

The logo for DKS Associates, featuring the letters 'DKS' in white on a dark blue rectangular background.

Experts Connecting Communities

A decorative graphic consisting of a large dark grey rectangle on the left, and three smaller squares on the right: a dark blue square, a teal square, and a red square stacked vertically.

# Smart Cities Challenge & Portland Response

Adrian Pearmine

National Director for Smart Cities and Connected Vehicles

DKS Associates

# Smart Cities & FAST Act



n 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



Paul Allen's Vulcan, Inc.



Mobileye



Autodesk



NXP



Amazon Web Services



Alphabet's Sidewalk Labs



U.S. Department of Energy

DKS

# USDOT Smart Cities Vision Elements

## Technology Elements *(Highest Priority)*



**Vision Element #1**  
**Urban Automation**

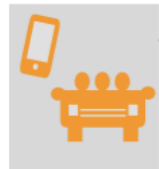


**Vision Element #2**  
**Connected Vehicles**



**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**

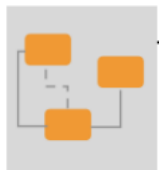


**Vision Element #8**  
**Smart Grid, Roadway Electrification, & EVs**



**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

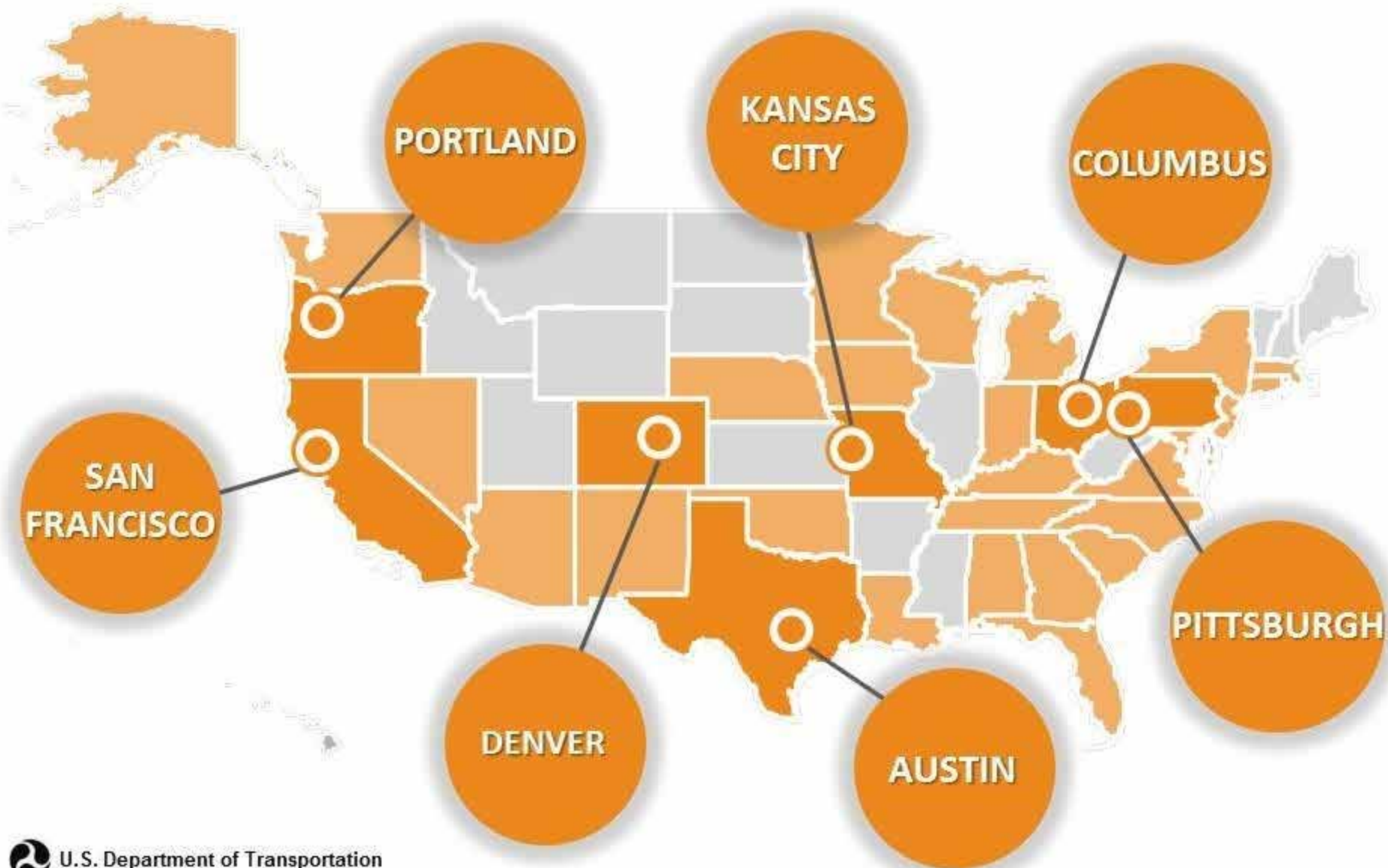
Smart City Challenge Winner announced in June



