DKS Experts Connecting Communities

Smart Cities Challenge & Portland Response

Adrian Pearmine
National Director for Smart Cities and Connected Vehicles
DKS Associates

Smart Cities & FAST Act

- New Transportation Bill **FAST Act** (Fixing America's Surface Transportation) has heavy emphasis on Smart Cities

DEC 7

Smart City Challenge seeks the best in integrated transportation technology for mid-sized cities

Posted by Anthony Foxx

"The city that develops the most innovative, most forward-thinking plan to harness technology and reimagine how people move will receive up to $40 million to become the first city in the world to implement it…And that's not all. Our partner in this, Vulcan, Inc., is offering an additional $10 million to the winning city to incorporate electric vehicle infrastructure into the city of tomorrow. "

Smart Cities Partners

DKS

- Paul Allen's Vulcan, Inc.
- Mobileye
- Autodesk
- NXP
- Amazon Web Services
- Alphabet's Sidewalk Labs
- U.S. Department of Energy

USDOT Smart Cities Vision Elements

Technology Elements *(Highest Priority)*

Vision Element #1
Urban Automation

Vision Element #2
Connected Vehicles

Vision Element #3
Intelligent, Sensor-Based Infrastructure

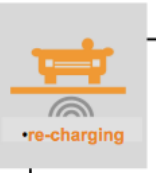
Innovative Approaches to Urban Transportation Elements *(High Priority)*

Vision Element #4
User-Focused Mobility Services and Choices

Vision Element #5
Urban Analytics

Vision Element #6
Urban Delivery and Logistics

Vision Element #7
Strategic Business Models & Partnering



Vision Element #8
Smart Grid, Roadway Electrification, & EVs

Vision Element #9
Connected, Involved Citizens

Smart City Elements *(Priority)*

Vision Element #10
Architecture and Standards

Vision Element #11
Low-Cost, Efficient, Secure, & Resilient ICT

Vision Element #12
Smart Land Use

Smart Cities Challenge Submittals

DOT Smart City Challenge

1,400 local officials, companies, academics and non-profits joined our webinars

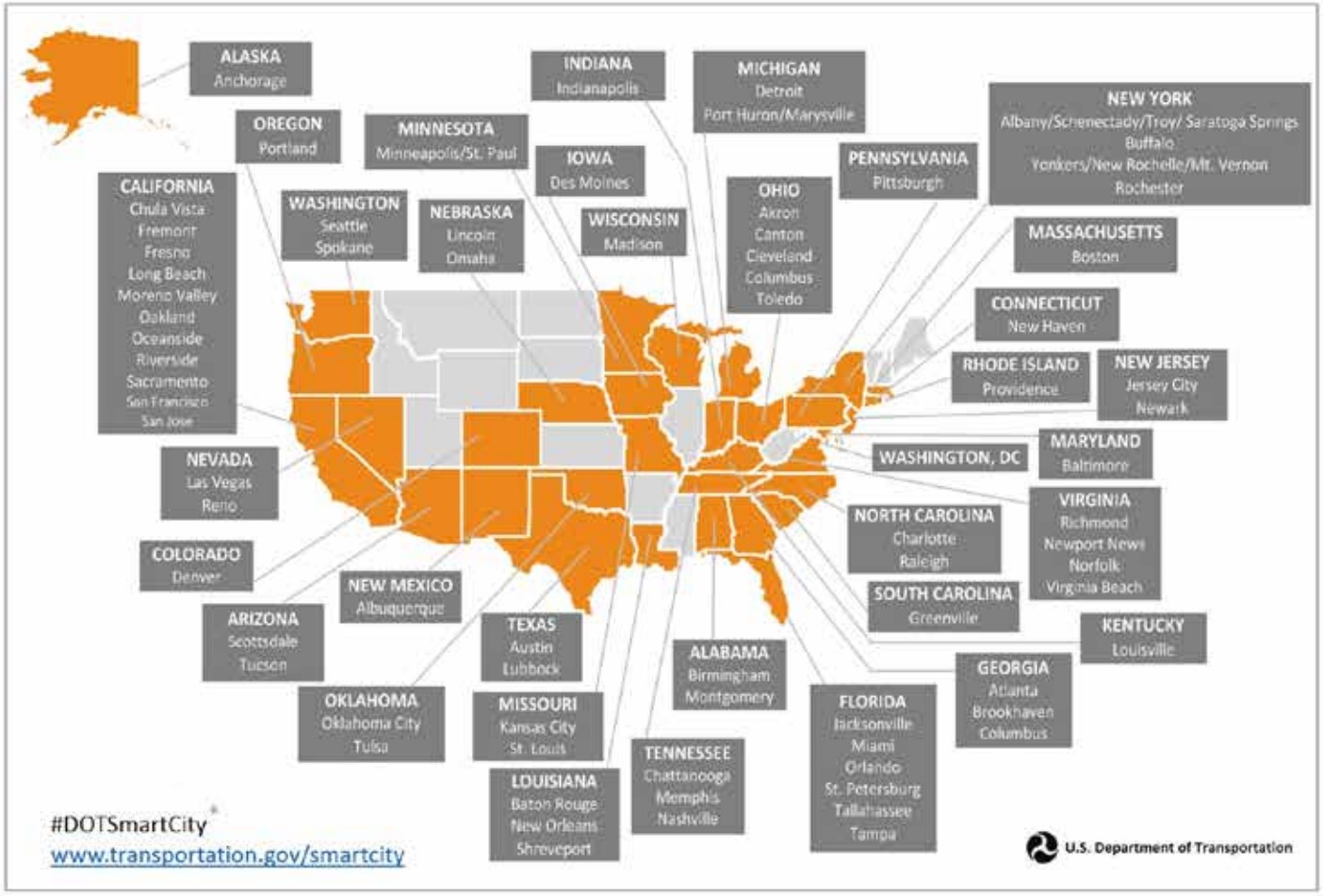
800 people participated in our Smart City Forum

300 companies have expressed interest in partnering

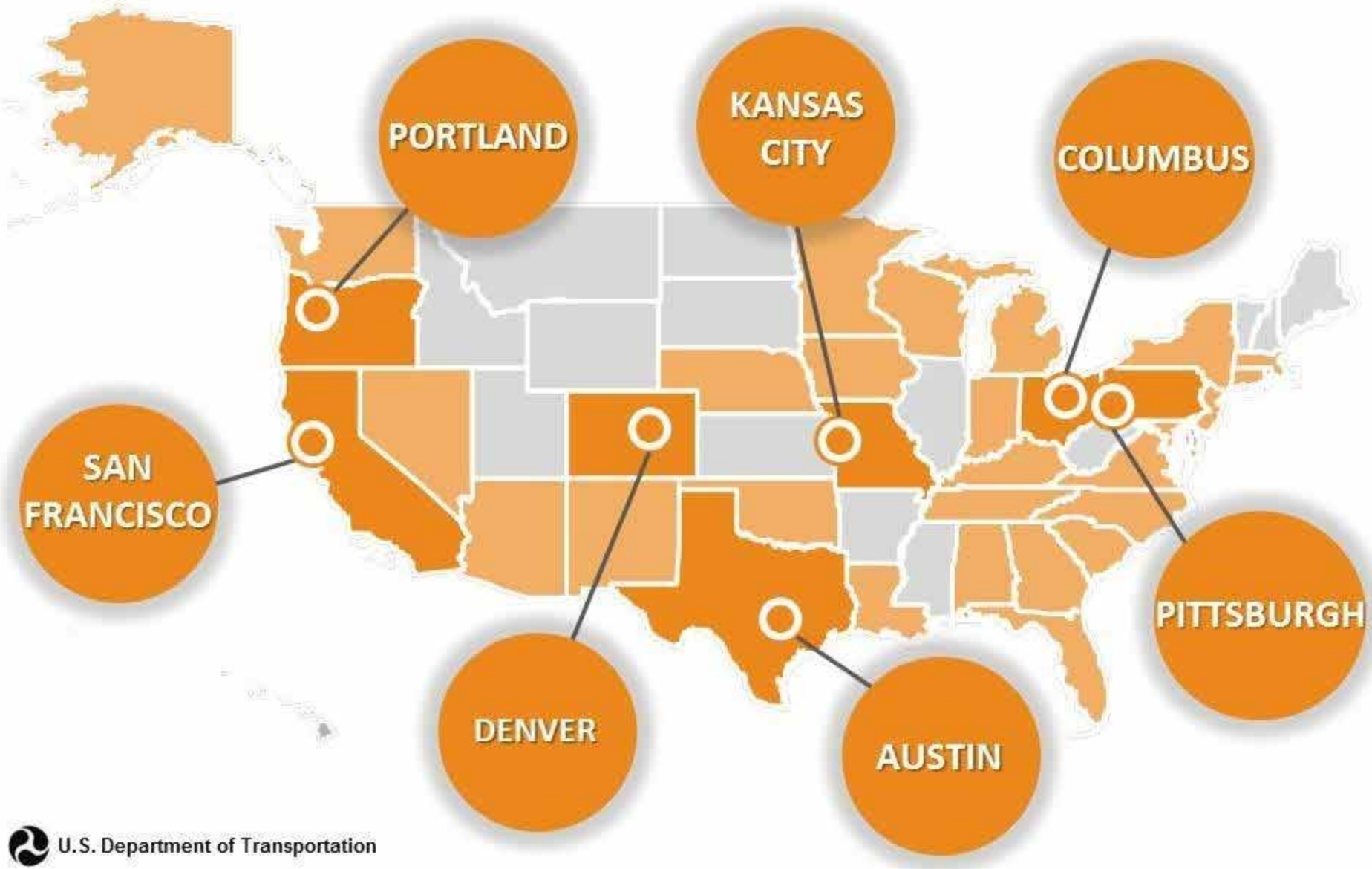
77 applications received for the Smart City Challenge

5 Smart City Challenge Finalists to be announced in March at SXSW

1 Smart City Challenge Winner announced in June



Smart City Challenge Finalists



U.S. Department of Transportation

What is a Smart City? (Smart City 101)

- A **smart city** uses digital technologies or information and communication technologies ***(ICT)*** to enhance quality and performance of urban services, to reduce costs and resource consumption, and ***to engage more effectively and actively with its citizens***. Sectors that have been developing smart city technology include government services, transport and traffic management, energy, health care, water and waste.

