

Paths of AV/CV Deployment: Strategic Roadmap for State and Local Transportation Agencies



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Outline

- Definitions
- Scenarios of Paths of AV/CV Deployment
- Implications for Transportation Agencies

Definitions

Automated Vehicles

- Technology
 - Internal sensors, cameras, GPS, and advanced software
 - Connected vehicle technology not required
- Levels of Automation

Connected Vehicles

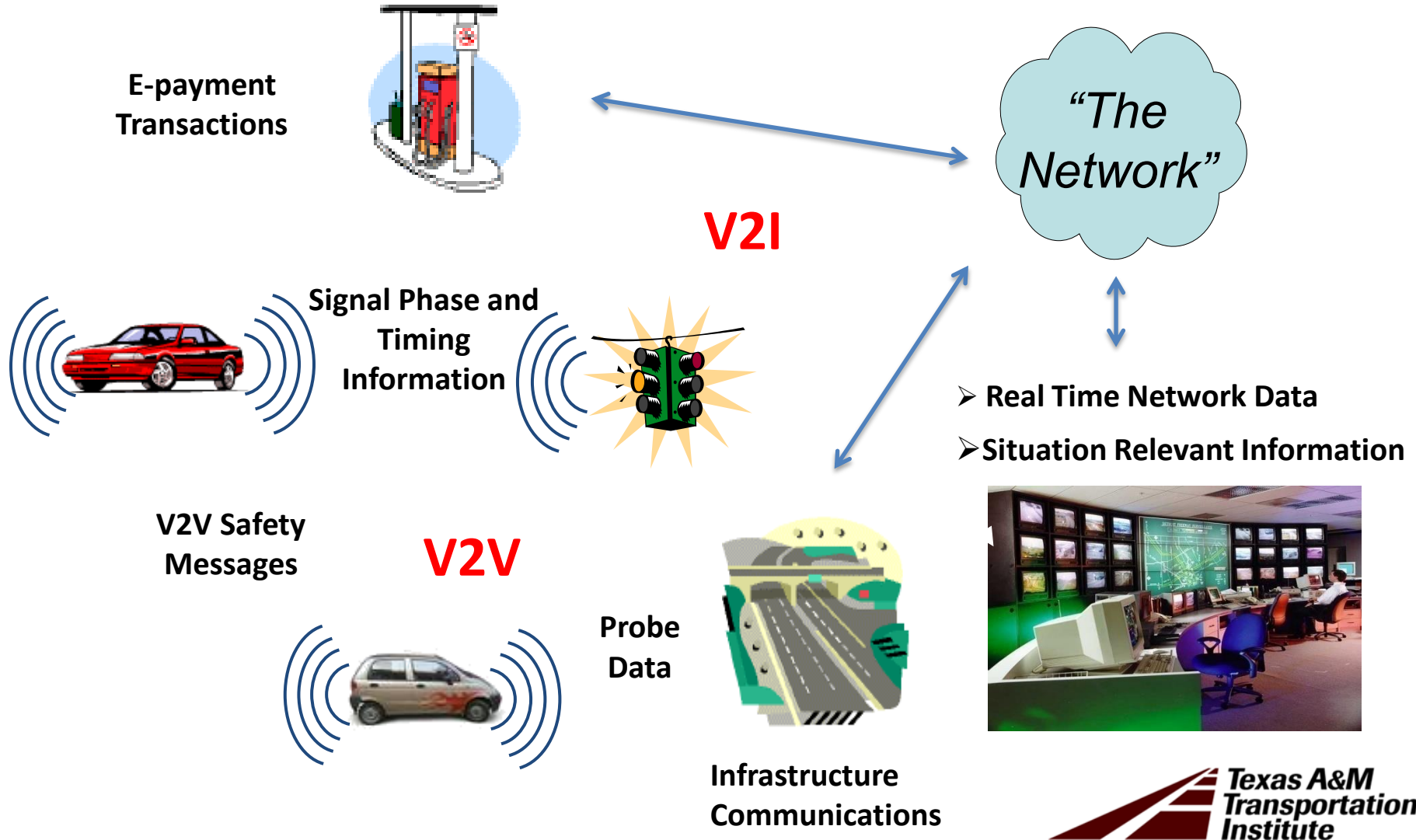
- Technology
 - Dedicated Short Range Communications (DSRC), WIFI, Cellular
- Data Gathering/Information Exchange
 - Vehicle to infrastructure (V2I)
 - Vehicle to vehicle (V2V)

Automated Vehicles

- Cars, public transport, interurban and urban freight
- Roles of driver and automation system in steering, throttle and braking, attention
- Fully autonomous responsible for driving, solely and independently, of other systems



Connected Vehicle Technology



State and Local Perspectives on AV

Sidelined

- Driven by OEM/private sector

Disruptive

- What's expected of us?

