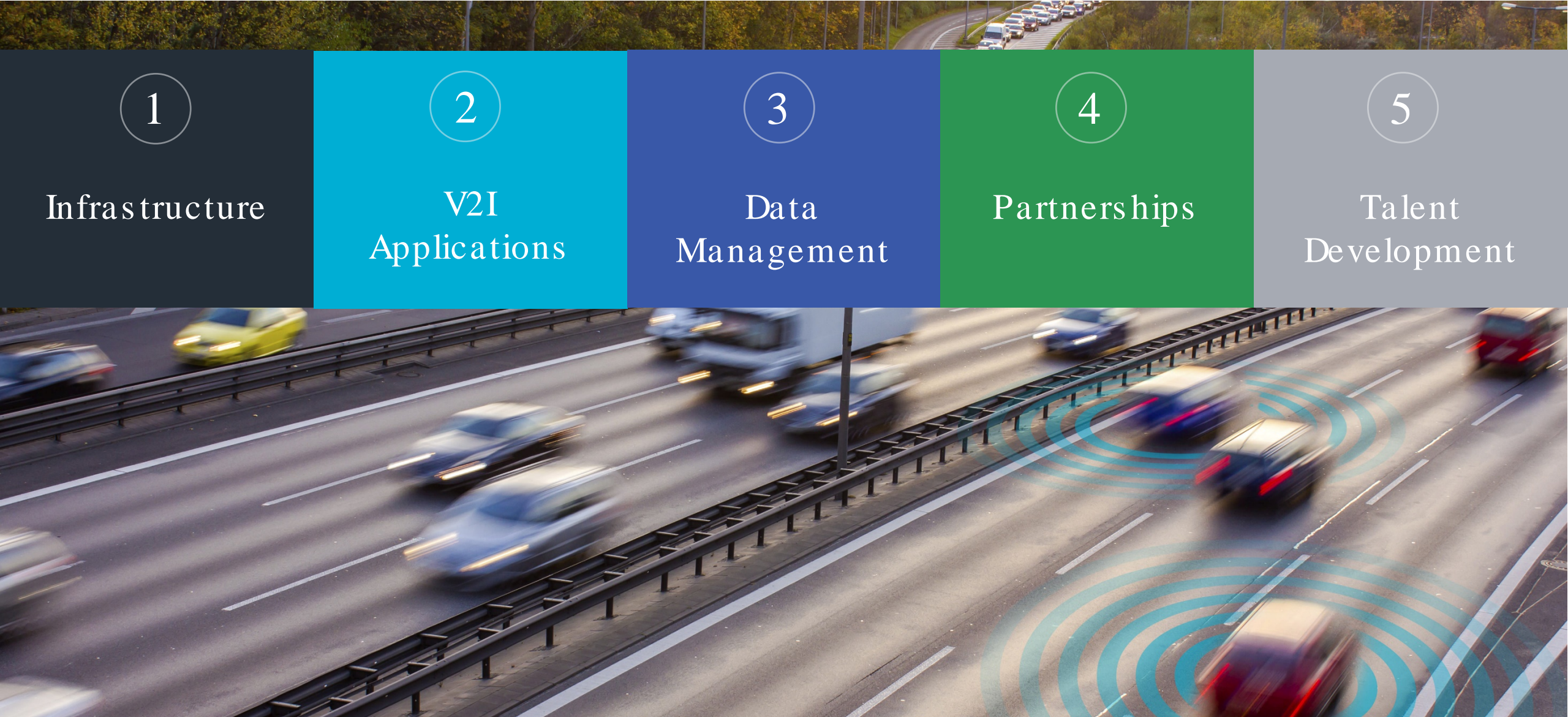
Data
Management

4

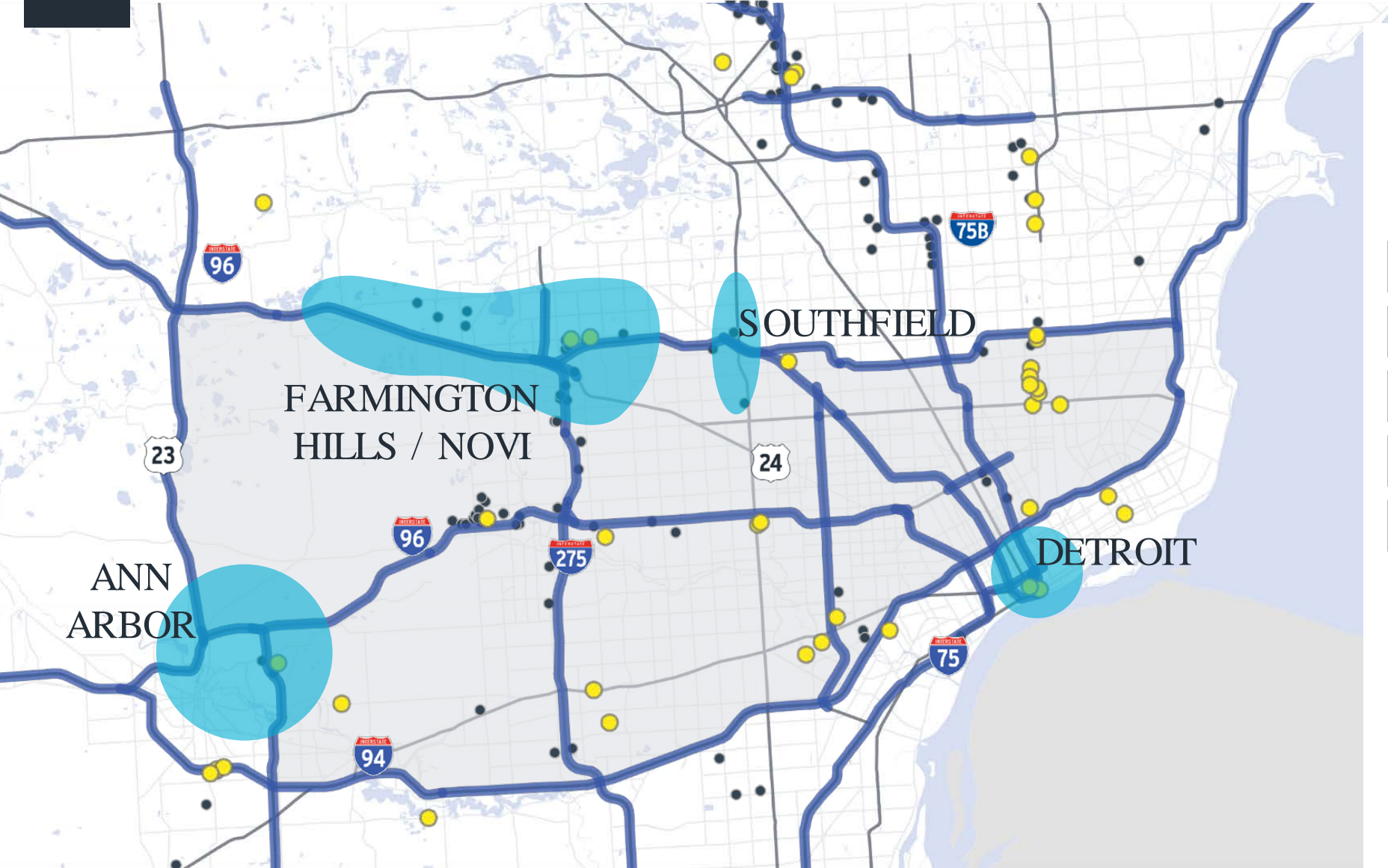
Partnerships

5

Talent
Development



Southeast Michigan Connected Vehicle Assets



- Connected Vehicle Environment
- Connected Vehicle Test Beds
- Tier 1 Automotive Suppliers
- Major OEM Facilities
- MDOT Roadway ITS Coverage