-Wikipedia Definition

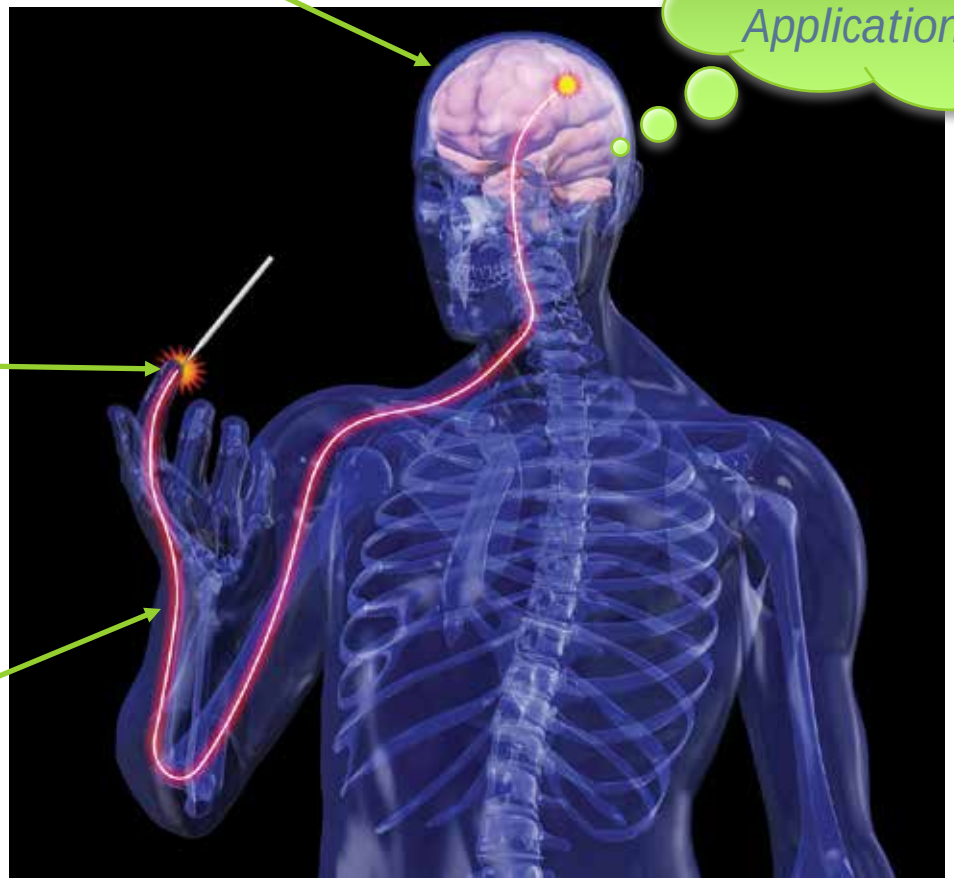
Smart City Sectors

http://www.wi-fi360.com/

Think of your City like the Nervous System

Big Data:
The brain processing the signals

Thoughts & Images:
Dashboards & Applications

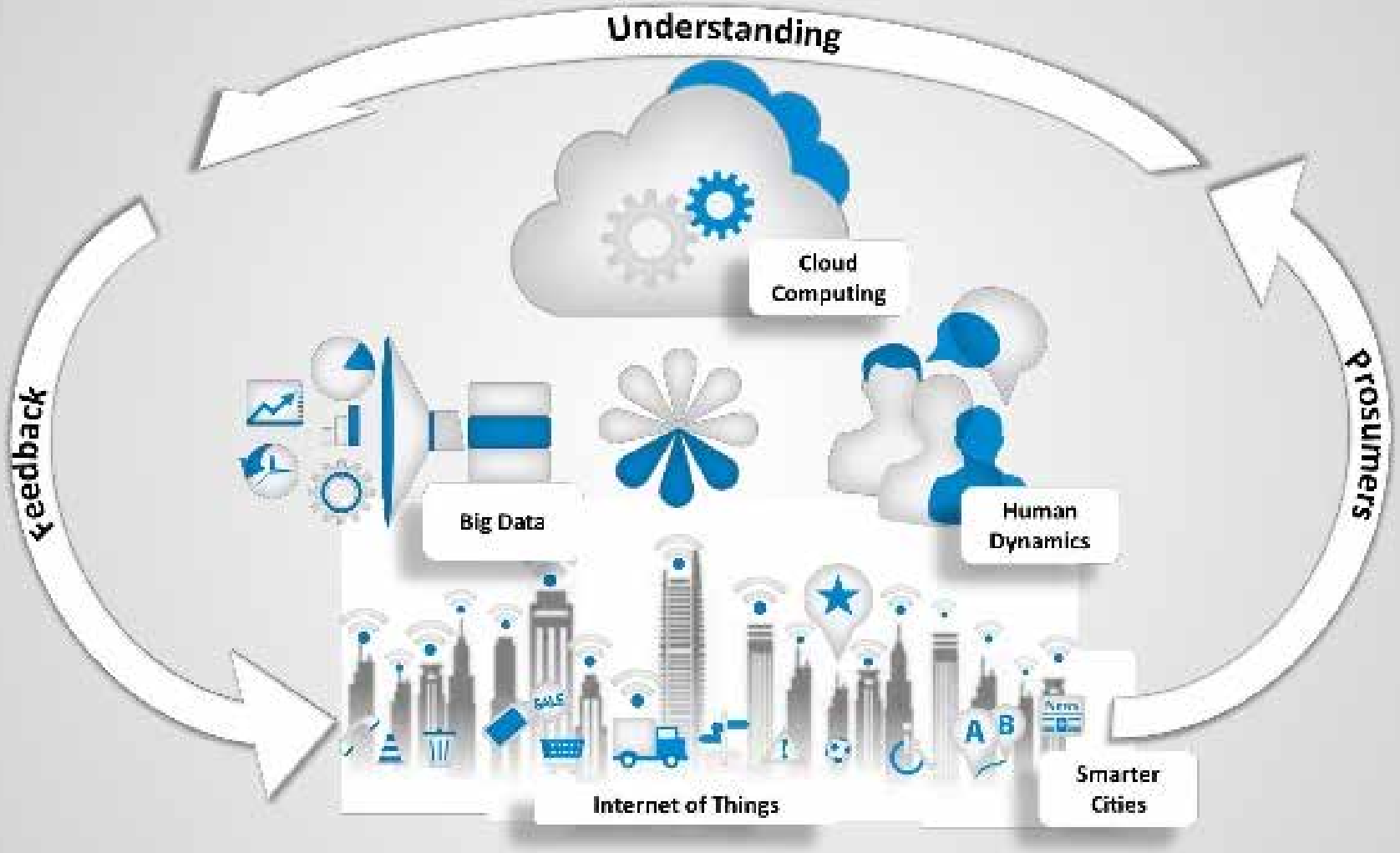


Sensors or IoT:
The nerve endings capturing signals

Telecom Network:
The nervous system backhauling the signals

DKS

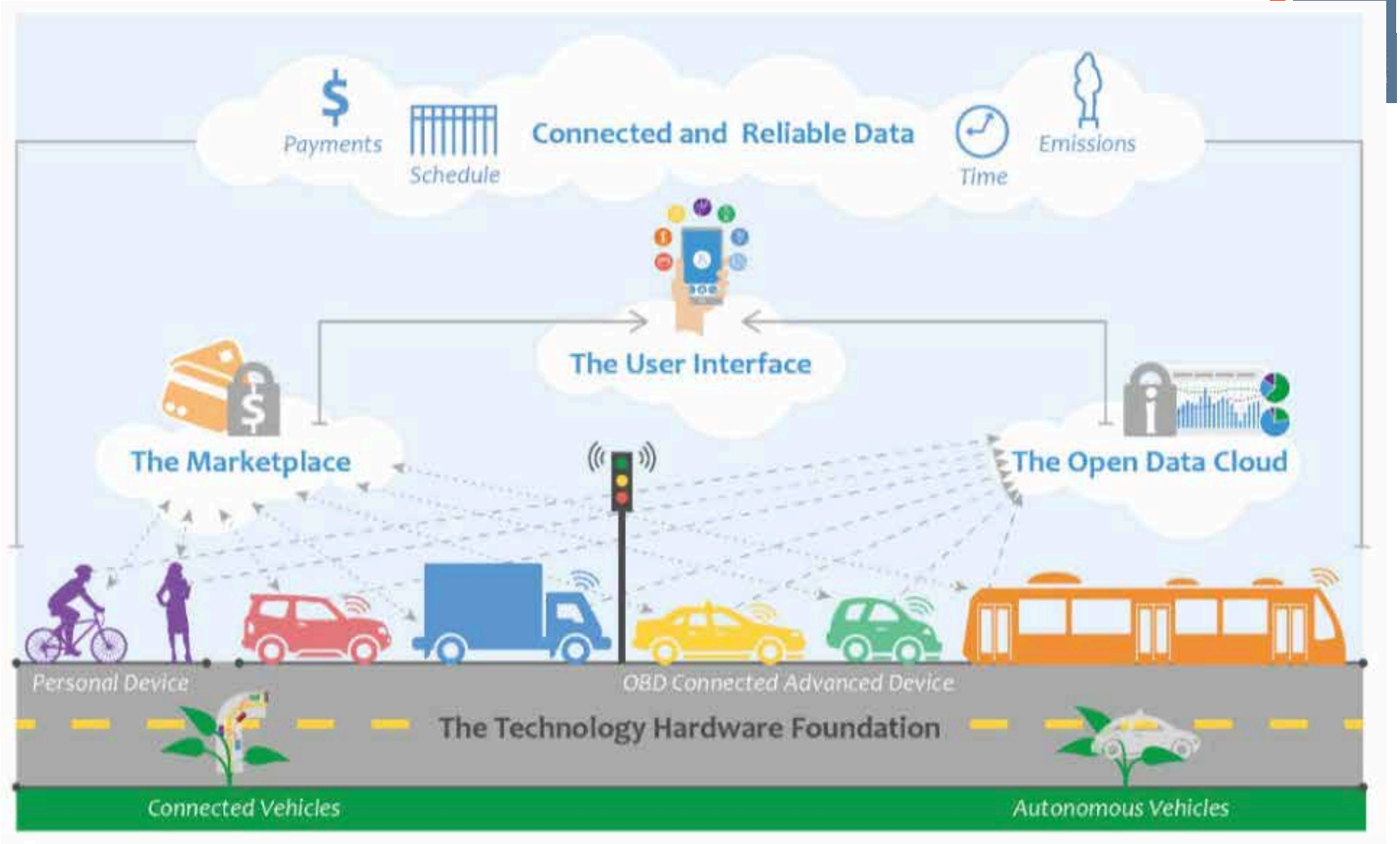
Big Data / Smart Cities ecosystem



Dr. Antonio J. Jara – jara@ieee.org
HES-SO//Valais Switzerland

Communications is the Backbone

UB Mobile PDX: Mobility Marketplace

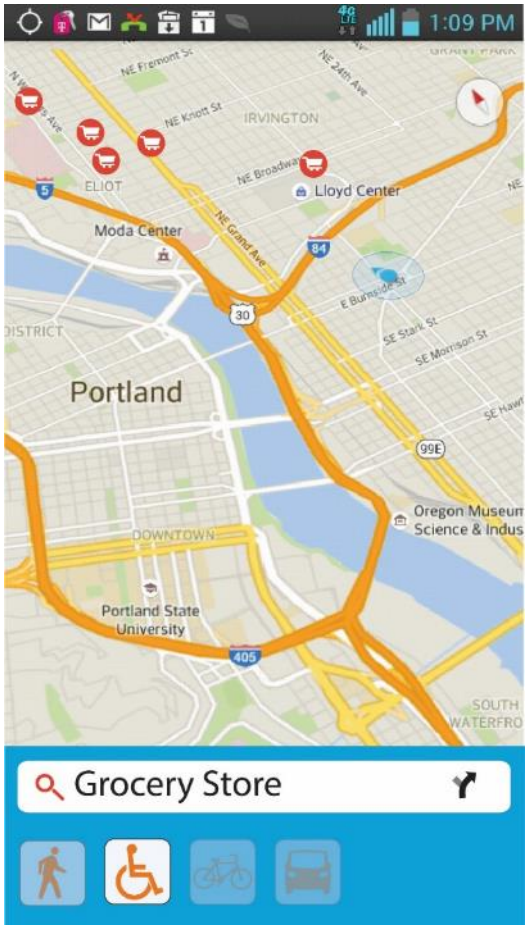


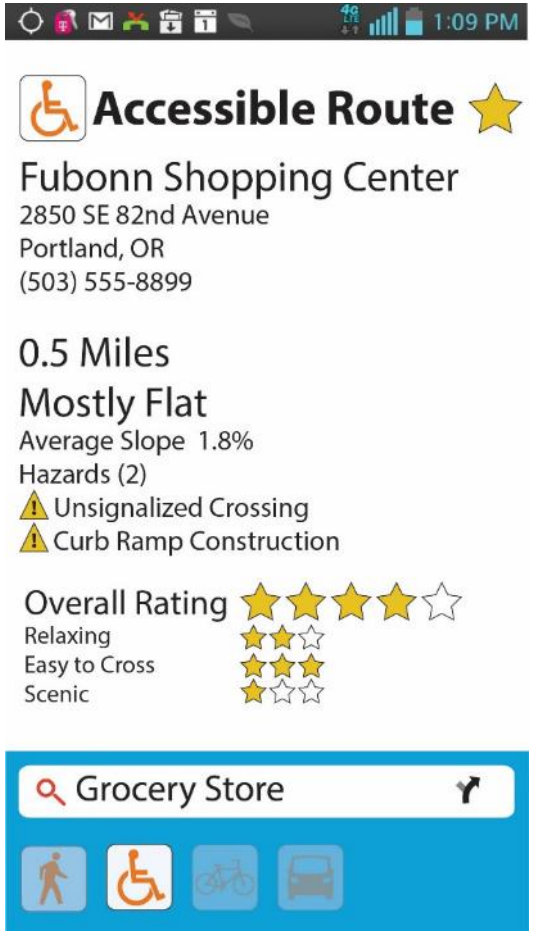
Community Outreach & Partnerships

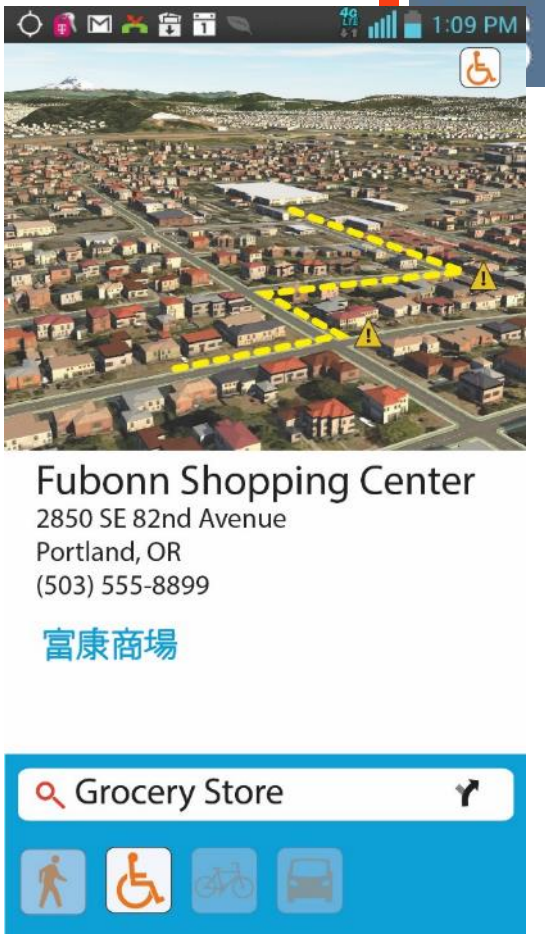
- Community Cycling Center
- Asian Pacific American Network of Oregon
- Girls Inc.
- National Association of Minority Contractors of Oregon
- Ride Connection
- Self Enhancement, Inc.
- Verde
- Worksystems, Inc.