Uncertainty

- Mixed traffic, dynamic conditions

Confusion

- Traffic signals, signage, striping

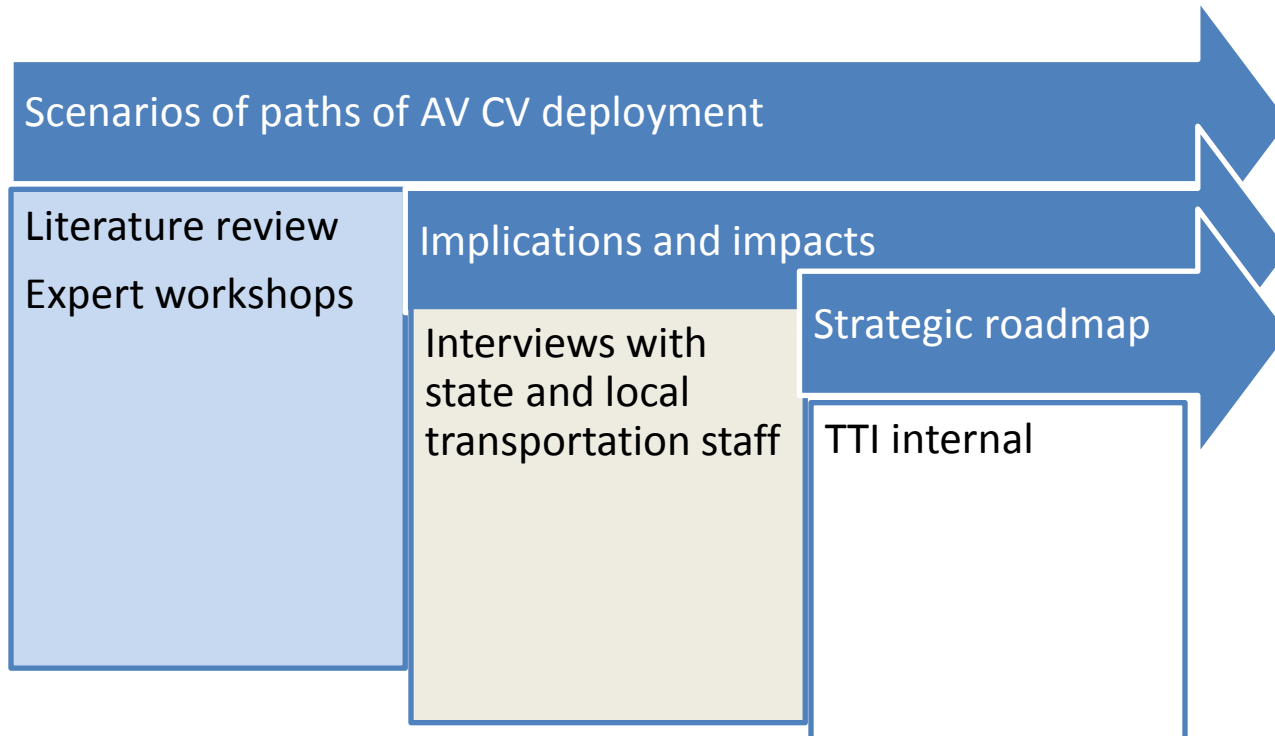


State and Local Perspectives on CV

- OEMs/private sector will implement V2V
- Unsure about V2I - \$
 - Implementation
 - Ongoing tech support
 - Databases and detailed mapping
- Data from CV applications
 - Excitement
 - Ownership questions

