Assessing Network and Policy Readiness

Steering Connected and Automated Mobility in the Right Direction
The 10th Annual UCLA Downtown Los Angeles Forum on Transportation, Land Use and the Environment

April 2017

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Agenda

Technical Overview

National, State, and Local Policy and Regulatory Context

Infrastructure Network Readiness

Case Studies

Looking Forward to CAV Readiness

TECHNICAL OVERVIEW

Connected and Autonomous Vehicles

- At least some aspect of control occurs **without driver input**
- May be **automated or connected**
- Implications for **safety, convenience, and physical environment**

V2V

Each vehicle is a node with the ability to send and receive critical safety + mobility information to other vehicles

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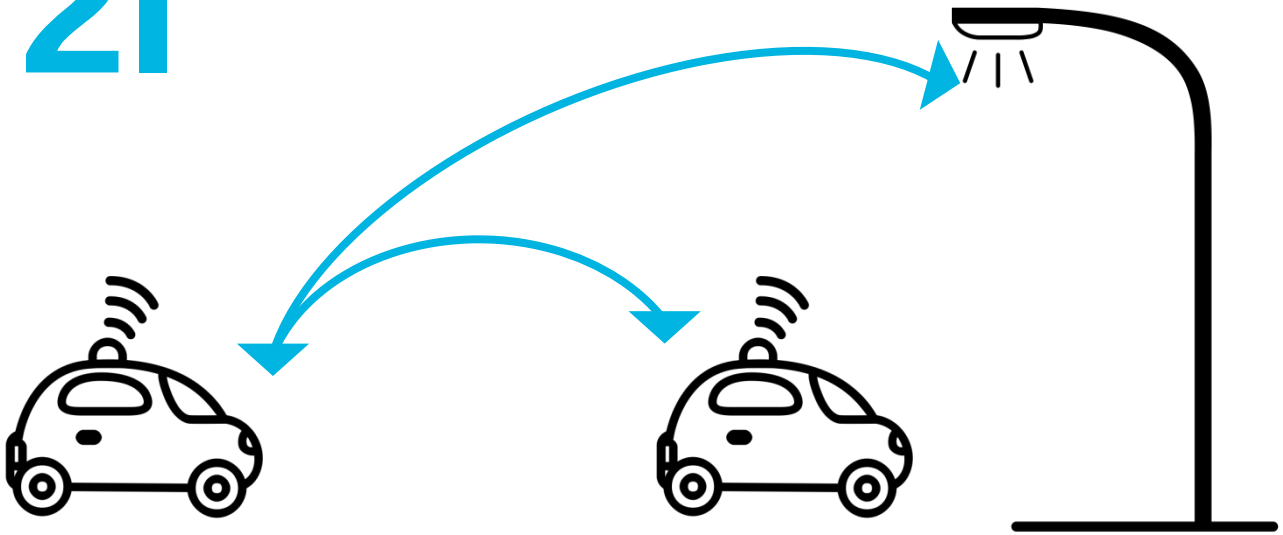
V2I



Vehicles are able to send and receive information to surrounding infrastructure

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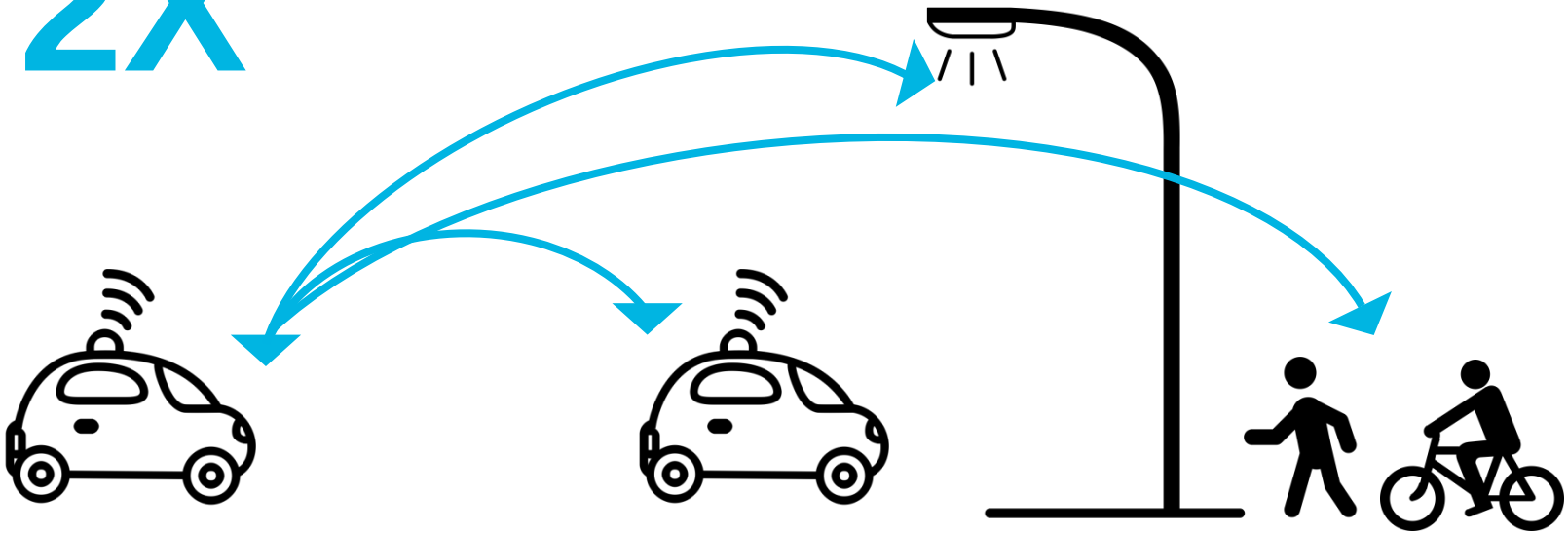
V2X