Students describe Smart Cities

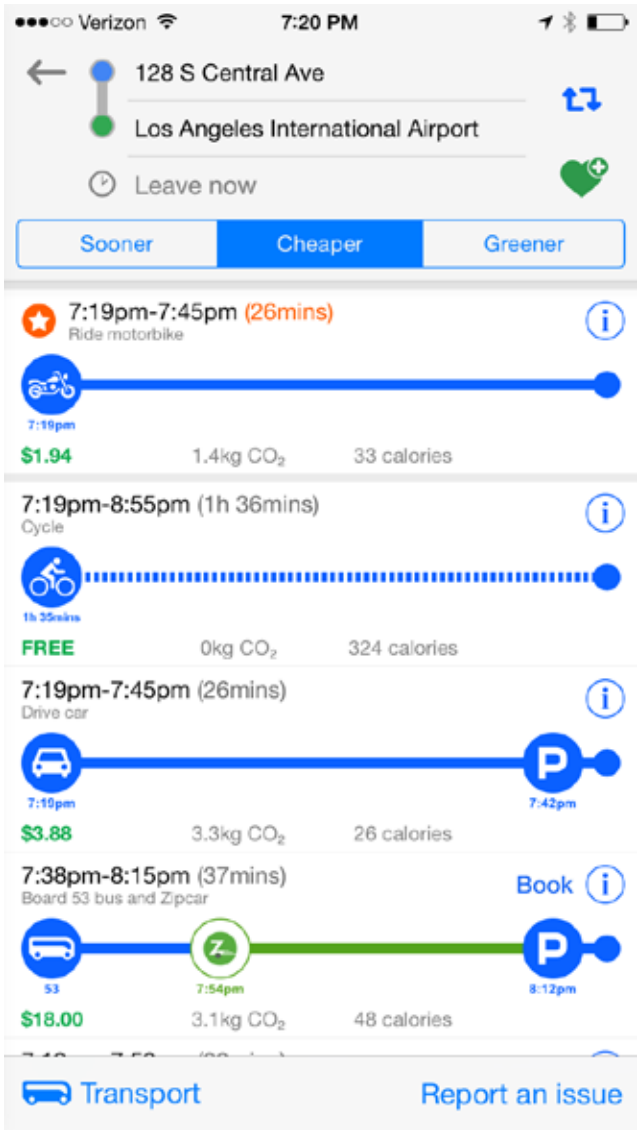
UB Mobile PDX: Ubiquitous Mobility

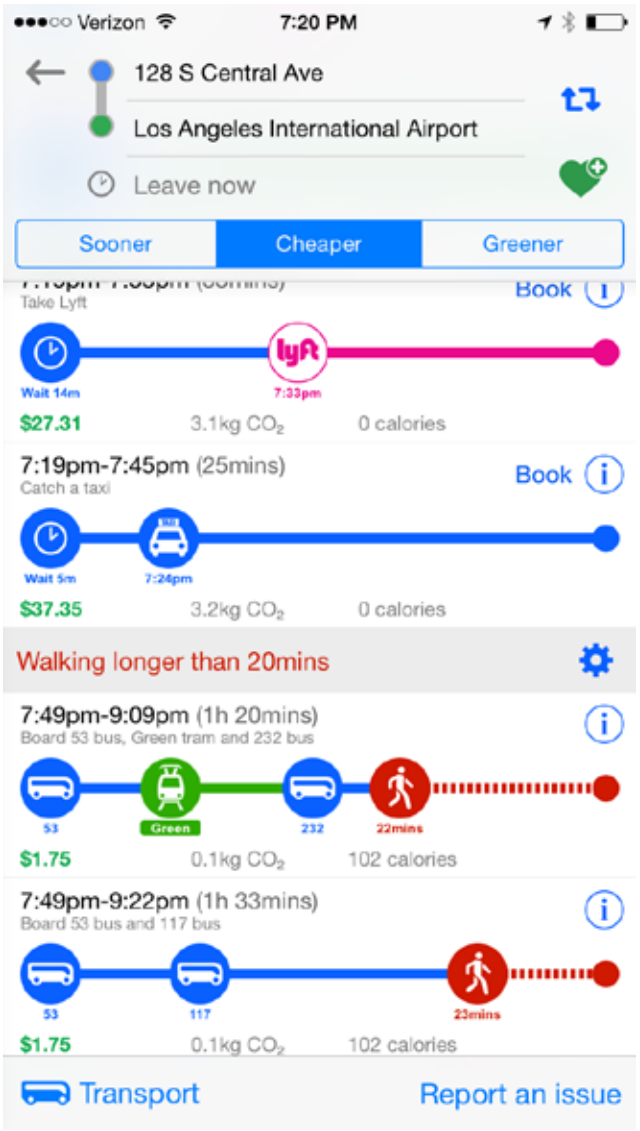






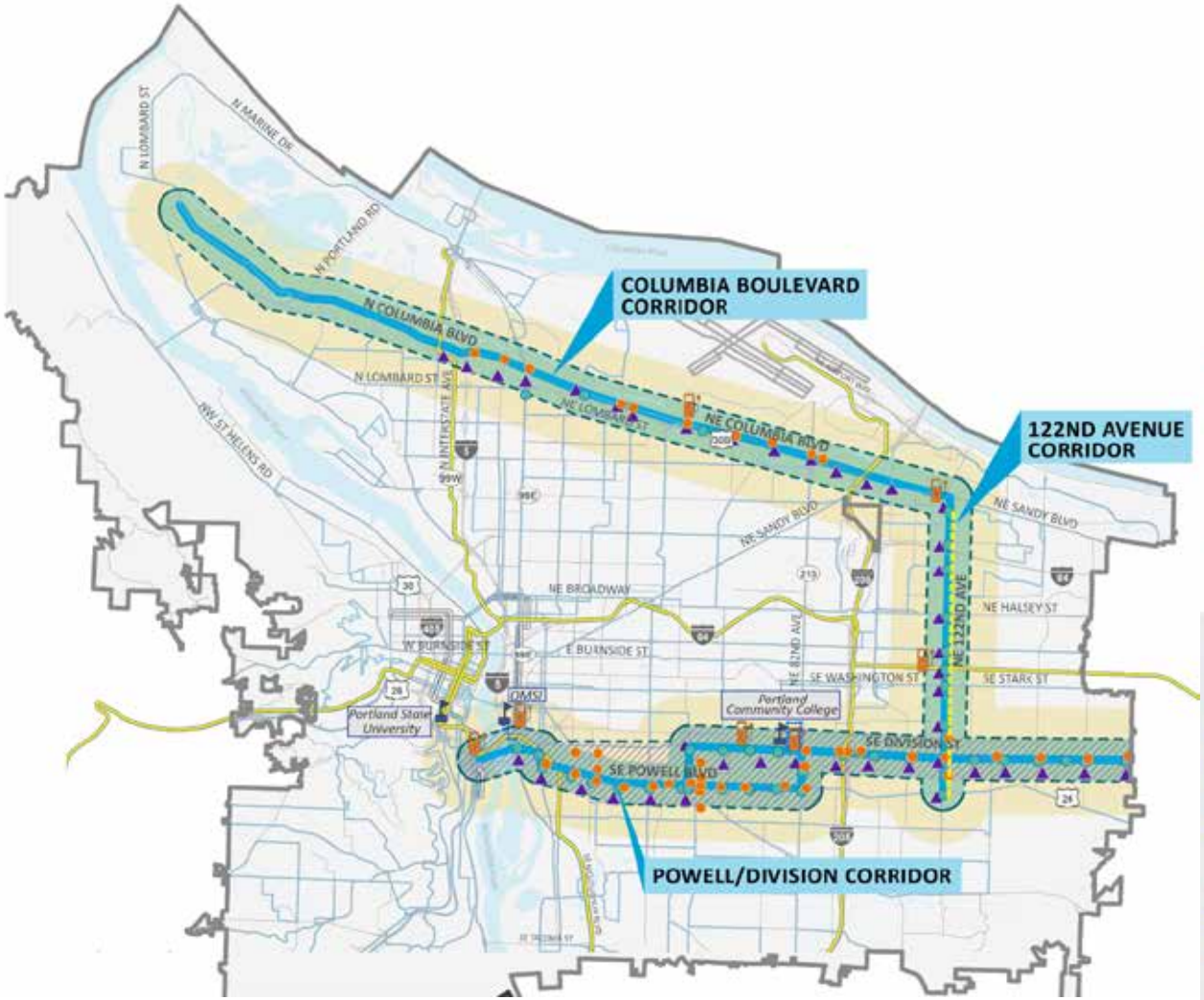
LA Go Example





LA Go: Gamification

Demonstration Corridors



Priority Demonstration Zones

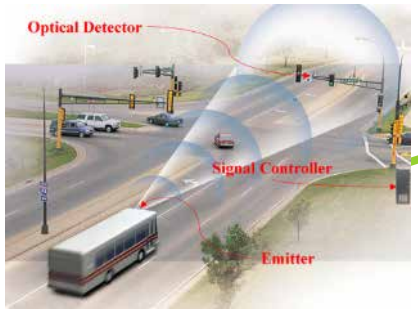
Powell-Division Corridor

Columbia Corridor

- Freight Priority Zone
- Enhanced Mobility
- Downtown
- Innovation Quadrant
- Columbia Boulevard
- Light Rail Corridor
- Bus Corridor
- Street Car Line
- Light Rail Line
- Bus Line
- Dedicated Short Range Communications (DSRC) at each corridor signal
- Electric Vehicle Charging Location
- Copper and Fiber Optic Communication Network
- Future Wireless Systems to Expand Communication
- Car & Ridesharing Focus
- Traffic Control Center
- Major Educational Institutions & Partnering Opportunities

