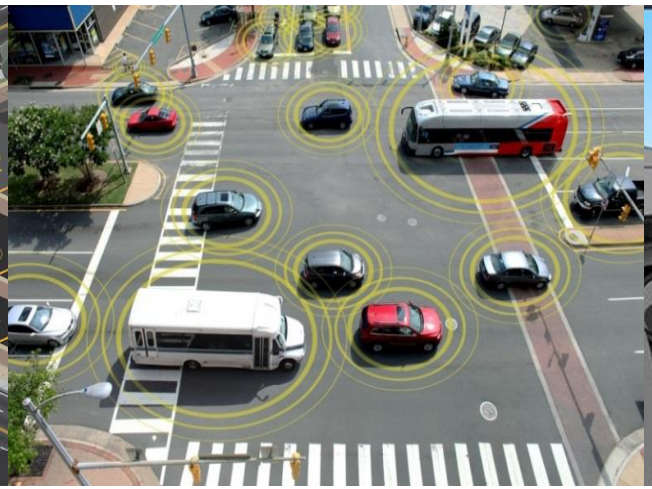
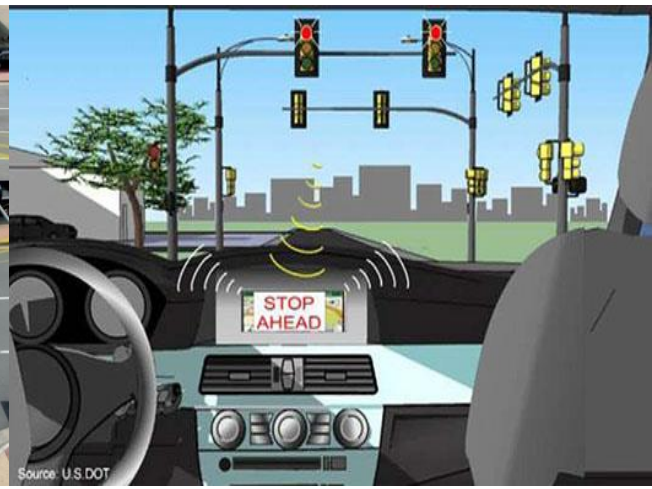
Establishing a Regional Planning Framework for Connected and Automated Vehicles (CAV)