#DOTSmartCity  
[www.transportation.gov/smartcity](http://www.transportation.gov/smartcity)



# Smart City Challenge Finalists



# What is a Smart City? (Smart City 101)



n 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/>



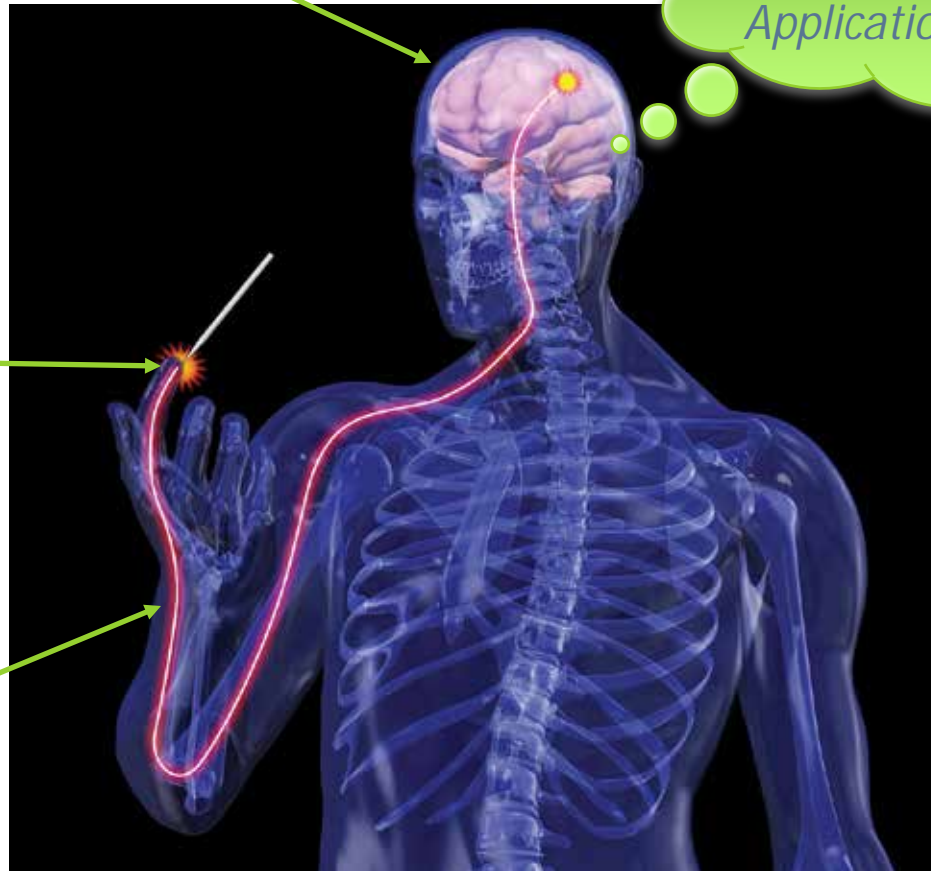
# Think of your City like the Nervous System