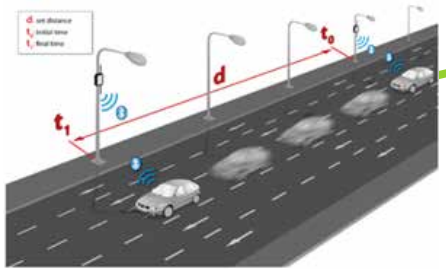
Sensors

Smart LED Street Lights

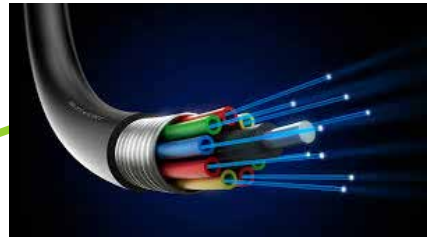


Transit Signal Priority

Air Quality Sensor



Traffic Detection Sensors



Fiber Communications

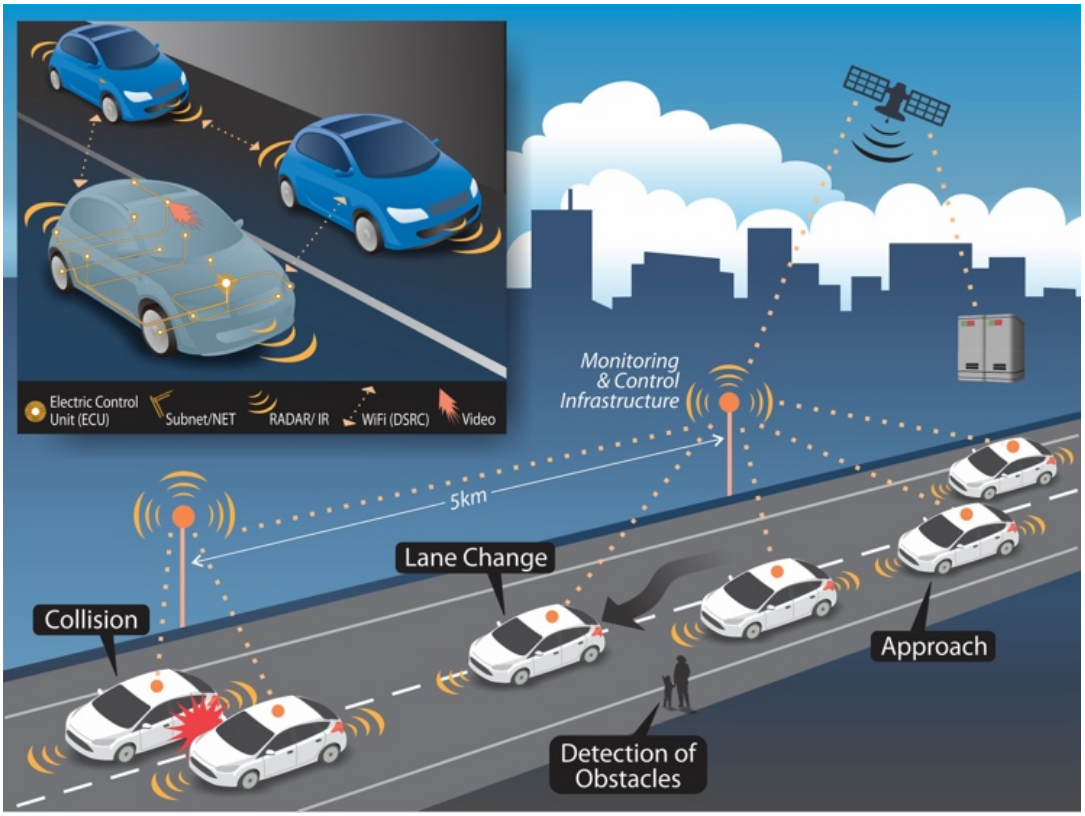
Sidewalk Labs & Intersection


ONLY
NO TURN ON RED
rain shine
eat
gather
drink

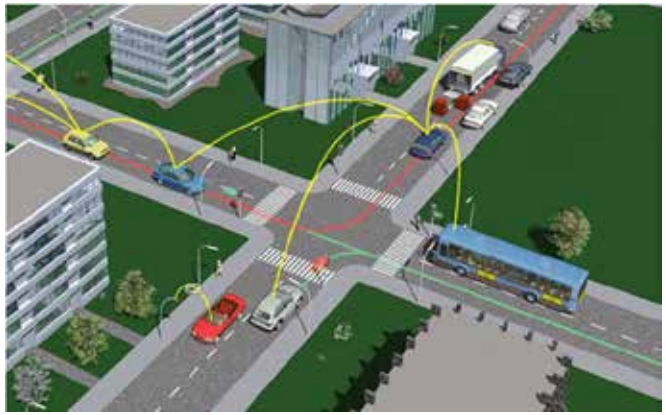
Corridors & Demonstrations

- **C**onnected
- **A**utomated
- **E**lectric

Connected Vehicles (V2X)