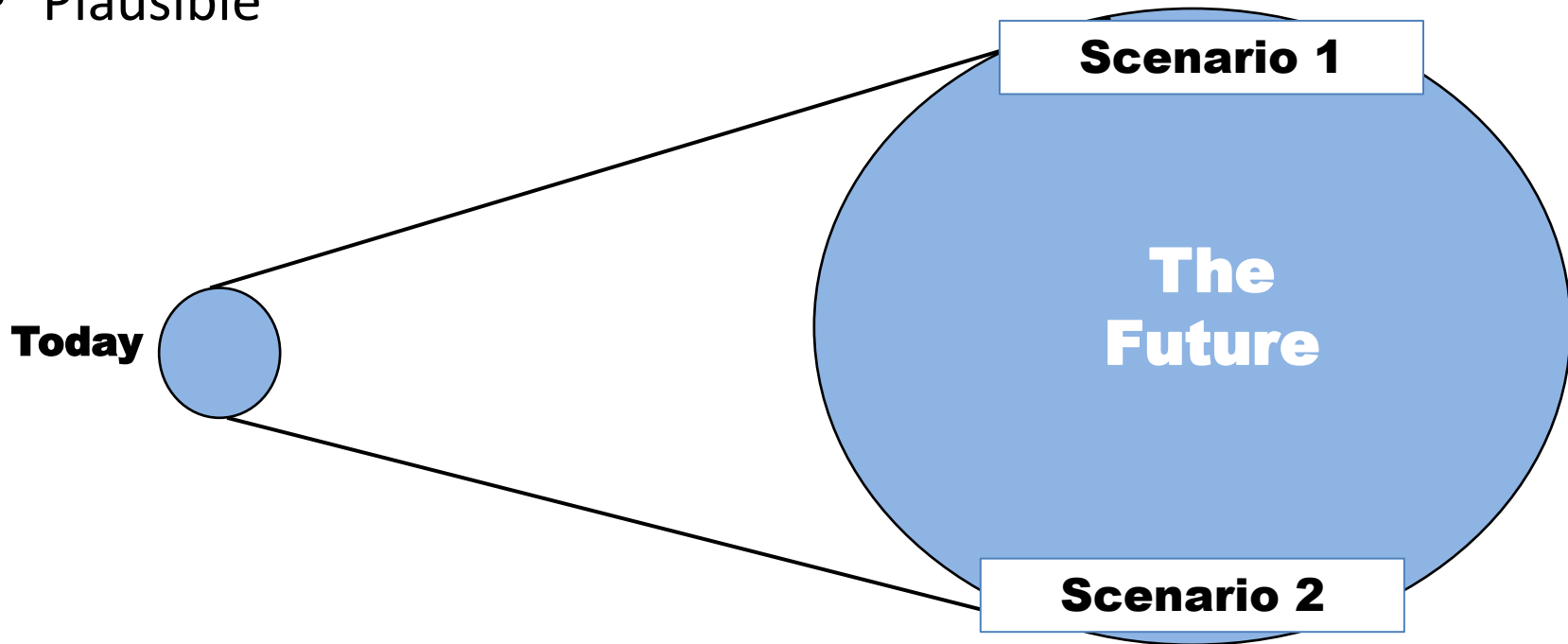


Scenario-Based Roadmapping



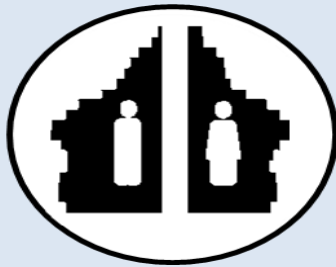
Scenario Approach

- Distinct narratives about future
- Represent extremes
- Plausible

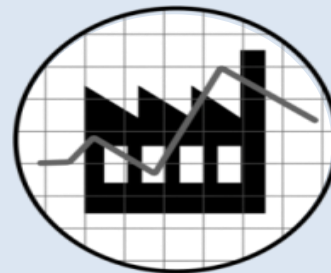


- *What would you do if this or that happens?*

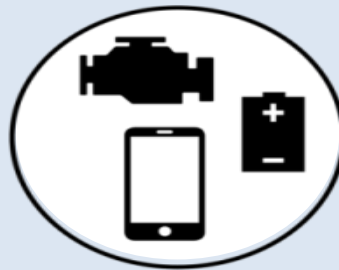
Systems Thinking: Influencing Areas



Society



Economy

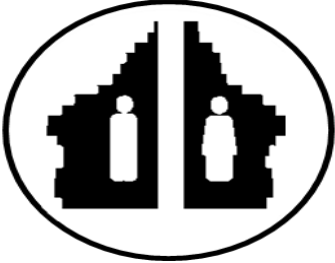


Technology




Policy

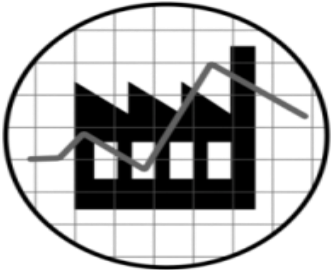
Projection Metrics: Society

Influencing Area	Factors	Projection Metric
 <p>Society</p>	Market Demand for AVs	Degree to which consumers embrace fully automated vehicles
	Consumer acceptance of V2V and V2I	Degree to which consumers accept V2V and V2I applications
	Auto ownership trends	Rate of auto ownership
	Operating environments	Locations of early adoption (type of operating environment)
	Data privacy	Concerns over privacy and data collection


Projection Metrics: Technology

Influencing Area	Factors	Projection Metric
 Technology	Interface between driver and vehicle	Ability to seamlessly and safely use vehicle in fully automated or manual modes
	Cybersecurity	Vulnerabilities adequately addressed
	Sensor technology	Speed of accuracy improvements for safety critical functions (high, moderate, low)
	Vehicles' decision making under uncertainty	Capabilities for artificial intelligence (AI) decisions under unexpected traffic situations

Projection Metrics: Economy

Influencing Area	Factors	Projection Metric
 Economy	Consumers' buying power	Ability to afford AVs
	Sectoral Disruption	Extinction versus increase in jobs or industries
	Supportive infrastructure investment	Capacity of state to invest in supporting infrastructure for AV and CV
	Cost of self-driving technology	Additional cost to MSRP

Projection Metrics: Policy

Influencing Area	Factors	Projection Metric
 Policy	Public policy perspective	Type of regulatory approach – precautionary or market-based
	NHTSA mandate on V2V technology	Year in which NHTSA mandates V2V
	Liability concerns from industry	Changes or shifts in insurance model

Revolutionary ----- Evolutionary

Disruptive innovation, consumer demand

Scenario Triggers