Vehicles can communicate with other vehicles, infrastructure, and other users of the public right-of-way

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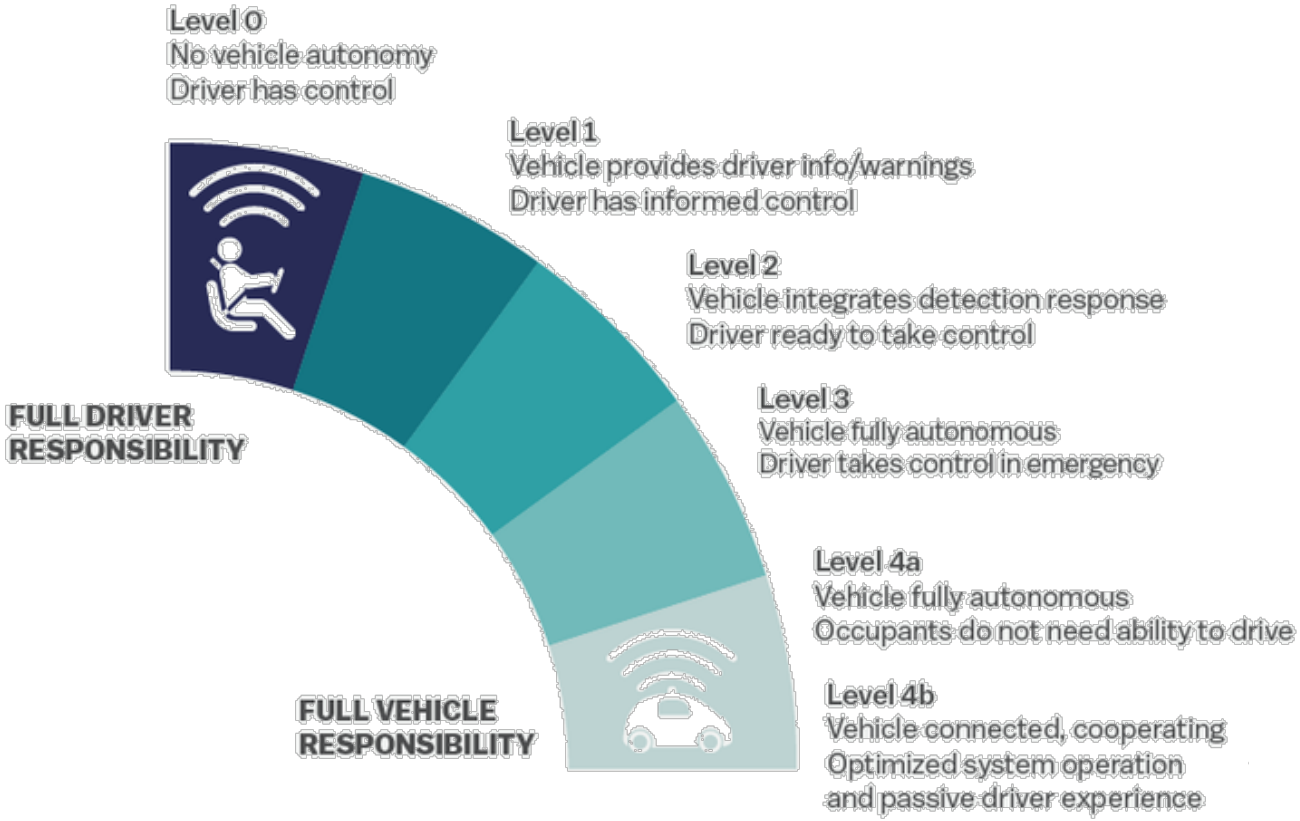
Levels of Autonomy



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Source: NHTSA's levels of autonomy graphic by Vox

Source: Ryan Automotive

4

years until there will be autonomous vehicles on the road (Ford)

~40

years for full fleet conversion (Victoria Transport Policy Institute)

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90%

reduction in accidents(AAA)

$190b

saved per year in U.S. by 2050 (McKinsey)

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90%

reduction in accidents(AAA)

$190b

saved per year in U.S. by 2050 (McKinsey)

50

minutes saved per day (McKinsey)

2,200

square miles of parking need reduced (McKinsey)

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80%

fewer cars
(MIT/NY, ITF/Lisbon, VDV/Stuttgart)