V2V: Vehicle-to-Vehicle

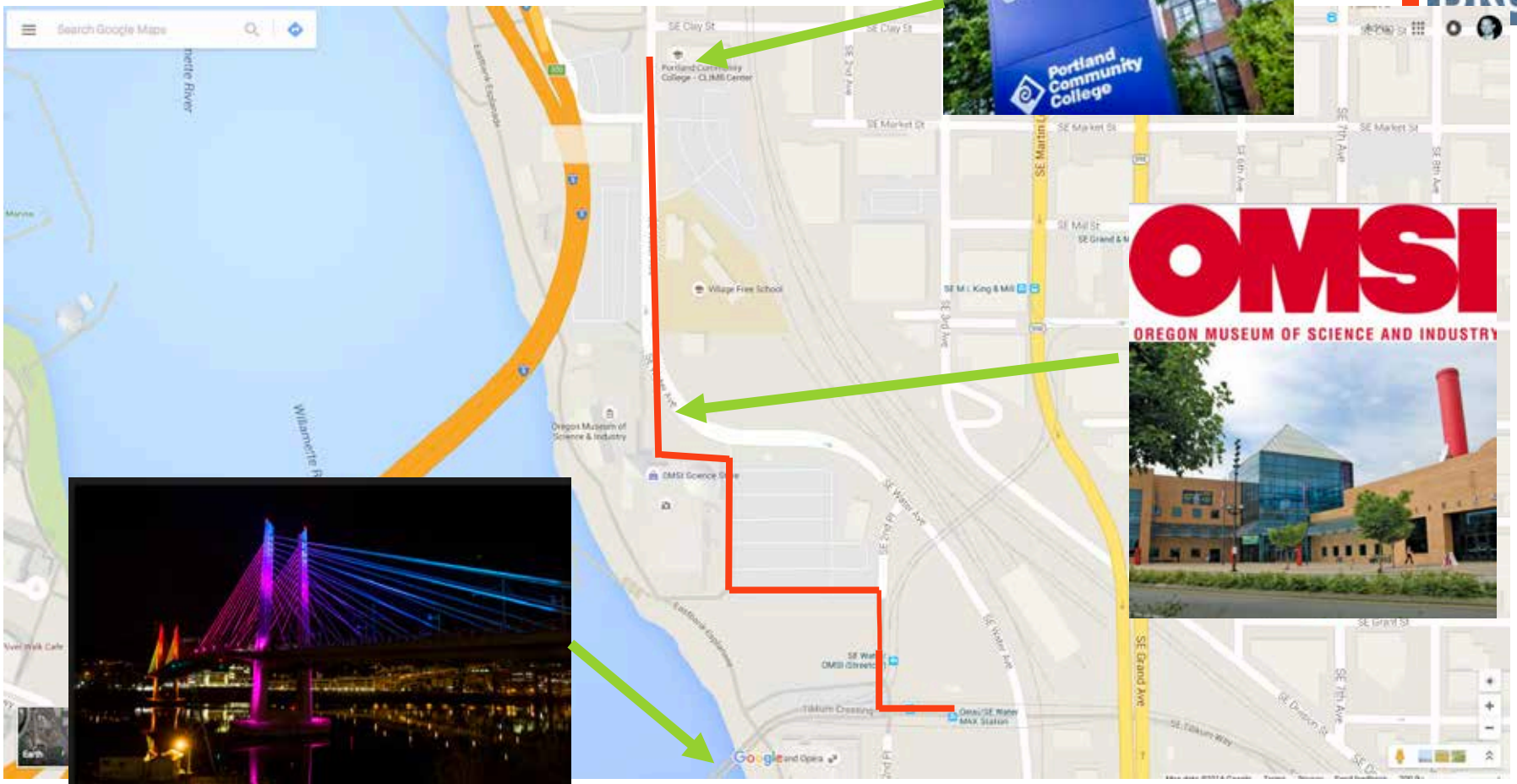


V2I: Vehicle-to-Infrastructure

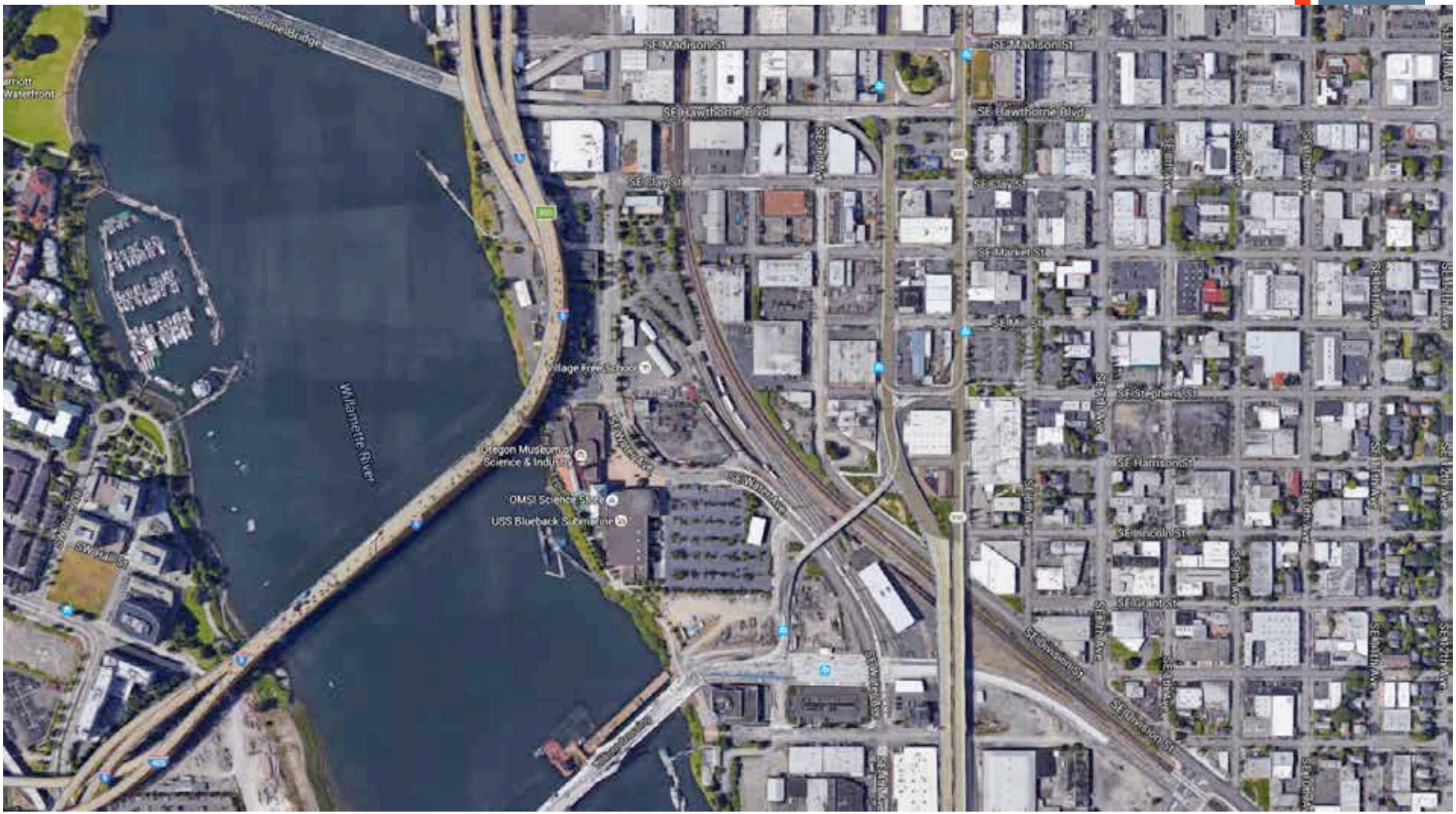
Mobileye Crash Avoidance

Autonomous Shuttles

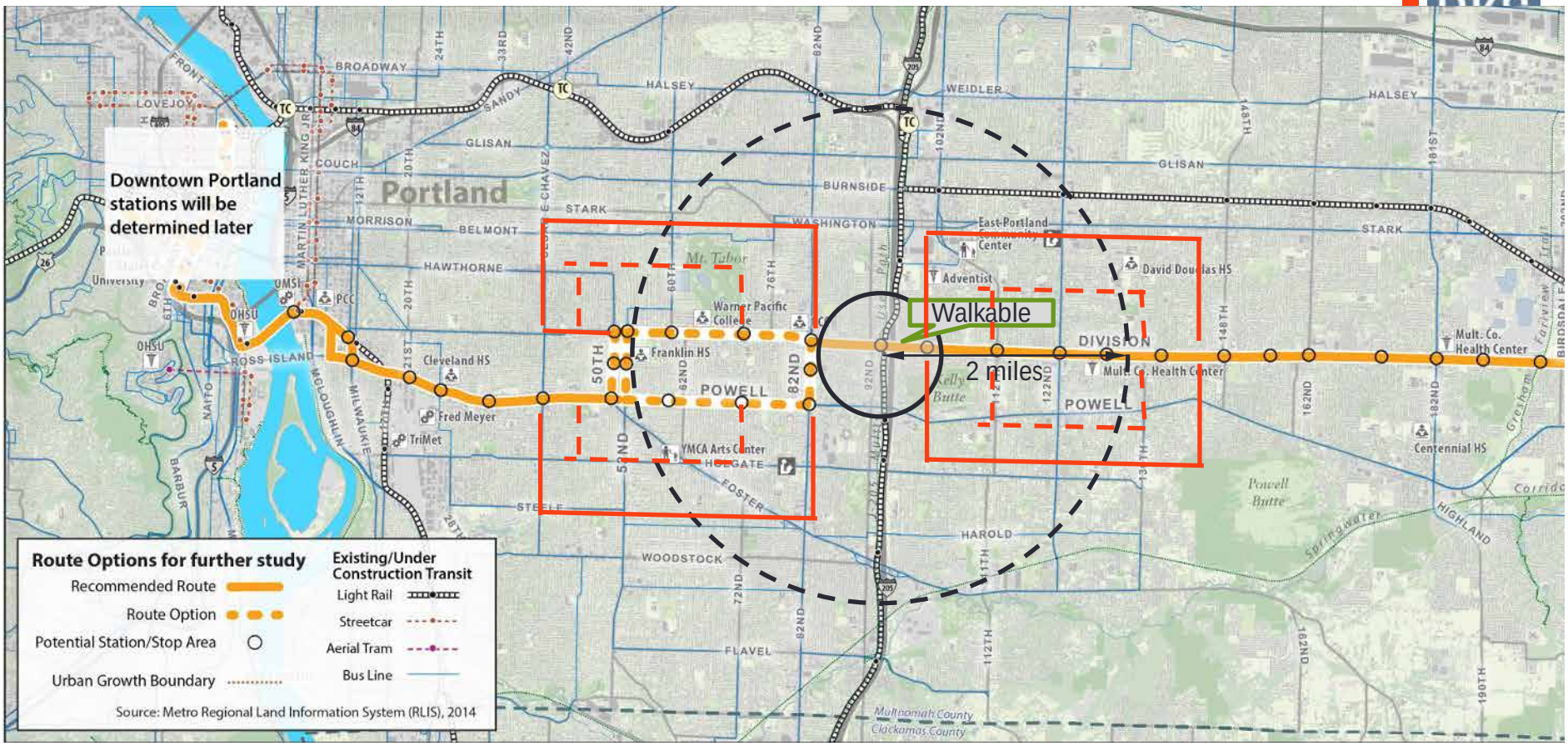
Example Routes for Shuttle



OMSI & Innovation Quadrant