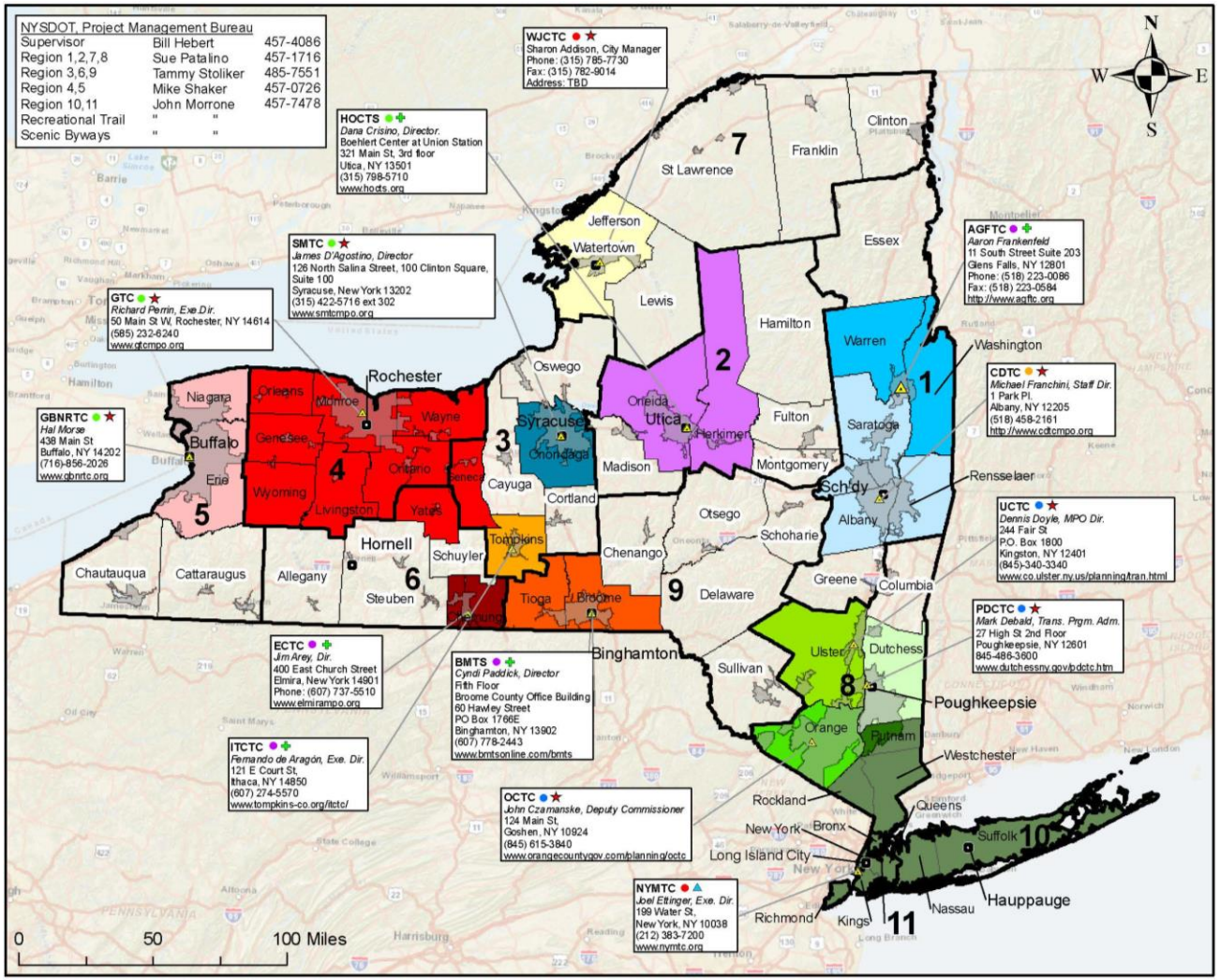


Joseph M. Bovenzi, AICP

NYSAMPO Conference – Syracuse, New York

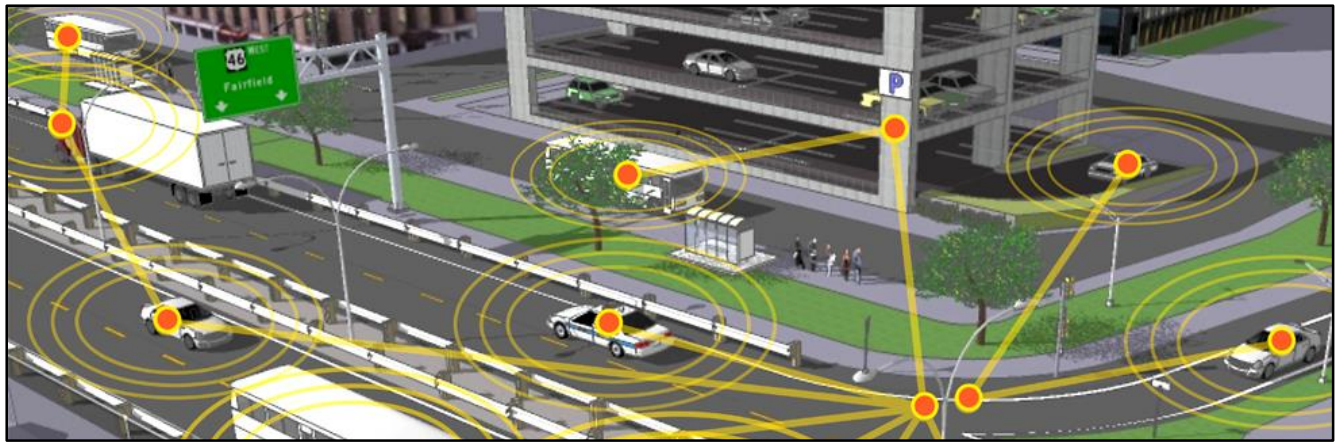
June 21, 2017

New York State Metropolitan Planning Organizations



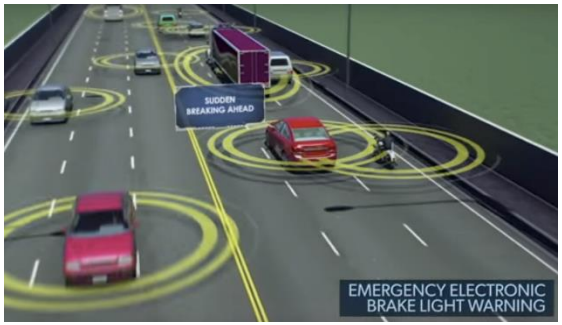
Planning for CAVs at the MPO Level

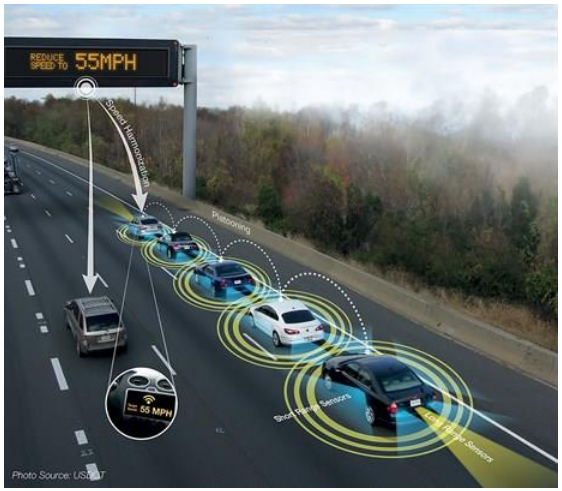
- **NYSAMPO Transportation System Management and Operations Working Group Work Plan**
  - **White Paper – Integrate CAV-related considerations into MPO policy and strategic planning tasks**
    - **Resource**
    - **Activities**
    - **Coordinated Approach**



Definitions

- **Connected Vehicles**
  - **Wireless Communications**
    - **Vehicle to vehicle (V2V)**
    - **Vehicle to infrastructure (V2I)**
    - **Vehicle to "everything" (V2X)**