**Big Data:**  
*The brain processing  
the signals*

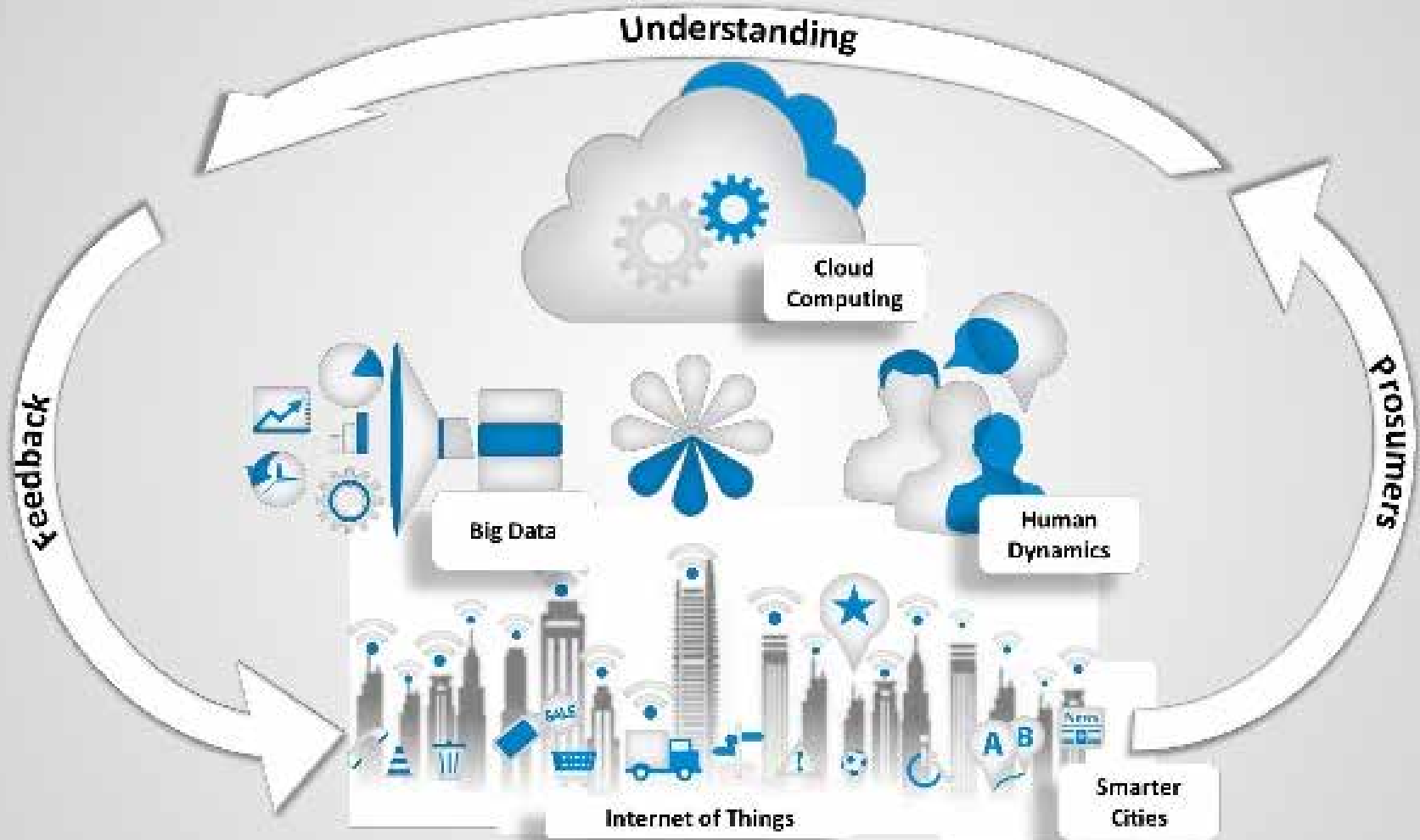
**Thoughts & Images:**  
*Dashboards &  
Applications*