Last Mile Solutions

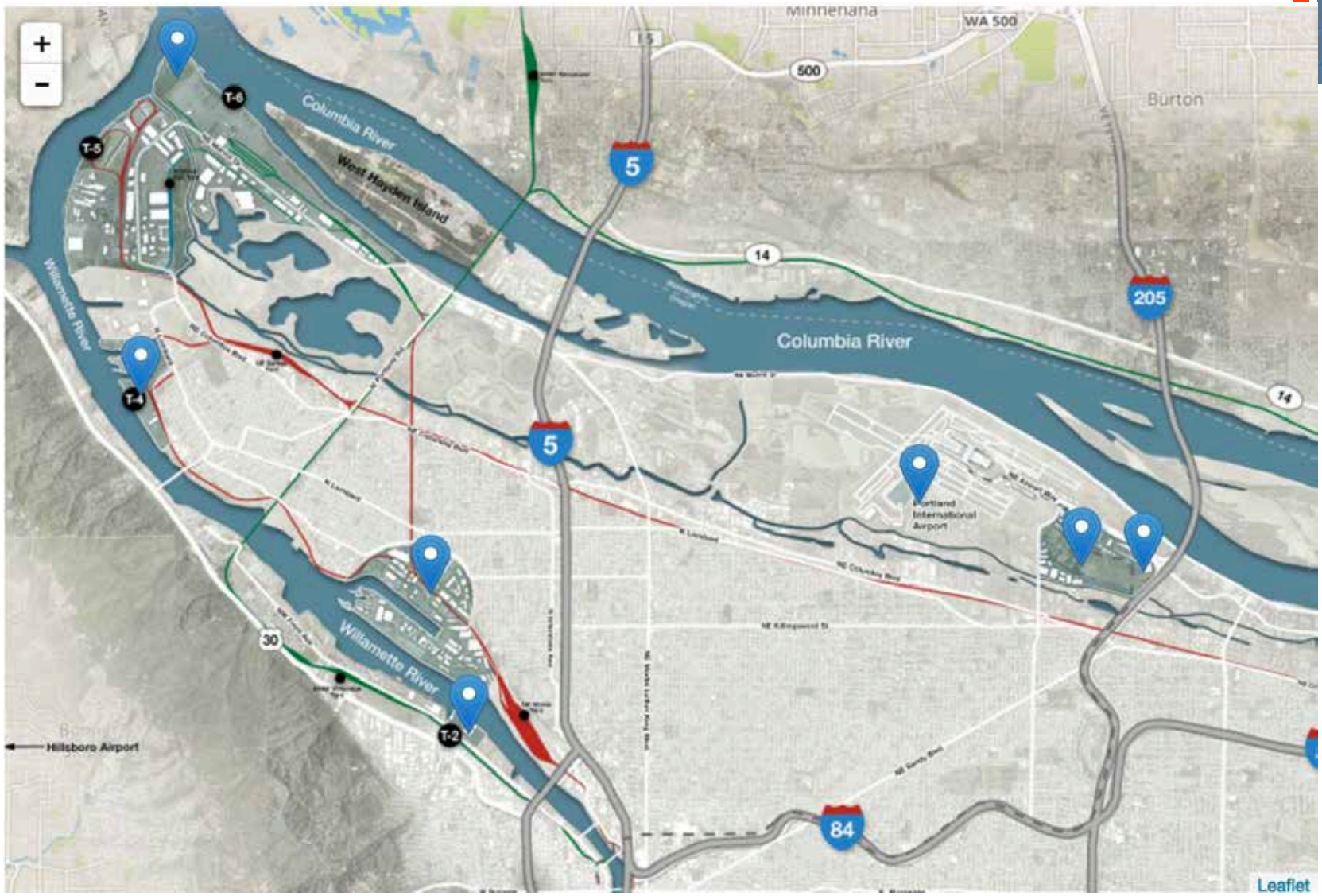


Phasing of Local Circulator Shuttles

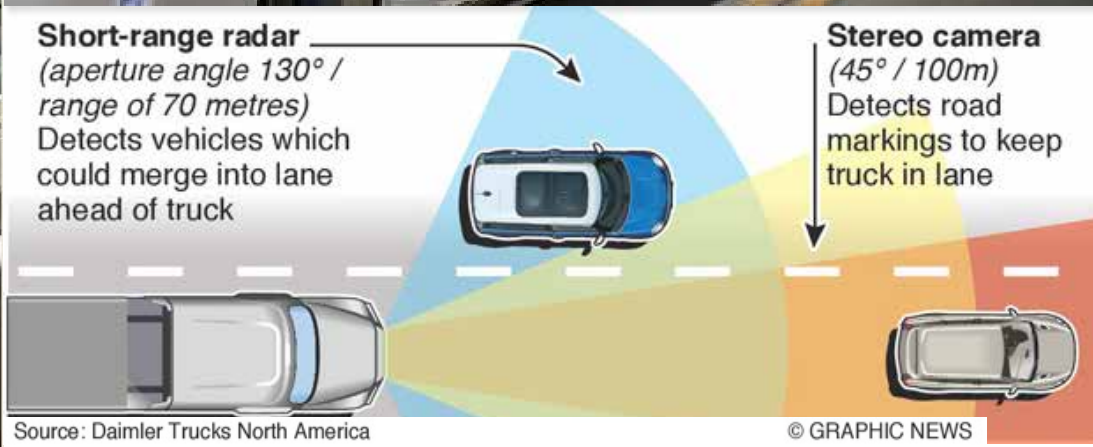

OREGON
LS 00180
8757 A

Ladders of Opportunity

Freight Corridor Testing



Connected & Autonomous Freight



Source: Daimler Trucks North America

Questions?