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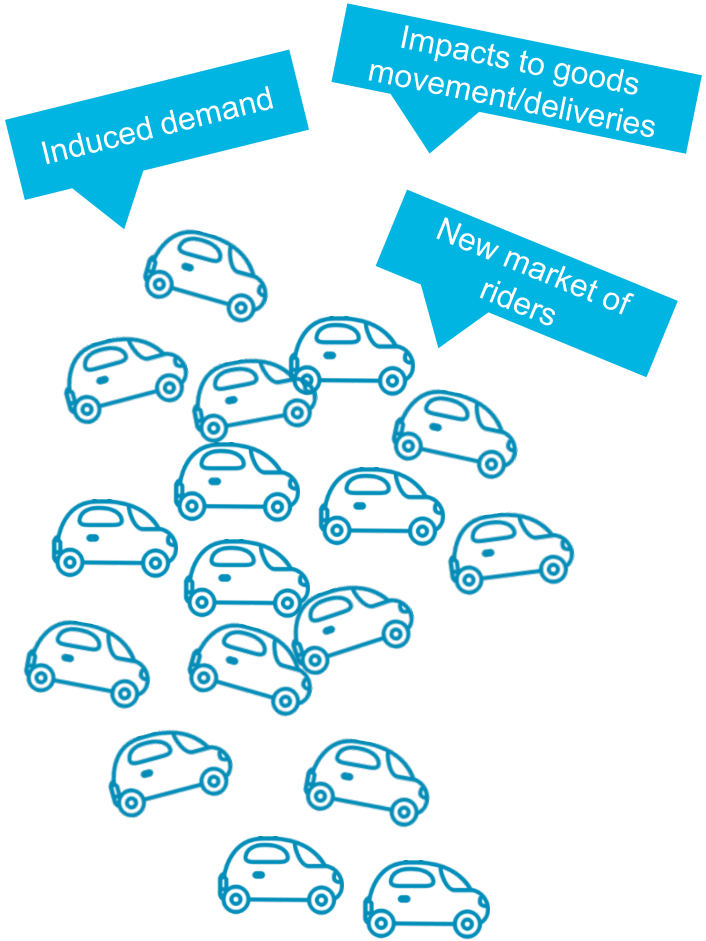
OR



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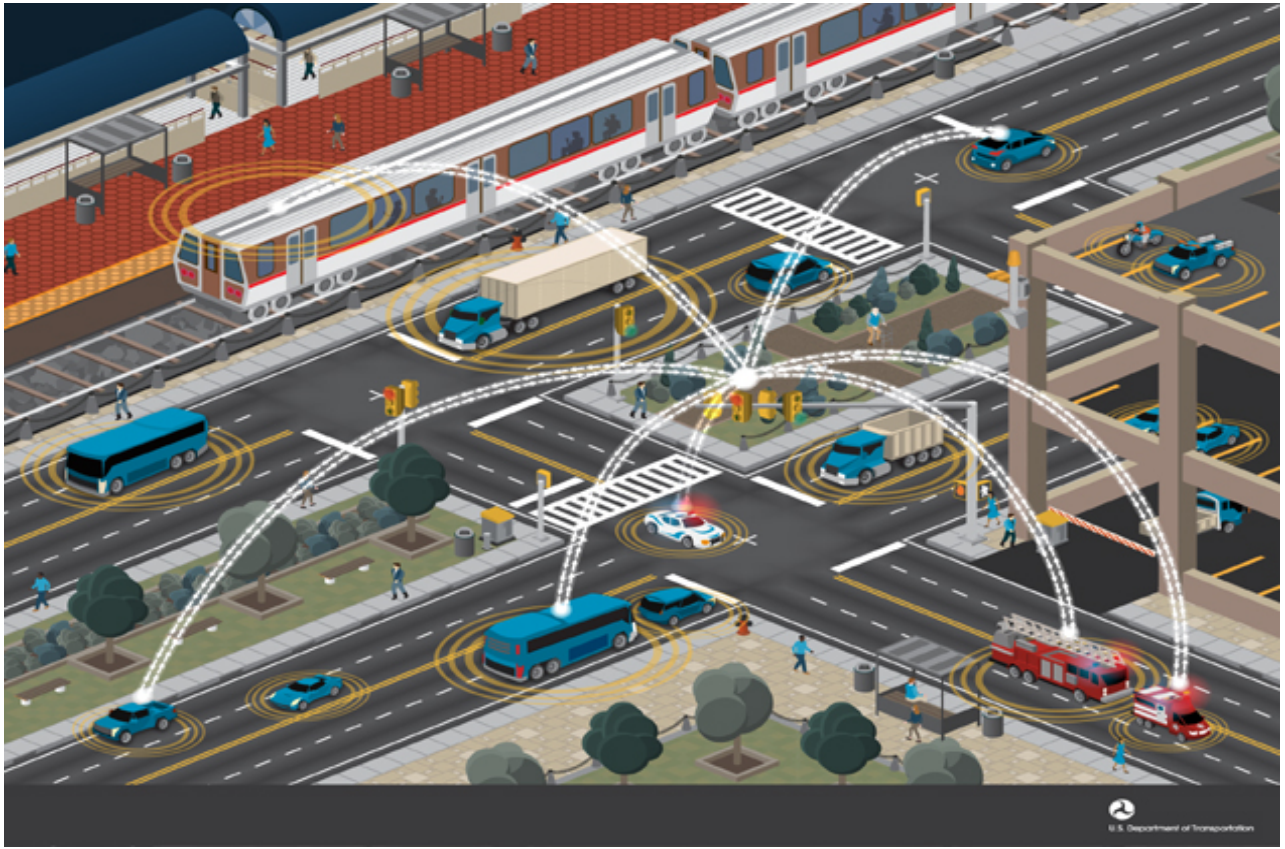
NATIONAL, STATE, AND LOCAL POLICY AND REGULATORY CONTEXT

Federal Regulatory Guidance: Vehicle to Infrastructure Communications



Lays out the eligibility for federal aid for V2I technology under programs to address safety, mobility, congestion and air quality

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Federal Regulatory Guidance: Vehicle to Vehicle Communication

- Requires automakers to include V2V technologies in all new light-duty vehicles
- Proposes requiring V2V devices to “speak the same language” through standardized messaging developed with industry.