Initial Pilot Applications



Red Light Violation
Warning



Work Zone
Warning/
Management

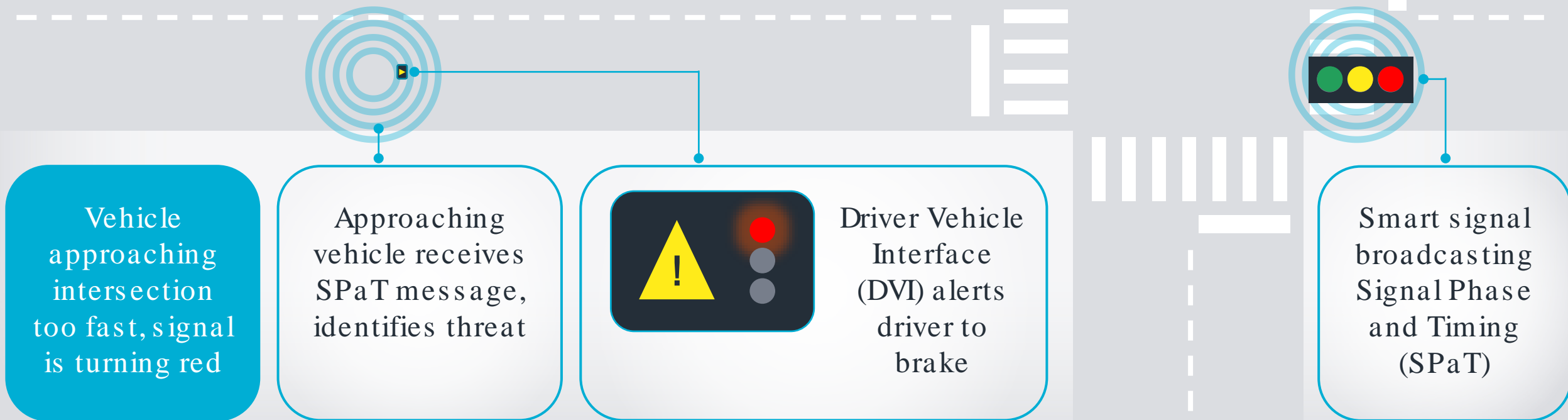


Road Weather
Management



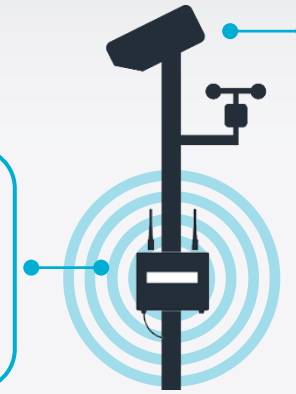
Pavement
Condition

Red Light Violation Warning

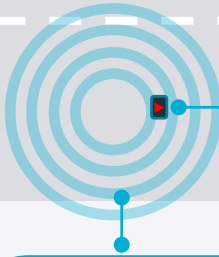


Road Weather Management

Portable Road Side Unit (RSU) sends weather warning to vehicle



Road weather station detects icing conditions, reports conditions to weather office



Vehicle is approaching hazardous weather conditions area

Approaching vehicle receives message of road ice in area **from RSU and/or cellular network**



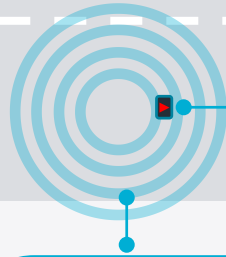
Driver Vehicle Interface (DVI) example

Driver reduces speed in response to warning

Work Zone Warning/ Management



Portable RSU sends
work zone info to
vehicle



Vehicle is
approaching
work zone too
fast

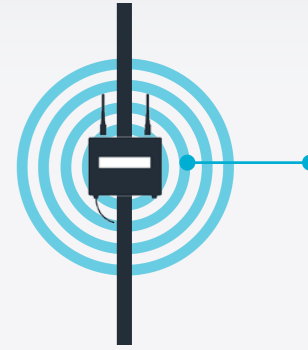
Approaching
vehicle receives
message
from **RSU** with
work zone
information



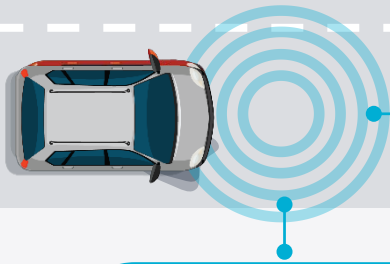
Driver Vehicle
Interface (DVI)
provides
warning of
lane closure



Pavement Condition Monitoring



roadside unit sends pothole data to operations center



Vehicle drives over pothole in pavement

Sensors in vehicle detect sharp acceleration at location from the pothole strike, stores data