- **Autonomous Vehicles**
  - **"Self-Driving"**
  - **No external connections**
- **Automated Vehicles**
  - **No driver input**
  - **Differing "levels" of automation**





Levels of Automation

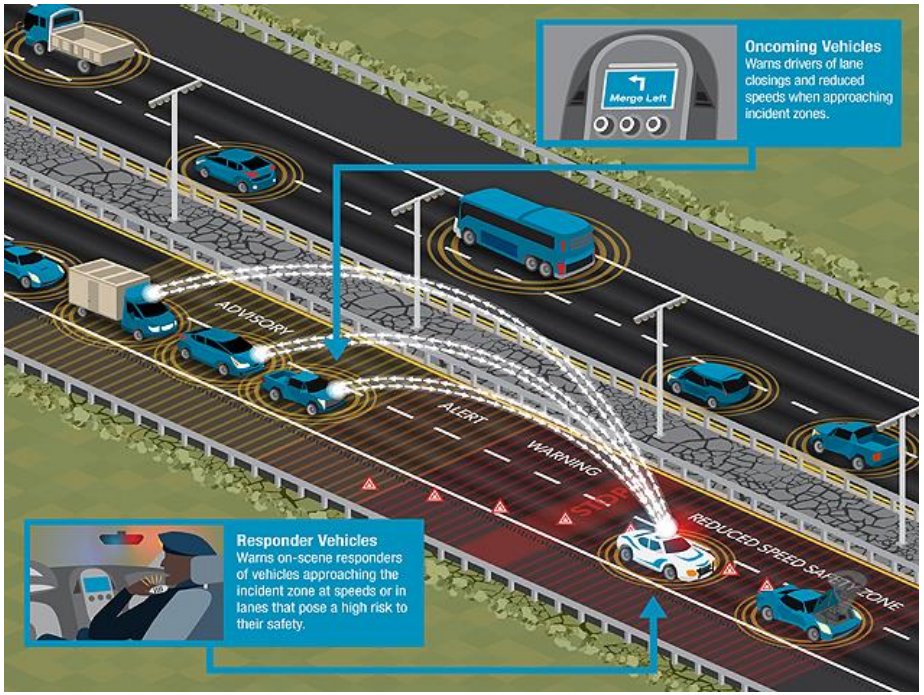
SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	**No Automation**	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	**Driver Assistance**	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	**Partial Automation**	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	**Conditional Automation**	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	**High Automation**	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	**Full Automation**	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