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Federal Regulatory Guidance: Federal Automated Vehicles Policy

- Vehicle Performance Guidance
- Model State Policy
- Current Regulatory Tools
- New Tools and Authorities

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Autonomous Vehicles Under the New Administration

"We are now seeing the advent of autonomous vehicles, artificial intelligence, smart cars, and also drones.

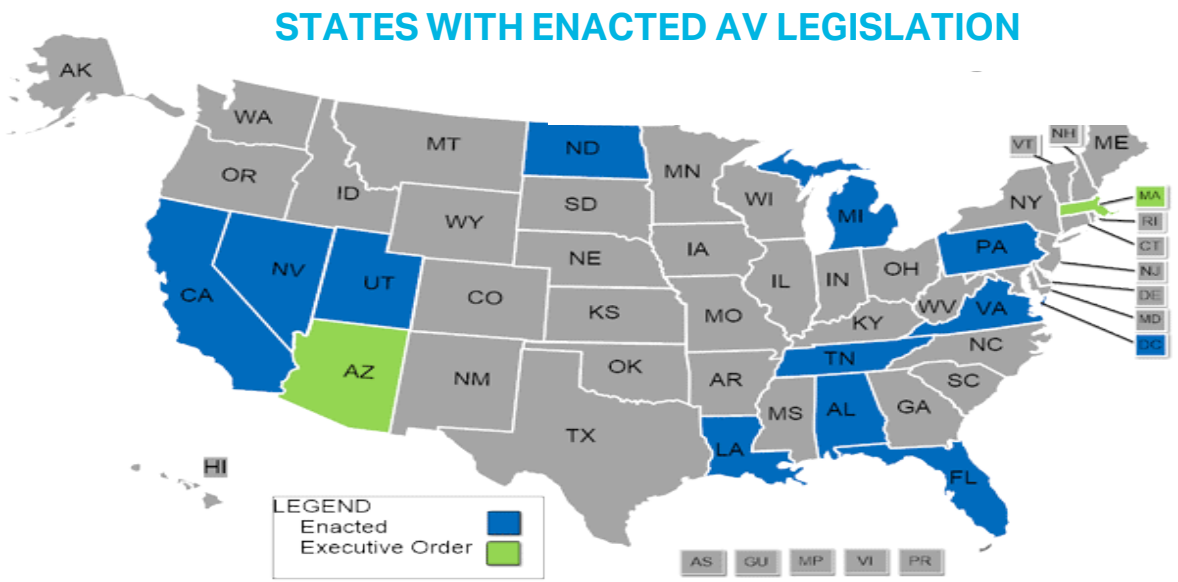
While the benefits are very much known, there are also ***concerns about how they will continue to develop****, and I will work with this committee and the Congress to address many of these concerns. But we need to do so in a way that will* ***not dampen the basic creativity and innovation of our country****." –Elaine Chao*

Chao's stances on emerging technologies:

- **Chao wants to start a "national conversation"** about how to regulate autonomous vehicles and eliminate burdensome regulations;
- **She promised to "work as a catalyst"** for the safe implementation of technology;
- **And agreed to work with all public and private stakeholders** to craft evidence-based policies.

State Regulatory Context

- Since 2012, 34 states and Washington D.C. have considered legislation related to autonomous vehicles
- Eleven states have passed legislation
- Several states are moving forward with testing in the absence of enacted regulation