Maintenance crews respond to fix pothole

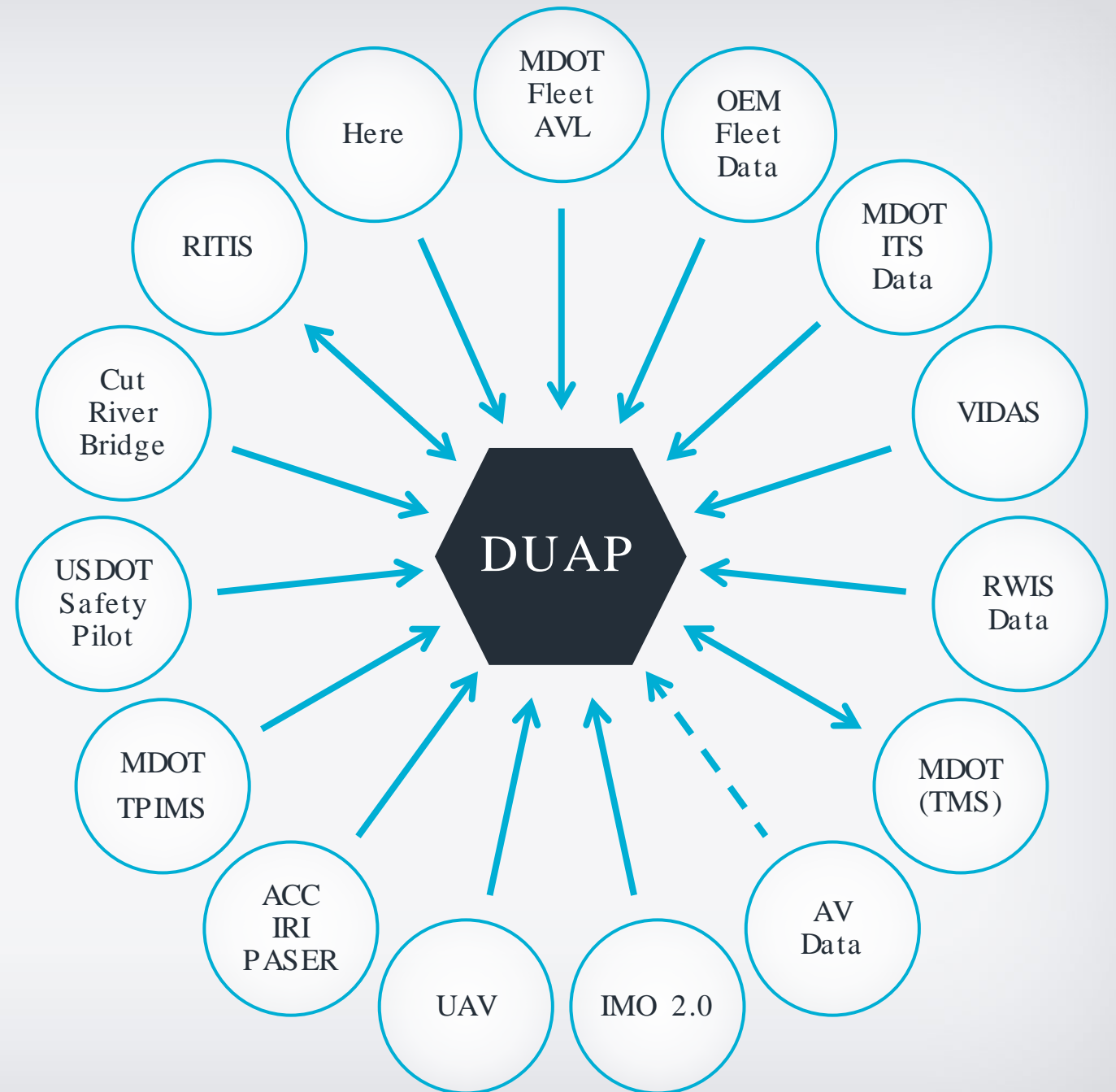
Vehicle broadcasts location and data to nearby roadside units as it drives past

MDOT receives data from that vehicle (and lots of others), dispatches maintenance crew