Federal Rule-Making

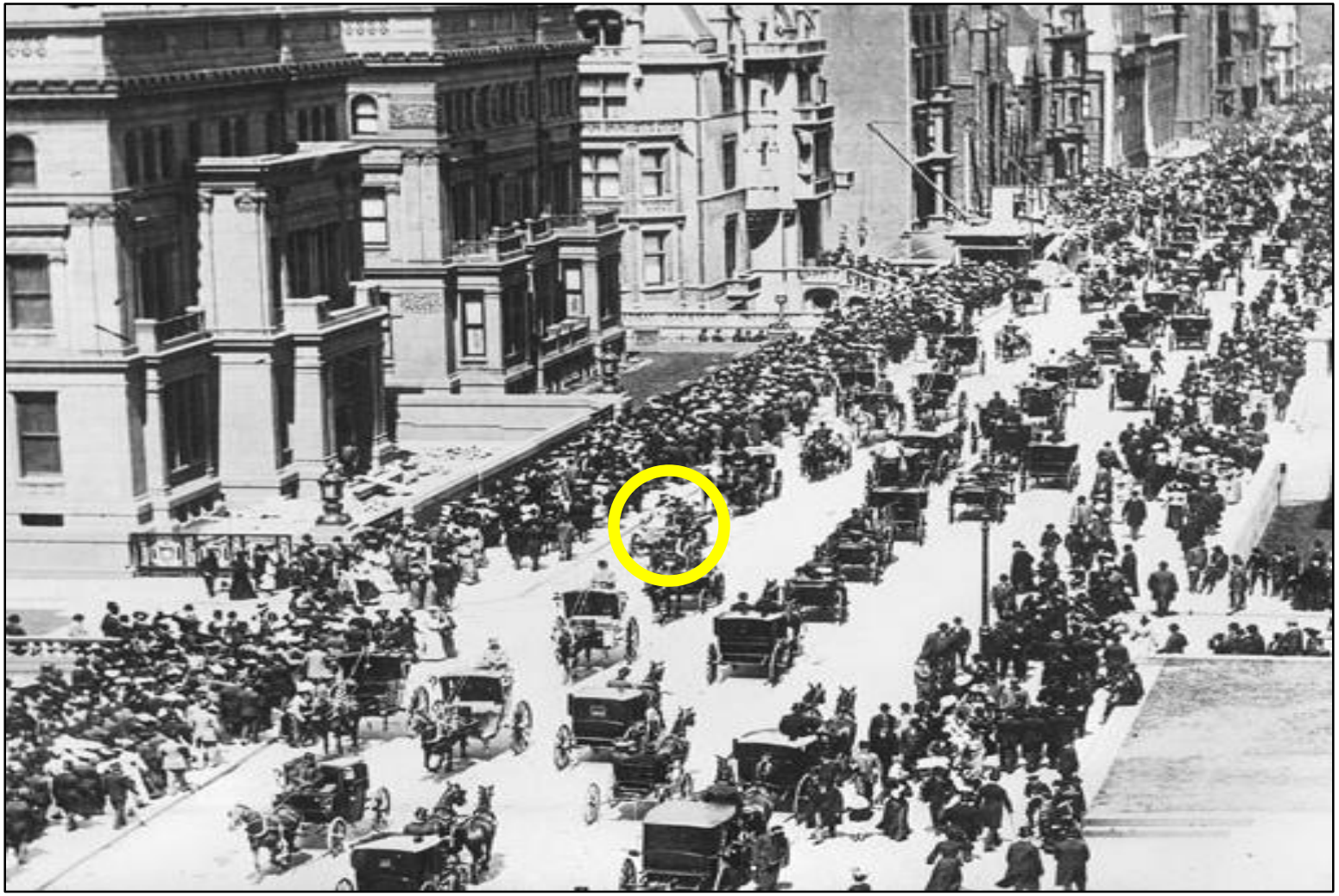
- **National Highway Traffic Safety Administration**
  - **Proposed Federal Motor Vehicle Safety Standard No. 150**
    - **Mandate V2V communications**
    - **Standardize message and format of V2V transmissions**
- **Emphasis on Safety**
  - **Mandate Basic Safety Messages**
    - **Speed, heading, brake status, etc.**

Timing

- Uncertainty
- Dependent on:
  - Automation levels
  - Driver acceptance
- Long Range Planning Horizons
  - 20 year minimum forecast period
  - Automation levels
  - Travel Demand Modeling



Easter Parade – 5th Avenue, New York City – 1900



Easter Parade – 5th Avenue, New York City – 1913

Future of Transportation – Autonomous?