Source: National Conference of State Legislatures

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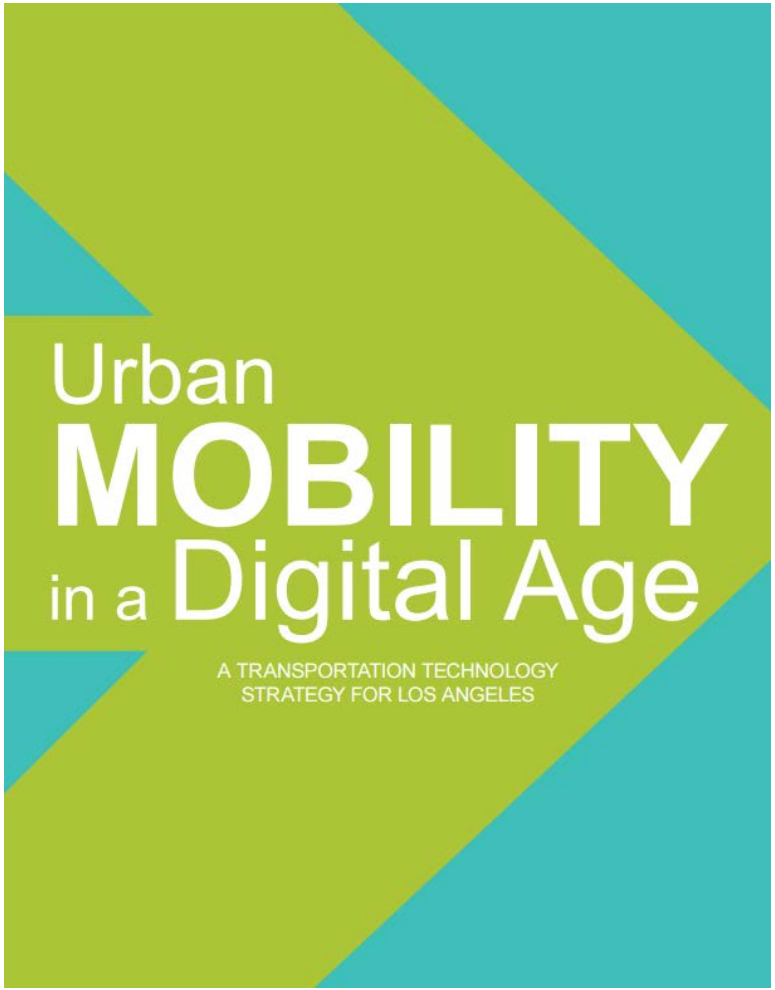
California Regulatory Context

– Testing of Autonomous Vehicles

– Deployment of Autonomous Vehicles for Public Operation



Local Policy Context

- City of Los Angeles DOT
- Funded by Goldhirsh Foundation fellowship and Mayor's Fund of Los Angeles
- How to manage public right-of-way, provide and partner to offer services, and understand how to meet city needs.

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Transportation Technology STRATEGY

1
Build a solid data foundation.

POLICY RECOMMENDATIONS
1. Define what can be shared.
2. Adopt privacy principles.
3. Develop a standard data sharing agreement.
4. **Create a regional blueprint for system integration.***
5. Establish design guidelines for digital infrastructure.

TODAY (0-2 years)
1. Inventory available data.*
2. Create a wishlist for other data sets + prioritize.*
3. Create a data analysis bench contract + grow internal capacity.*
4. Develop a roadmap for new data resources.

TOMORROW (3-5 years)
1. Make the data easier to use with data dictionaries and other tools.
2. Adopt APIs + other tools to streamline sharing.

FUTURE (6+ years)
- Leverage data to manage a more flexible transportation system with public + private service providers.

2
Leverage tech + design for a better transportation experience.

POLICY RECOMMENDATIONS
1. Create ATSAC 3.0.
2. Enforce congestion-busting rules for safety.
3. Adopt a customer bill of rights and metrics for transportation happiness.
4. Require corridor + building designs that serve multiple modes.
5. Eliminate parking minimums.
6. Rethink parking garages.
7. Stop widening roads.

TODAY (0-2 years)
1. **Code the curb to optimize access.***
2. Develop customer-centered requirements for public services.
3. Integrate real-time data + tech into urban design and planning processes.
4. Publish data on EV charging station locations.
5. **Advance fleet conversion to greener fuel.***

TOMORROW (3-5 years)
1. Create a unified wayfinding program.
2. Route transit by demand where suitable.
3. Expand ExpressPark citywide.
4. Introduce a portal for employers to manage transit benefits.

FUTURE (6+ years)
- Create a universal fare system for LA.

3
Create partnerships for more shared services.

POLICY RECOMMENDATIONS
1. Update regulations to include new transportation modes.
2. Make it easier to work with the City + provide a level playing field.
3. Adopt a new transportation demand management (TDM) ordinance for developments.

TODAY (0-2 years)
1. **Develop a shared mobility action plan.**
2. Form a multi-discipline mobility assessment team to understand changes + data needs.
3. **Designate an innovation pilot project manager.*°**

TOMORROW (3-5 years)
1. Bring sharing to City Hall through carsharing, bikesharing + carpooling platforms.
2. Launch a mobility lab.

FUTURE (6+ years)
- Implement Mobility as a Service.

4
Establish feedback loops for services + infrastructure.

POLICY RECOMMENDATIONS
1. Become a more responsive service provider by enabling feedback + measuring impact.
2. Establish a project evaluation standard.

TODAY (0-2 years)
1. Create a user experience working group.
2. Investigate new tools for the ongoing evaluation of infrastructure conditions.
3. Engage the entire community on infrastructure assessments.
4. Partner and support a marketing campaign on shared mobility.

TOMORROW (3-5 years)
1. Streamline LADOT online content + launch a project dashboard.
2. Prepare the workforce for changes driven by innovation in transportation tech.
3. Adopt multi-modal smart fare system.

FUTURE (6+ years)
- Develop a methodology to move to Infrastructure as a Service.

5
Prepare for an automated future.

POLICY RECOMMENDATIONS
1. **Call for mobility innovation in California.**
2. Collaborate regionally to promote interoperability.
3. Launch a taskforce on data monetization strategies.
4. Advocate for new approaches to financing infrastructure projects.