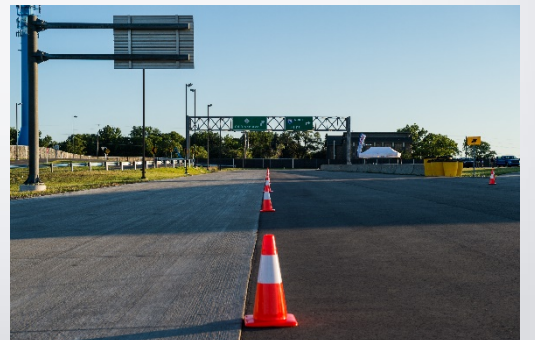


Heat map of pavement conditions

MDOT's Data Use Analysis and Processing (DUAP) program is pioneering the collection and fusion of CV data with a wide range of data sources.



Mobility Transformation Center (M-City)





American Center for Mobility

CONNECTED. AUTOMATED. VALIDATED.

A non-profit testing and product development facility,
designed to enable safe validation of CAV technology, and
accelerate the development of voluntary standards

American Center for Mobility (ACM)

- ❑ Letters of support from ~40 companies
- ❑ \$20M Funded from MI Strategic Fund
- ❑ Schedule of Activities:
 - ❑ Property Purchased: November 4, 2016
 - ❑ Ground Breaking: November 21, 2016
 - ❑ Test Environment & ITS Design Work: Underway
 - ❑ USDOT AV Proving Grounds Designation: January 17, 2017
 - ❑ Opening Highway Loop: Planned Winter 2017