Future of Transportation – Connected?

Planning for Connected and Automated Vehicles

- **Long Range Plans**
  - **Establish the policy basis for CAV planning at the MPO level**
- **New York City (NYMTC)**
  - **Draft *Plan 2045***
  - **Identifies seven "Critical Drivers of Change"**
    - **Discusses CAV under Operational and Safety Improvements**
    - **Contextualizes these technologies within broader safety and operational improvements**
  - **NYCDOT V2V and V2I Pilot Program**

Planning for Connected and Automated Vehicles

- **Syracuse (SMTC)**
  - ***2050 Long Range Transportation Plan***
  - **Identifies autonomous vehicles as a disruptive technology**
- **Albany (CDTC)**
  - ***New Visions 2040 Plan***
  - **Summarizes potential CAV impacts**
  - **Identifies planning policies regarding:**
    - **Highway and Bridge Design**
    - **Smart Growth**
    - **Investments**

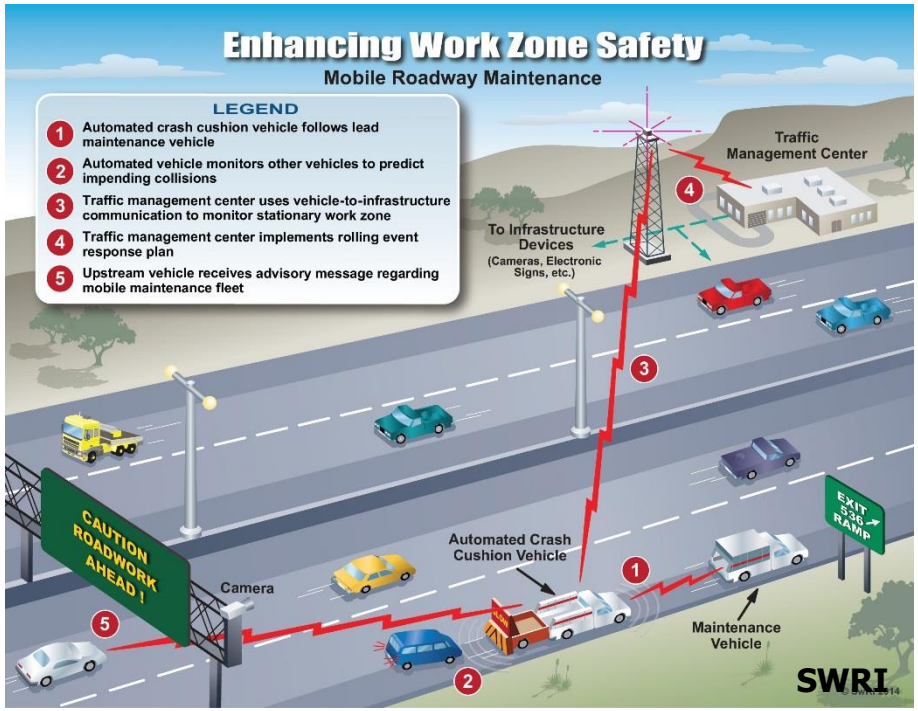
Planning for Connected and Automated Vehicles

- **Ulster County (UCTC)**
  - ***Rethinking Transportation: Plan 2040***
  - **Discussion of CAV impacts**
  - **Transportation Technology Objectives**
    - **Facilitate Connected Vehicle Deployment**
    - **Monitor Autonomous Vehicle Fleet Penetration**

- **Rochester (GTC)**
  - ***Long Range Transportation Plan 2040***
  - **Emerging Opportunities and Issues – Identifies Connected and Automated Vehicles**