TODAY (0-2 years)
1. **Develop a business plan for a city AV fleet.***
2. Create a dedicated staff position focused on connected and automated vehicle tech.
3. **Implement blind spot detection systems for public transit vehicles.***
4. Expand LADOT connected bus technologies fleet-wide.
5. Invest in lane markings that enhance effectiveness of lane departure warning and prevention systems.

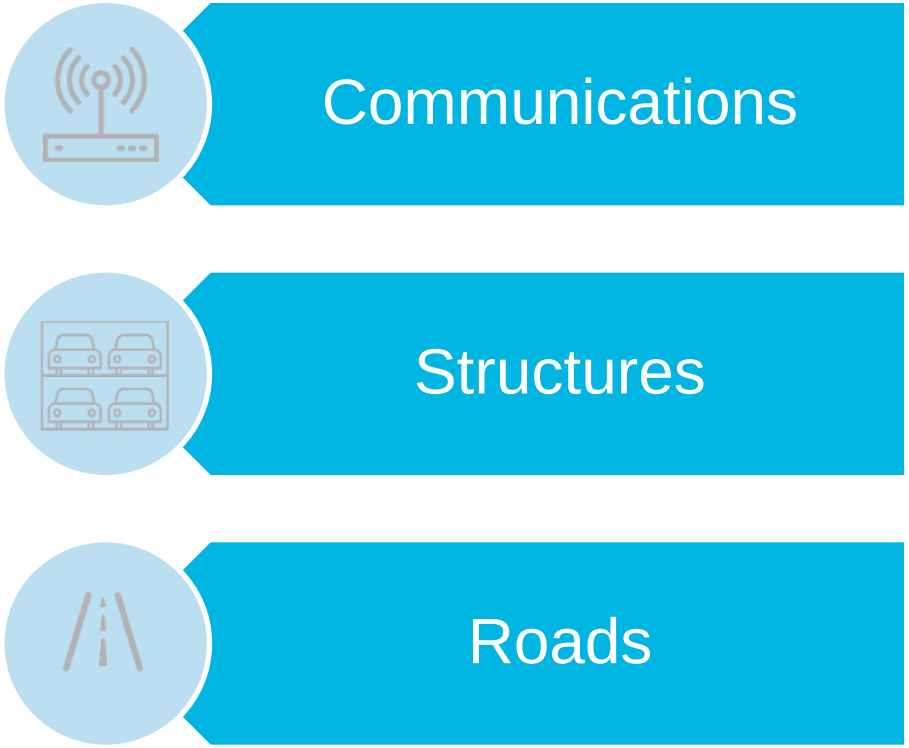
TOMORROW (3-5 years)
1. Create better access to ATSAC data and enhance transparency of network prioritization for planning.
2. Develop an AV road network along transit and enhanced vehicle networks.
3. Launch a Data as a Service program to provide real-time infrastructure data to connected vehicles.

FUTURE (6+ years)
- Convert the public transit vehicle fleet to fully automated.

° Action proposed for bench contracts. ** Action already planned or underway.*

INFRASTRUCTURE NETWORK READINESS

Infrastructure and Network Readiness: Infrastructure Assets and CAVs



Framework adapted from RAC Foundation

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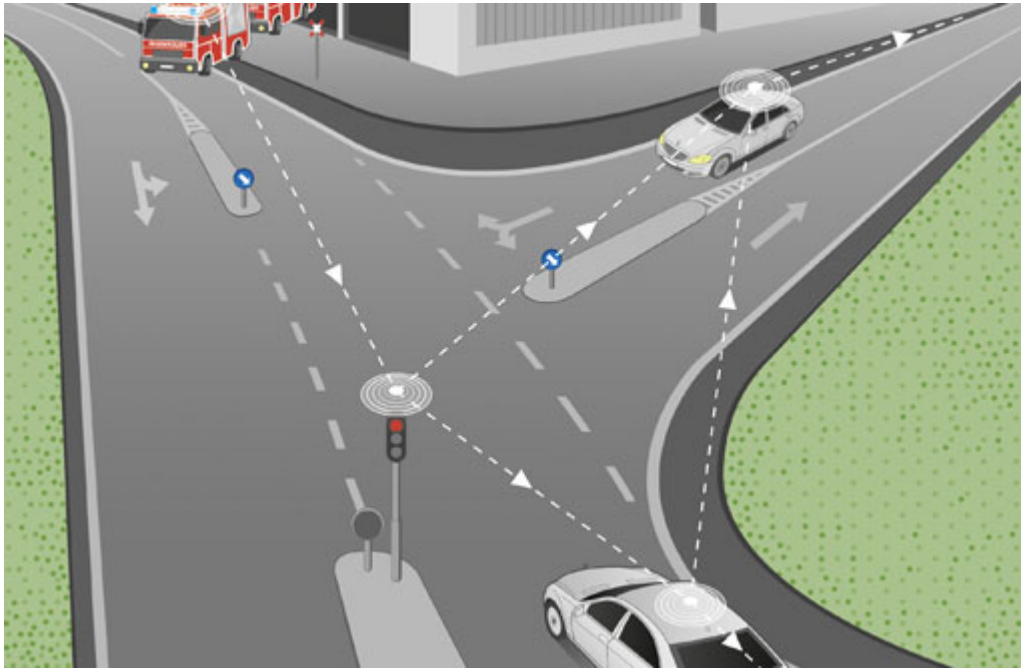
Infrastructure and Network Readiness: Infrastructure Assets and CAVs- Communications