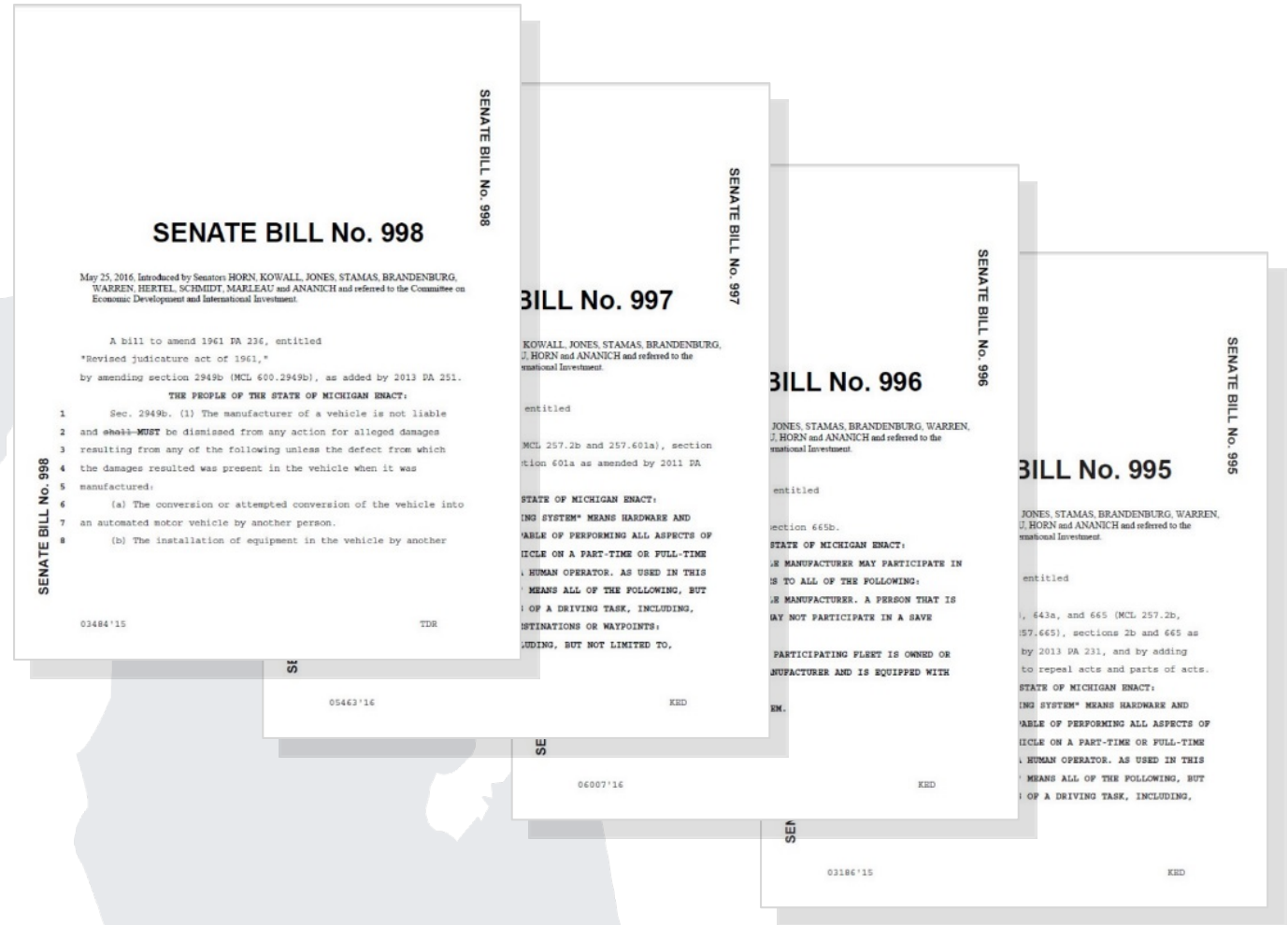
AV Legislative Actions: MI Senate Bills

Legislation Introduced by Senators

- Mike Kowall (R-White Lake)
- Rebekah Warren (D-Ann Arbor)
- Ken Horn (R-Frankenmuth)

Signed into Law by Governor Snyder

Led the way to opening Michigan up for the business of automated vehicles





Public Act No. 332

Mike Kowall (R-White Lake), Primary Sponsor

SENATE BILL No. 995

May 25, 2016. Introduced by Senator KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTZEL, COLBERG, SCHMIDT, MARLEAU, HORN and ANANICIC and referred to the Committee on Economic Development and International Investment.

A Bill to amend 1949 PA 302, entitled "Michigan vehicle code," by amending sections 2b, 402b, 441, 643a, and 645 (MCL 207.2b, 207.402b, 207.441, 207.443a, and 207.445), sections 2b and 645 as added and section 402b as amended by 2011 PA 211, and by adding sections 45c, 406b, and 655a; and to repeal acts and parts of acts.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

1 Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND
2 SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF
3 THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME
4 BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS
5 SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT
6 DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING:

SENATE BILL No. 995

03184 115 XED

Putting AV's on the Road

Eliminates "test only" restriction

Allows driverless operation on public roads at any time





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Mike Kowall (R-White Lake), Primary Sponsor

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THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING:

SENATE BILL No. 995
1
2
3
4
5
6

03161 '16

KED



Open for Transport

Platooning of commercial vehicles

Supporting the military, large shipping or logistics companies



Public Act No. 332

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A bill to amend 1949 PA 302, entitled "Michigan vehicle code," by amending sections 2b, 402b, 441, 443a, and 445 (MCL 207.2b, 207.402b, 207.441, 207.443a, and 207.445); sections 2b and 445 as added and section 402b as amended by 2011 PA 211, and by adding sections 45c, 406b, and 655a; and to repeal acts and parts of acts.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING:

SENATE BILL NO. 995

03181 '16

KED

A New Way to Ride

Automated vehicle networks connected to consumers

Creates array of travel options for consumers





Public Act No. 332

Mike Kowall (R-White Lake), Primary Sponsor

SENATE BILL NO. 995

SENATE BILL No. 995

May 25, 2016, Introduced by Senator KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTZEL, COLEBECK, SCHMIDT, MARLEAU, HORN and KAWANACHI and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 302, entitled "Michigan vehicle code," by amending sections 2b, 402b, 441, 643a, and 645 (MCL 207.2b, 207.402b, 207.441, 207.643a, and 207.645), sections 2b and 645 as added and section 402b as amended by 2011 PA 211, and by adding sections 45c, 606b, and 655a; and to repeal acts and parts of acts.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING:

SENATE BILL NO. 995

03/04/16

KED



State of Michigan Support

Council on Future Mobility reports to the legislature annually on new laws or regulations

What new policies would help enhance safety, mobility and the state's economy through this technology



Public Act No. 333

Mike Kowall (R-White Lake), Primary Sponsor

SENATE BILL No. 996

SENATE BILL No. 996

May 25, 2016, Introduced by Senator KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTZEL, COLEBECK, SCHMIDT, MARLEAU, WOOD and ANASTASIOU and referred to the Committee on Economic Development and International Development.