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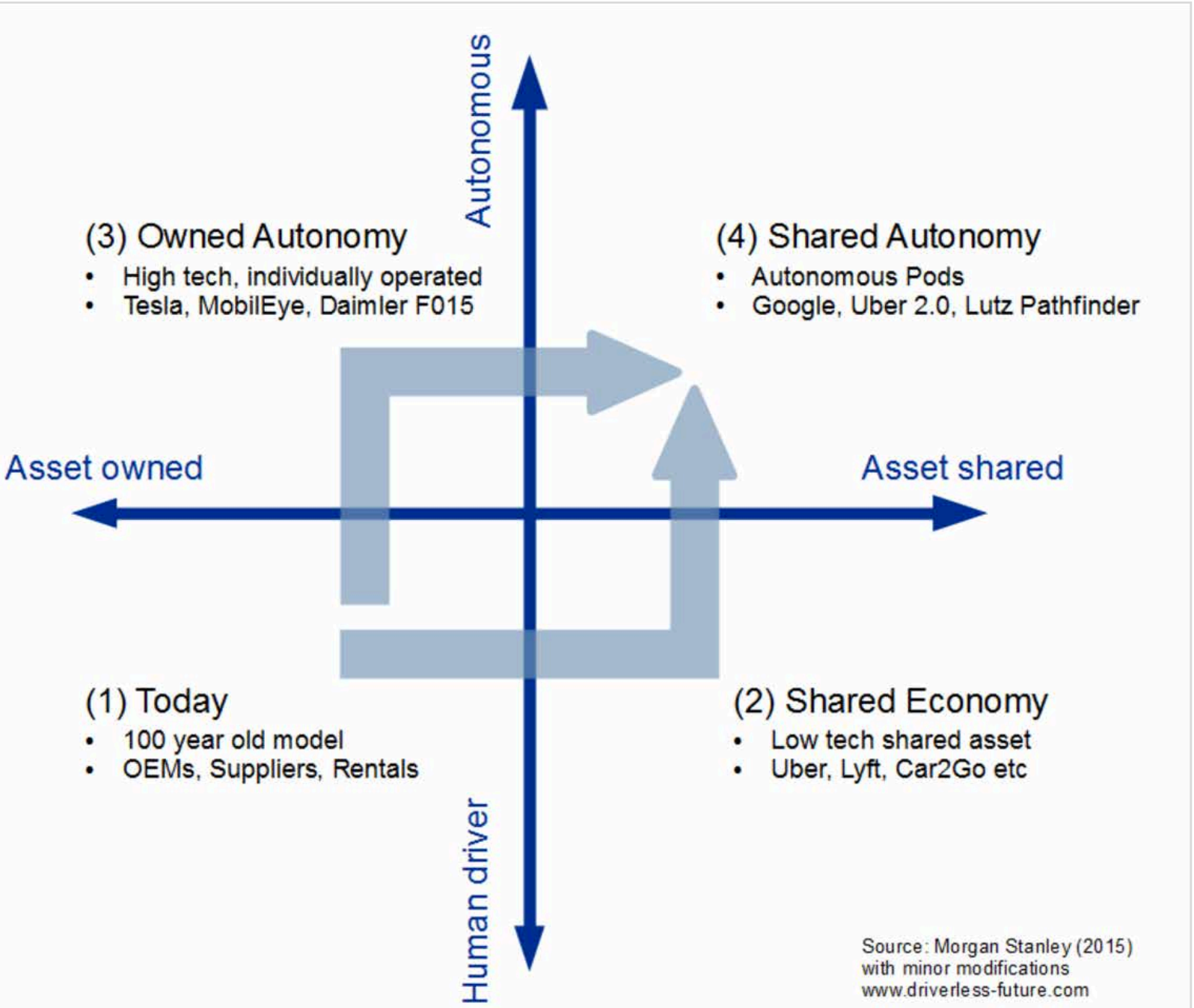
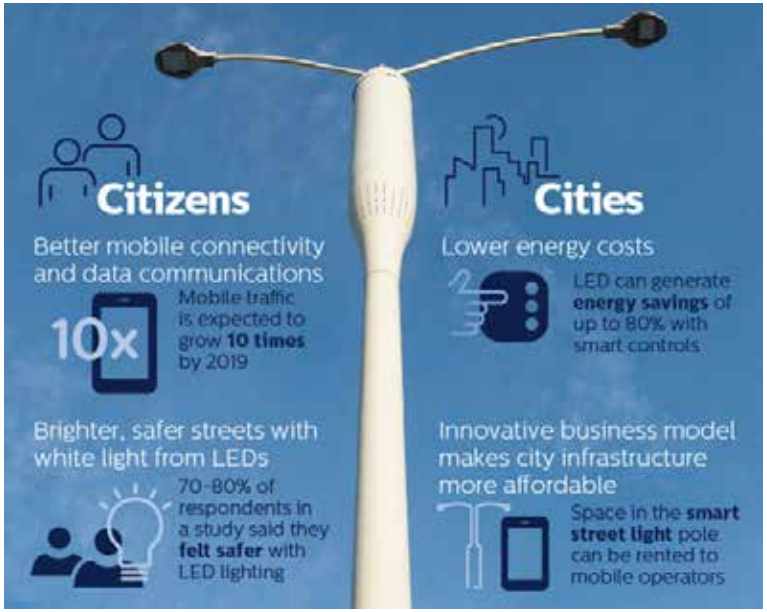
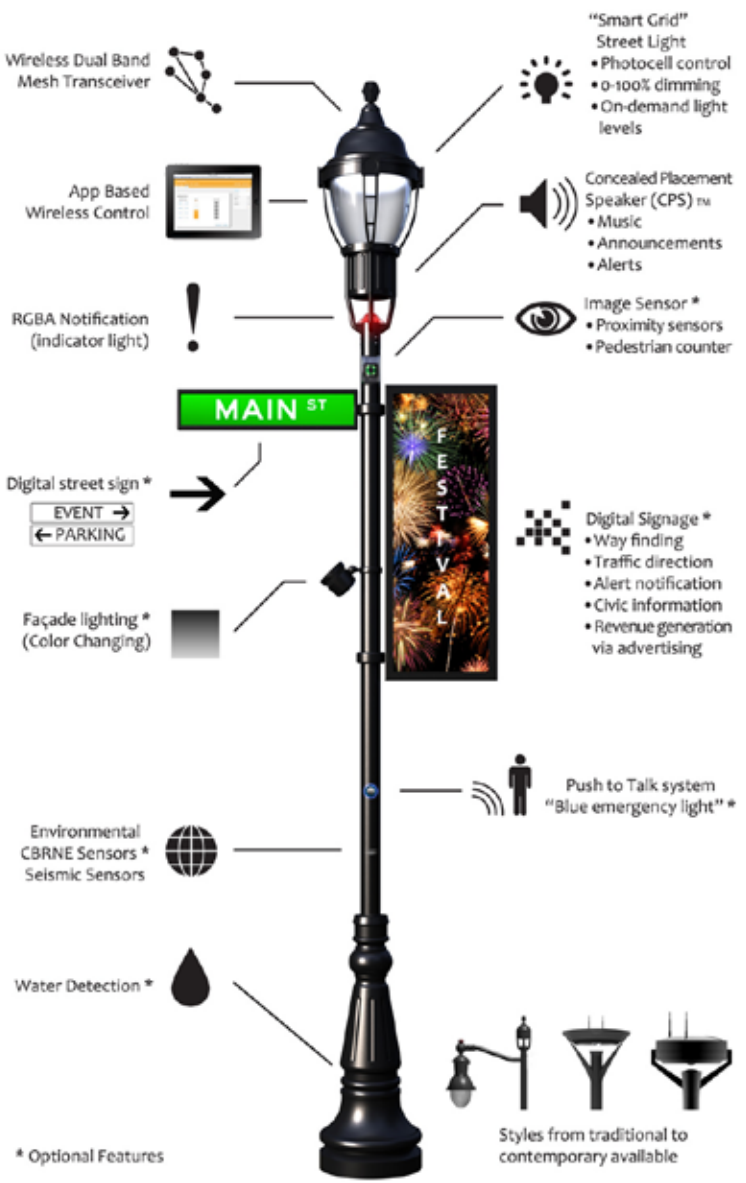

Autonomous
(3) Owned Autonomy
• High tech, individually operated
• Tesla, MobilEye, Daimler F015
(4) Shared Autonomy
• Autonomous Pods
• Google, Uber 2.0, Lutz Pathfinder
Asset owned
Asset shared
(1) Today
• 100 year old model
• OEMs, Suppliers, Rentals
(2) Shared Economy
• Low tech shared asset
• Uber, Lyft, Car2Go etc
Human driver
Source: Morgan Stanley (2015)
with minor modifications
www.driverless-future.com