- Roadside communication
- Fiber optic networks
- Traffic signals
- Road markings, signals, signage
- Toll roads

Image Source: ITS

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Infrastructure and Network Readiness: Infrastructure Assets and CAVs- Structures

- Parking facilities
- Fueling and power distribution
- Segregated infrastructure
- Street lighting

Image Source: Curbed

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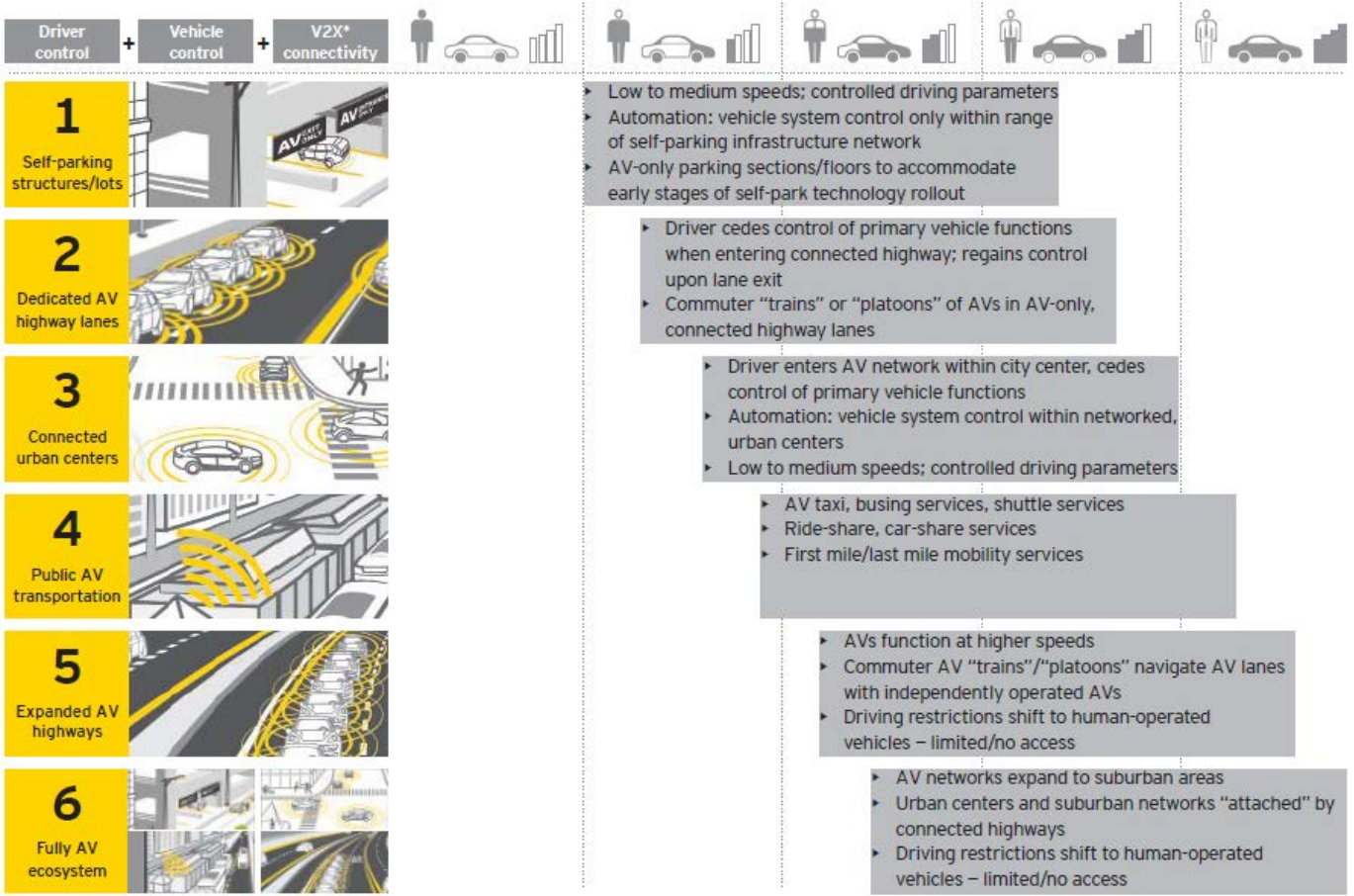
Infrastructure and Network Readiness: Infrastructure Assets and CAVs- Roads

- Maintenance
- Autonomy-enabled roads
- Road geometry
- Geotechnical features
- Drainage

Infrastructure and Network Readiness



Source: EY

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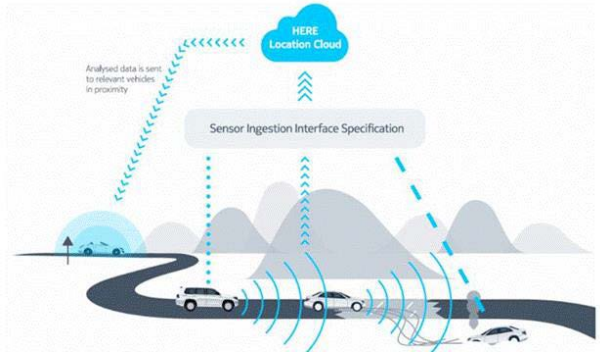
CASE STUDIES

Readiness for Connected and Automated Vehicles

Project

- Literature review of technical requirements and assessment of technical readiness for automation.