A bill to amend 1949 PA 300, entitled "Michigan vehicle code," (MCL 257.1 to 257.923) by adding section 449.

THE PEOPLE OF THE STATE OF MICHIGAN BEHAVE:

SEC. 449. (1) A MOTOR VEHICLE MANUFACTURER MAY PARTICIPATE IN A SAVE PROJECT IF IT SELF-CERTIFIES TO ALL OF THE FOLLOWING:

(A) THAT IT IS A MOTOR VEHICLE MANUFACTURER, A PERSON THAT IS NOT A MOTOR VEHICLE MANUFACTURER MAY NOT PARTICIPATE IN A SAVE PROJECT.

(B) THAT EACH VEHICLE IN THE PARTICIPATING FLEET IS OWNED OR CONTROLLED BY THE MOTOR VEHICLE MANUFACTURER AND IS EQUIPPED WITH ALL OF THE FOLLOWING:

(i) AN AUTOMATED DRIVING SYSTEM.

SENATE BILL No. 996

00007'16

XED



Supports Manufacturers

Provides specific standards for SAVE projects

Vehicle networks started and controlled by vehicle manufacturers



Public Act No. 334

Rebekah Warren (D-Ann Arbor), Primary Sponsor

SENATE BILL No. 997

Mar 25, 2016, Introduced by Senator WARREN, KOPWALL, JONES, STAMAS, BRANDENBURG, HERTZEL, COLBERG, SCHMIDT, MARLENE, WISBY and AMANN/CR and referred to the Committee on Economic Development and International Development

A bill to amend 1949 PA 300, entitled "Michigan vehicle code," by amending sections 20 and 401a (MCL 207.20 and 207.401a), section 20 as added by 2012 PA 221 and section 401a as amended by 2011 PA 121, and by adding section 465a.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

1 Sec. 20. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND
2 SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF
3 THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME
4 BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS
5 SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT
6 DOES NOT INCLUDE STATISTICAL ASPECTS OF A DRIVING TASK, INCLUDING,
7 BUT NOT LIMITED TO, DETERMINING DESTINATIONS OR WAYPOINTS,
8 (A) OPERATIONAL ASPECTS, INCLUDING, BUT NOT LIMITED TO,

05443 '16 XED

World Class Destination

Creates the American Center for Mobility (ACM)

The mission of the ACM is still evolving and will include vehicle testing in real world conditions





Public Act No. 335

Ken Horn (R-Frankenmuth), Primary Sponsor

SENATE BILL No. 998

May 25, 2016 Introduced by Senators HORN, KOVALL, ZONER, STAMAK, BRANDENBURG, WARREN, BERTEL, SCHMIDT, MARLEAU and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1961 PA 236, entitled "Revised Jurisdiction act of 1961,"

by amending section 2949b (MCL 600.2949b), as added by 2013 PA 251,

THE PEOPLE OF THE STATE OF MICHIGAN BEAUFORT,

1 Sec. 2949b. (1) The manufacturer of a vehicle is not liable

2 and shall ~~NOT~~ be dismissed from any action for alleged damage

3 resulting from any of the following unless the defect from which

4 the damage resulted was present in the vehicle when it was

5 manufactured.