**Sensors or IoT:**  
*The nerve endings  
capturing signals*

**Telecom Network:**  
*The nervous system  
backhauling the  
signals*

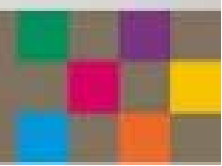


# Big Data / Smart Cities ecosystem



Dr. Antonio J. Jara – [jara@ieee.org](mailto:jara@ieee.org)  
HES-SO/Valais Switzerland

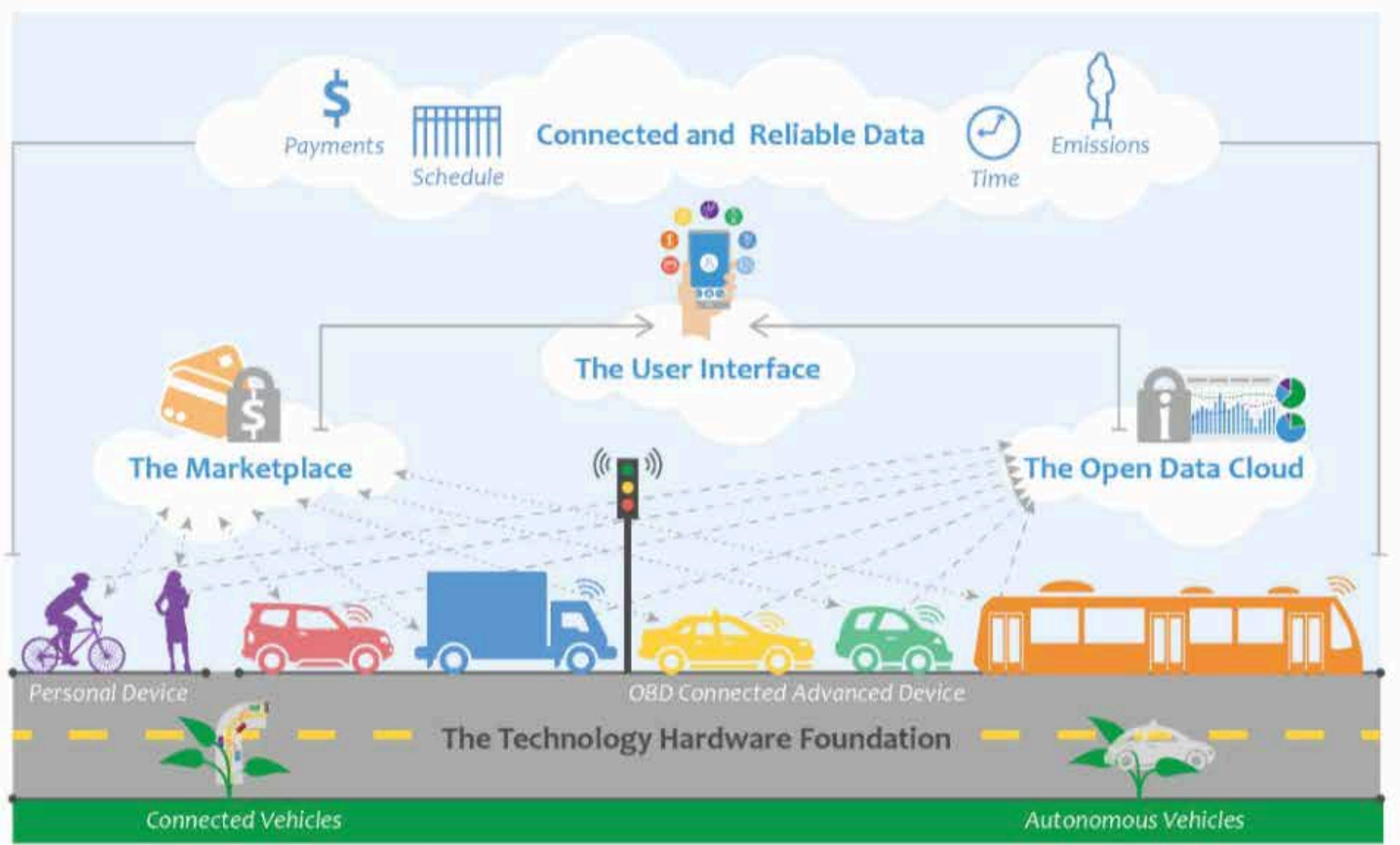
**Hes-so**  
Haute école spécialisée  
de Suisse romande  
Technische Hochschule  
Südwestschweiz  
University of Applied Sciences  
Western Switzerland