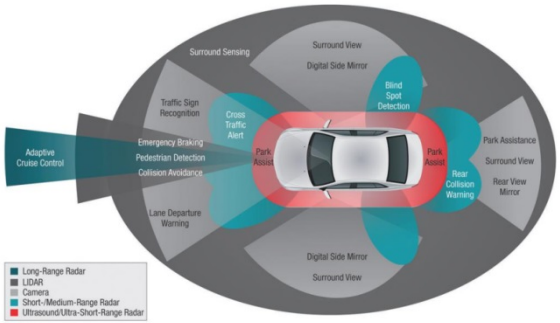


Objective

- Establish New Zealand's state of readiness for the introduction of connected and autonomous vehicles.

Goals

- Determine requirements for CAVs
- Assess infrastructure gaps
- Identify infrastructure needs for deployment



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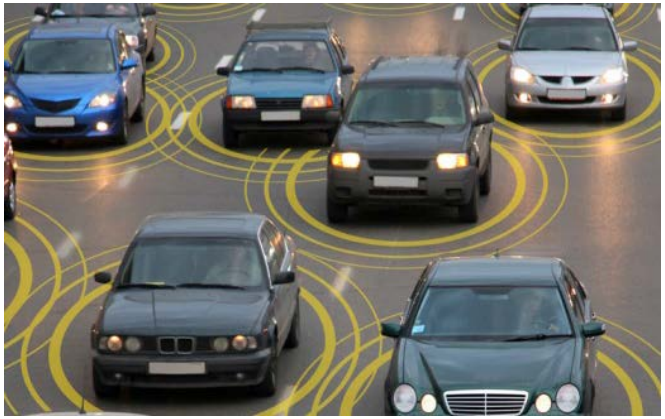
Connected Vehicle Data Applications for TMCs

Project

- Study for Michigan DOT addressing Connected Vehicle Data Applications for Transportation Management Centers (TMC).



Objective

- Evaluate and determine how data sets from Connected Vehicle Program may support the function of TMCs.

Goals

- Support execution of incident management, system performance monitoring, and ITS performance
- Accurate and reliable travel data

Connected and Autonomous Vehicle Policy Plan

Project

- Trend analysis and development of policy plan to incorporate connected and autonomous vehicles into Tennessee DOT's Long-Range Transportation Plan.

Objective

- Develop state-specific policy recommendations for how CAVs can support state's mobility, sustainability, and equity goals.

Goals

- Assess regulatory environment and state of industry. Provide recommended policies.

TN TDOT Department of Transportation

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Autonomous Bus Pilot

Project

- Evaluate vehicle manufacturers and select a site location to conduct testing of an autonomous bus for transit use.

Objective

- Test autonomous vehicle capabilities in cold weather conditions.

Goals

- Identify challenges and solutions to using autonomous vehicles in cold weather conditions.

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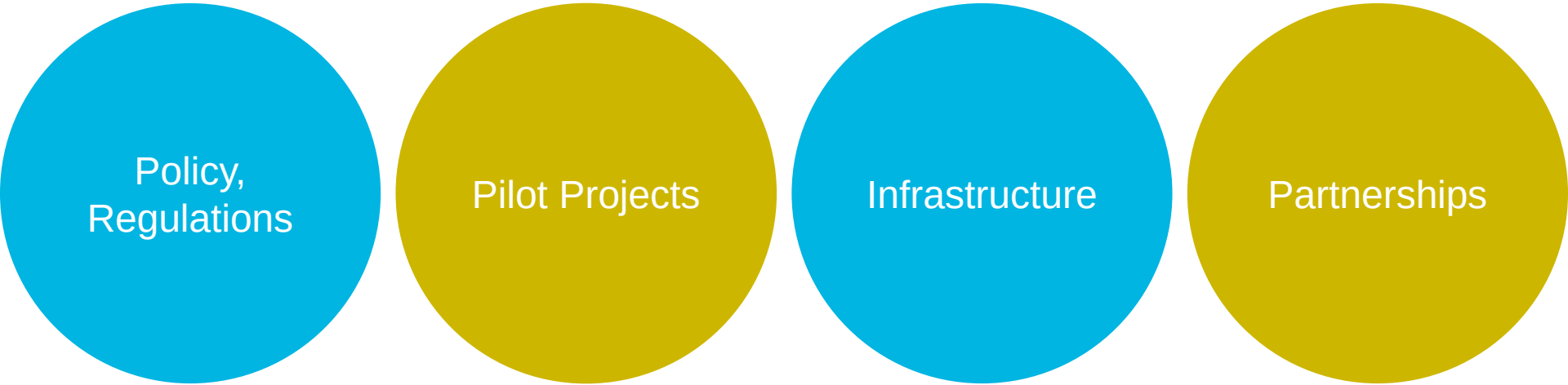
LOOKING FORWARD TO CAV READINESS

Looking Forward to CAV Readiness



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THANK YOU

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