Precautionary and partisan policymaking, technical issues

Strong economy

Economy

Sluggish economy

Demand: Baby Boomer and young adult

Society

Barriers: Fleet turnover, price, negative media

Timely supporting federal, state legislation

Policy

Cautious federal, state legislation

2025 critical mass self-driving vehicles

AV Outcome

2050 critical mass self-driving vehicles

V2I outmoded by AV and V2V

CV Outcome

V2I and V2V necessary for AV

Reactions to Scenarios

Scenario	Likelihood	Preference
Evolutionary	Regulatory change and fleet turnover slow even though technology changes fast 47%	Easier to adapt, less stressful More time to evolve the enabling infrastructure 43%
Revolutionary	AV – OEMs pushing, Consumers buying Quick use cases: Trucking, shared ride, package delivery 53%	Private sector push brings capital resources to make it happen Benefits evident and should be realized as quickly as safely to do so 57%

Potential Changes for Organization

Mission

- No change

Responsibilities

- ↓ • Construction, safety, human services transportation, traditional ITS, Parking
- ↑ • Maintenance, operations, “big data” management and analysis

Structure

- Larger operations group
- AV/CV section



Policy or Planning Actions

- Review current legislation and policies that could impact the implementation of AV/CV technologies
- Designate a specific individual within an organization be responsible for AV/CV
- Participate in the national discussion on AV/CV
- Establish a working relationship with resources in state/region with useful expertise
- Outreach to state and local policy makers to familiarize and educate regarding AV/CV
- Develop plan for workforce development
- Formulate strategy to address financial challenges of implementation



Research Needs

- What is the business case for V2I?
- To what degree is V2I technology necessary for AV deployment?
- What can we start monitoring now to understand future market development (i.e., private vehicle ownership or vehicle-on-demand fleets)?
- How do regulatory issues for AVs differ between models of private vehicle ownership or vehicle-on-demand fleets?
- What role will after-market play in AV deployment?

Thank you!
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