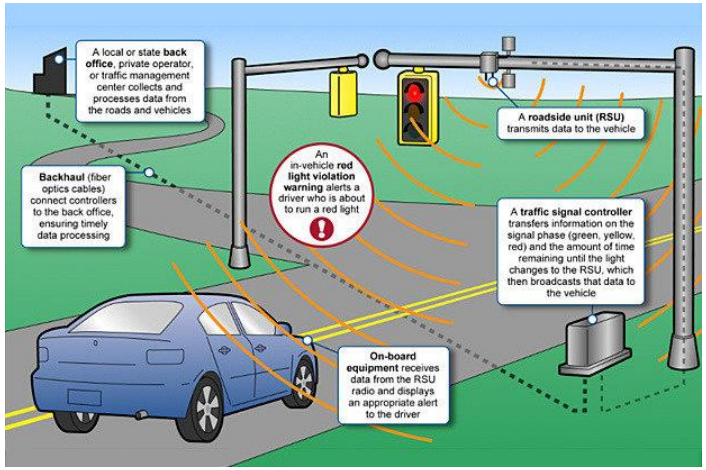
Regional Planning Framework

1. Long Range Transportation Plans
   - 1.A. Infrastructure
   - 1.B. Services
2. Congestion Management Process
3. Goods Movement
4. Travel Demand Modeling
5. Transportation Improvement Program



Long Range Plans – Infrastructure

- **Define and Articulate:**
  - **Community development goals**
  - **Transportation system management and operations goals**
- **Operations**
  - **Traffic management and communications networks**
  - **Adaptive reuse**
- **Infrastructure**
  - **Signage, striping, lighting, etc.**
  - **Preservation and maintenance**



Long Range Plans – Infrastructure

- "Infostructure"
  - Digital (transportation) Infrastructure
- Complete Streets
  - Review and update Complete Streets policies to include CAV
- Universal Design
  - Integrate CAV into Universal Design policies
- Applicable Federal Regulations
  - Regional ITS Architecture (RITSA)

Long Range Plans – Services

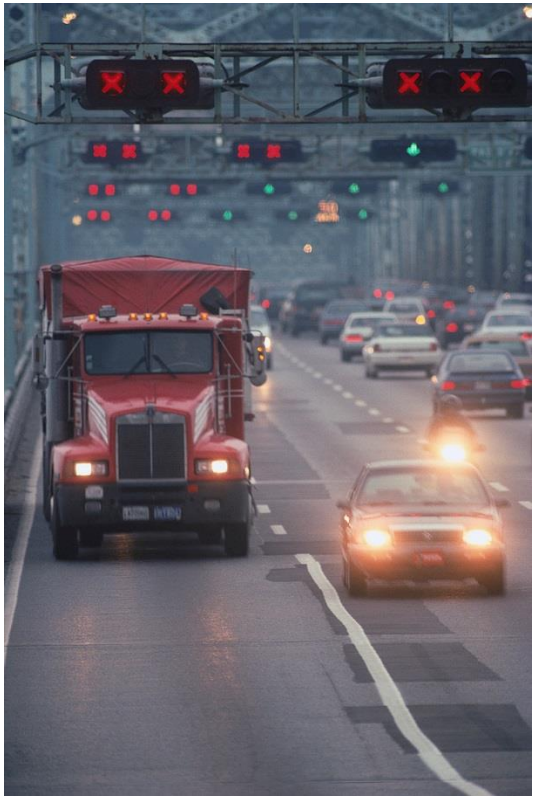
- **Agency Awareness**
  - **Technical Training**
  - **Peer-to-Peer Roundtables**
- **Mobility**
  - **Ensuring Options vs. "One-Size-fits-All" Approach**
- **Availability**
  - **Equitable access to ride-sharing services**
- **Social and Economic Trends**
  - **Workforce**
- **Navigation and Wayfinding**

Congestion Management Process (CMP)

- **Identify and Monitor Congested Locations**
  - **Data Generation and Management**
  - **Travel Demand Model**
- **Travel Time**
  - **Predictability**
  - **Reliability**
- **Shift Travel Patterns and Times**
- **Maximize Road Usage**