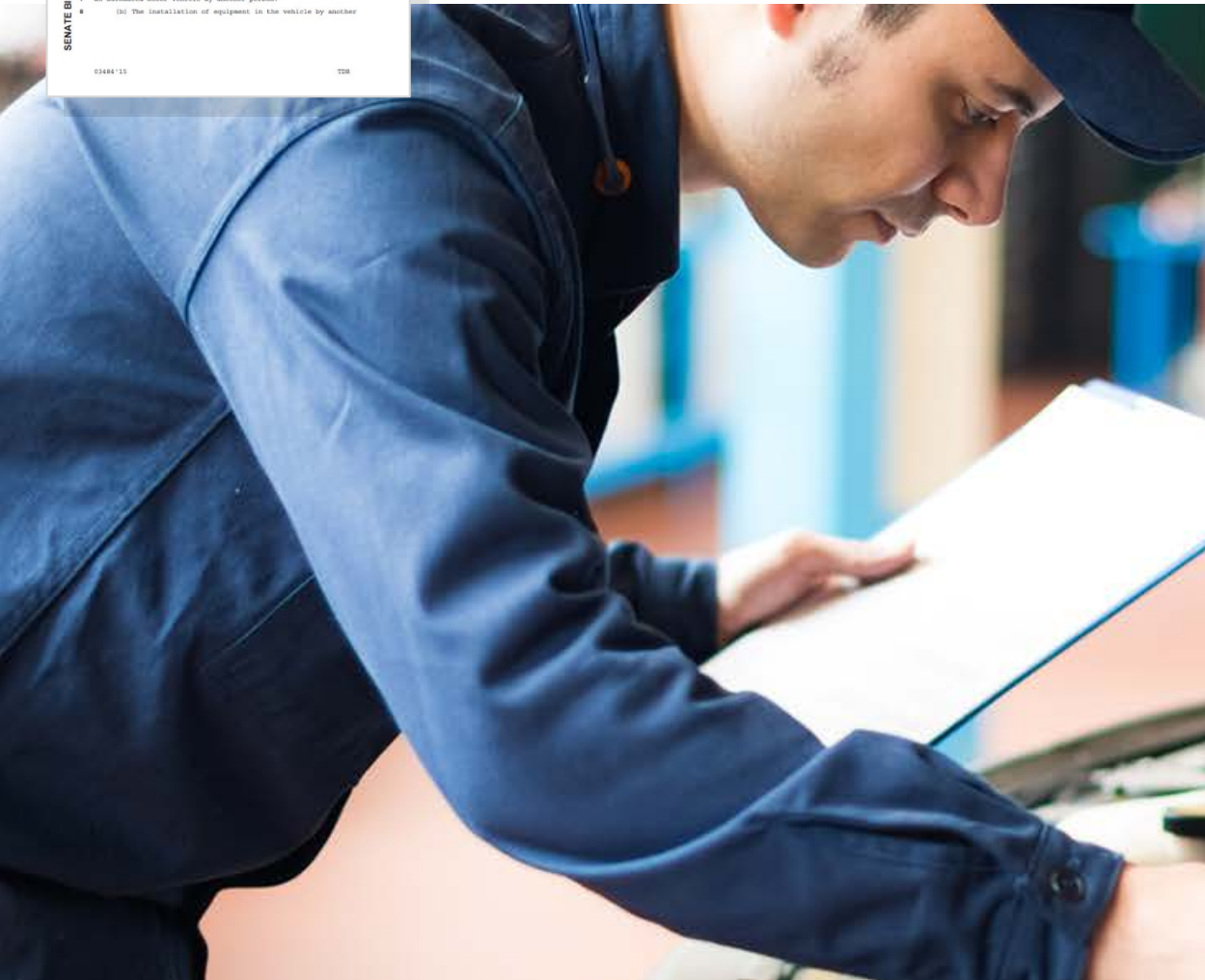
6 (a) The conversion or attempted conversion of the vehicle into

7 an automated motor vehicle by another person.

8 (b) The installation of equipment in the vehicle by another

SENATE BILL No. 998

03484 '16 TDR



Protection for Mechanics

Ensures that a mechanic, acting in compliance, will not be exposed to liability when working on autonomous technology.

The logo for planetm features the word "planet" in a bold, green, lowercase sans-serif font, followed by "m" in a white, lowercase sans-serif font inside a dark blue circle. Below the logo is the tagline "Michigan. Where big ideas in mobility are born." in a white, lowercase sans-serif font. The background is a dark blue gradient with a network of white lines and dots, and various circular icons representing transportation and technology, such as a car, a truck, a train, a helicopter, a traffic light, a smartphone, a location pin, a speedometer, a tank, and a hand pointing at a screen.

planetm[®]

Michigan. Where big ideas in mobility are born.

“

Michigan is the global center for automotive technology and development. By establishing guidelines and standards for self-driving vehicles, we're continuing that tradition.

Governor Rick Snyder

”

Contact Information

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PLANET M Website

www.planetm.com