Case Study: Big Belly Garbage

Case Study: Intelligent Street Lights

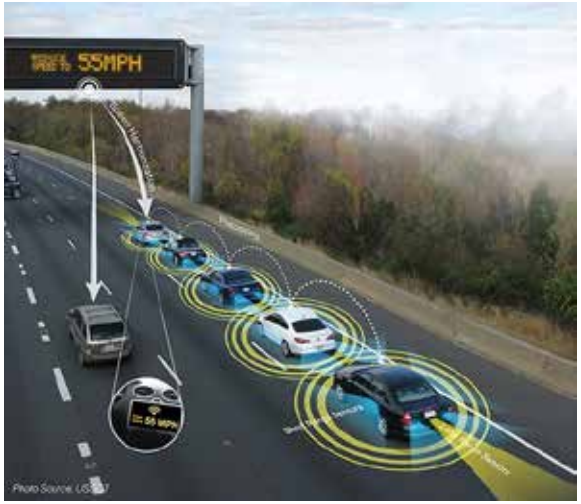




Autonomous will be Connected

Connected Vehicles

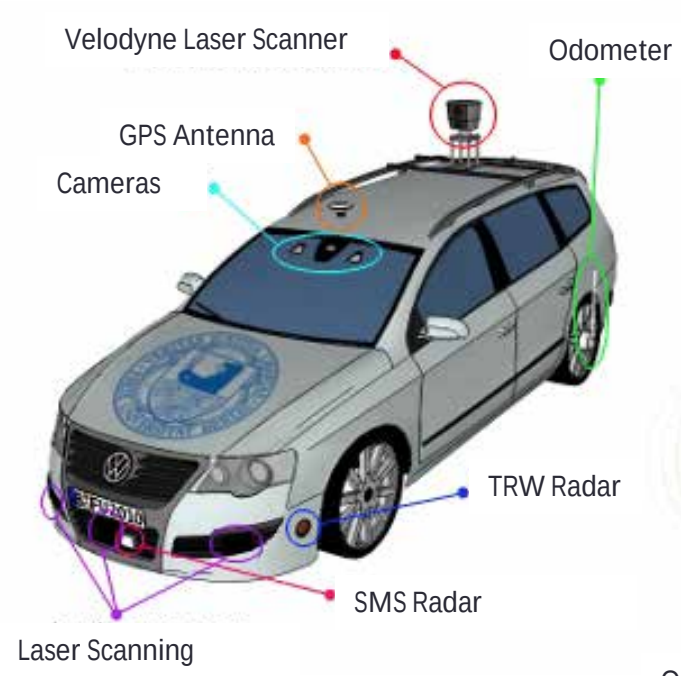
Autonomous Vehicles

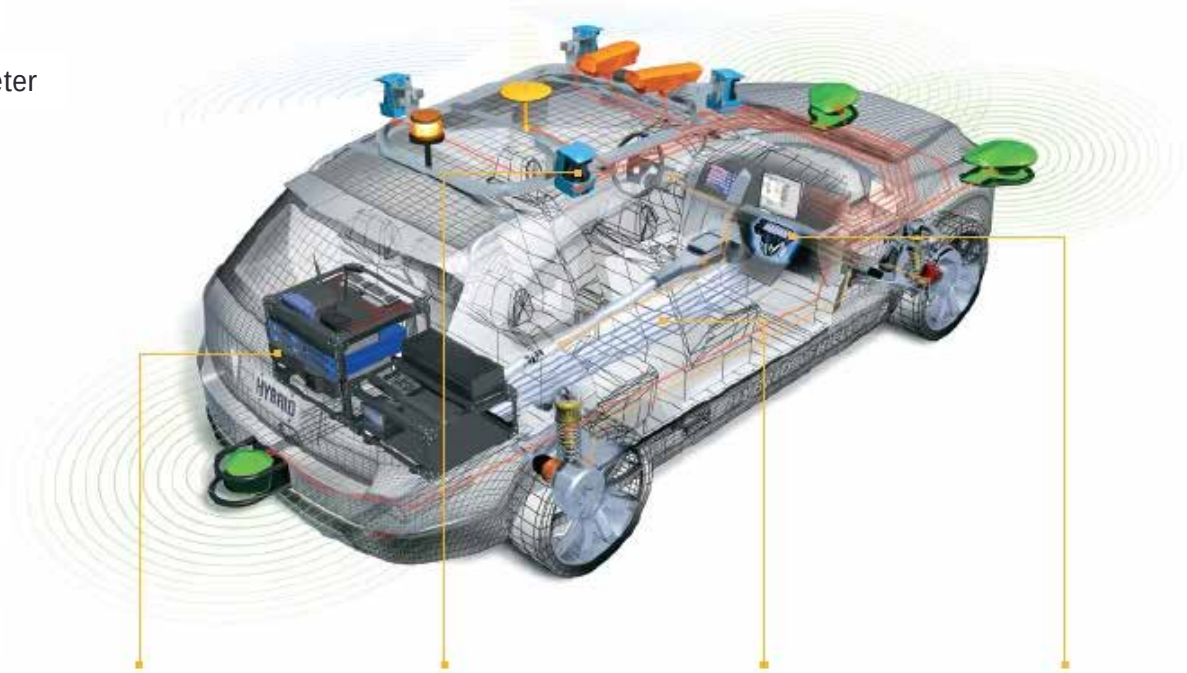


NHTSA Defined Levels of Automation

- **No-Automation (Level 0):** The driver is in complete and sole control.
- **Function-specific Automation (Level 1):** Automation at this level involves one or more specific control functions.
- **Combined Function Automation (Level 2):** Automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions.
- **Limited Self-Driving Automation (Level 3):** Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions.
- **Full Self-Driving Automation (Level 4):** The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip.

What makes Autonomous work?





On-board Computing with GIS Mapping

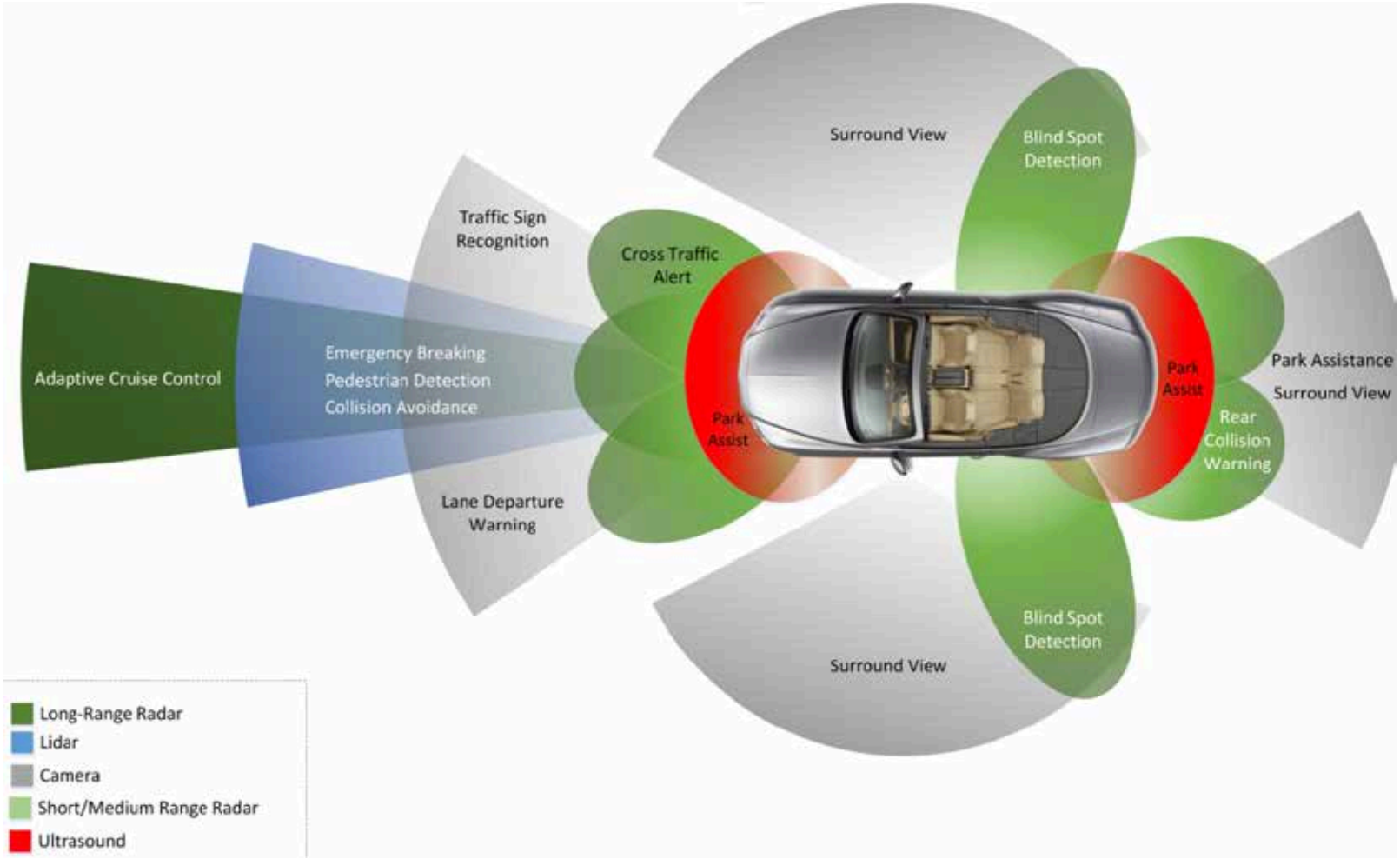
Sensor Data Acquisition & Processing

Communications Network

Drive-by-Wire System

Do you believe?

- http://watchmojo.com/video/id/15178/



Shared Use & Mobility Hubs