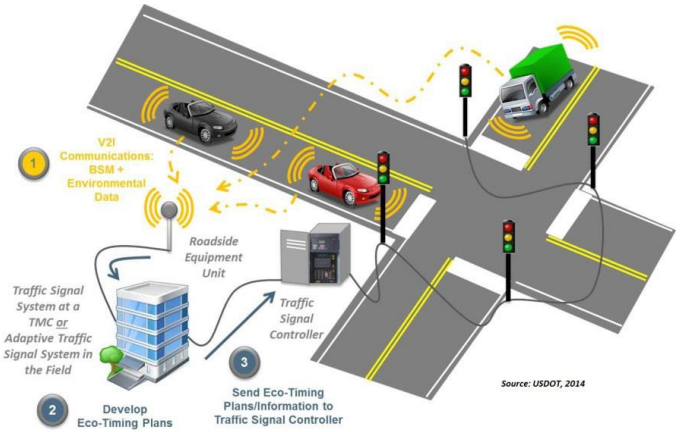
Goods Movement

- **Decentralized Distribution Networks**
  - **Service Infrastructure**
- **Flexibility**
  - **Truck Platooning**
  - **Enhanced Just-in-Time Delivery**
  - **Overnight Delivery**
  - **Roaming Stores**



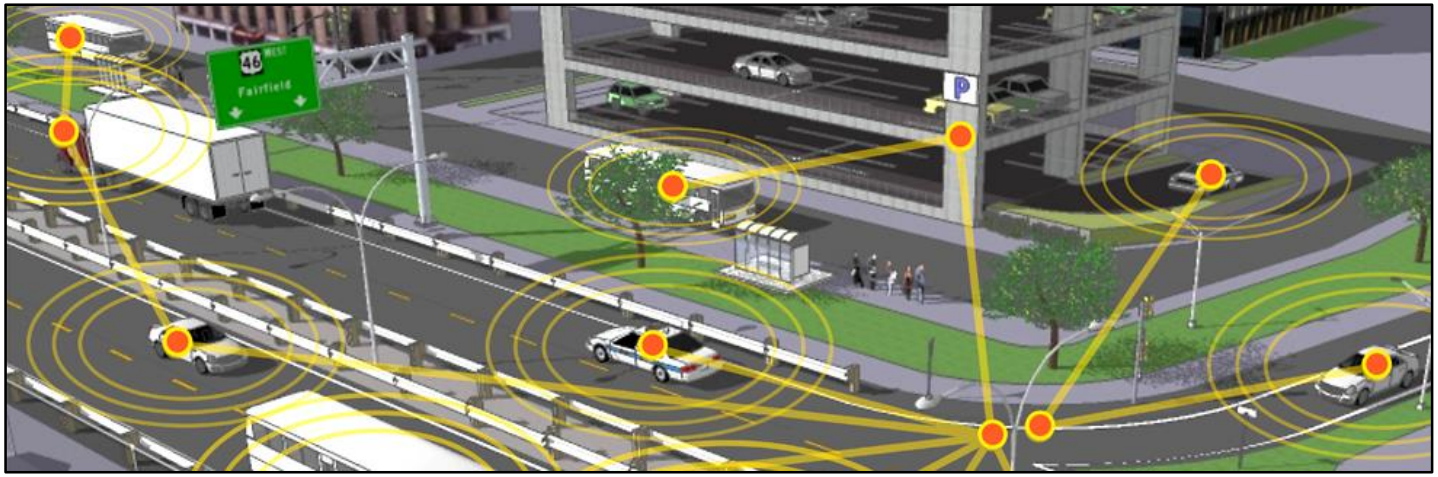
Travel Demand Modeling

- **Integrate CAV in Travel Demand Models**
  - **Puget Sound Regional Council**
    - **Increased Capacity**
    - **Increased Capacity and Value of Time Changes**
    - **Increased Capacity, Value of Time Changes, and Reduced Parking Costs**
    - **Per-mile Auto Costs Increased**
- **Model Calibration and Validation**
- **Planning Coordination**



Transportation Improvement Program

- **Review and Revise Project Selection Criteria**
  - **Community development goals**
  - **Transportation system goals**
  - **Integration vs. stand-alone**
  - **Maximize investments**



The Big Question

- **How do we ensure that CAV technologies support community development goals?**
  - ❑ Safety
  - ❑ Mobility
  - ❑ Accessibility
  - ❑ Efficiency
  - ❑ Reliability
  - ❑ Land Use
  - ❑ Urban Design
  - ❑ Equity
  - ❑ Air Quality

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