# Communications is the Backbone



# UB Mobile PDX: Mobility Marketplace



# Community Outreach & Partnerships

DKS

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



# Students describe Smart Cities



# UB Mobile PDX: Ubiquitous Mobility

4G LTE 1:09 PM

Portland

Grocery Store

Walking, Wheelchair, Bicycle, Car icons

4G LTE 1:09 PM

**Accessible Route** ★

**Fubonn Shopping Center**  
 2850 SE 82nd Avenue  
 Portland, OR  
 (503) 555-8899

0.5 Miles  
 Mostly Flat  
 Average Slope 1.8%  
 Hazards (2)  
 ⚠️ Unsignalized Crossing  
 ⚠️ Curb Ramp Construction

Overall Rating ★★★★★  
 Relaxing ★★★★★  
 Easy to Cross ★★★★★  
 Scenic ★★★★★

Grocery Store

Walking, Wheelchair, Bicycle, Car icons

4G LTE 1:09 PM

**Fubonn Shopping Center**  
 2850 SE 82nd Avenue  
 Portland, OR  
 (503) 555-8899

富康商場

Grocery Store

Walking, Wheelchair, Bicycle, Car icons

# LA Go Example



Verizon 7:20 PM

128 S Central Ave  
Los Angeles International Airport

Leave now

Sooner Cheaper Greener

**7:19pm-7:45pm (26mins)**  
Ride motorbike

7:19pm  
**\$1.94** 1.4kg CO<sub>2</sub> 33 calories

**7:19pm-8:55pm (1h 36mins)**  
Cycle

1h 35mins  
**FREE** 0kg CO<sub>2</sub> 324 calories

**7:19pm-7:45pm (26mins)**  
Drive car

7:19pm 7:42pm  
**\$3.88** 3.3kg CO<sub>2</sub> 26 calories

**7:38pm-8:15pm (37mins)**  
Board 53 bus and Zipcar

53 7:54pm 8:12pm  
**\$18.00** 3.1kg CO<sub>2</sub> 48 calories

Transport Report an issue

Verizon 7:20 PM

128 S Central Ave  
Los Angeles International Airport

Leave now

Sooner Cheaper Greener

**7:19pm-7:45pm (26mins)**  
Take Lyft

7:19pm 7:33pm  
**\$27.31** 3.1kg CO<sub>2</sub> 0 calories

**7:19pm-7:45pm (25mins)**  
Catch a taxi

7:19pm 7:24pm  
**\$37.35** 3.2kg CO<sub>2</sub> 0 calories

**Walking longer than 20mins**

**7:49pm-9:09pm (1h 20mins)**  
Board 53 bus, Green tram and 232 bus

53 Green 232 22mins  
**\$1.75** 0.1kg CO<sub>2</sub> 102 calories

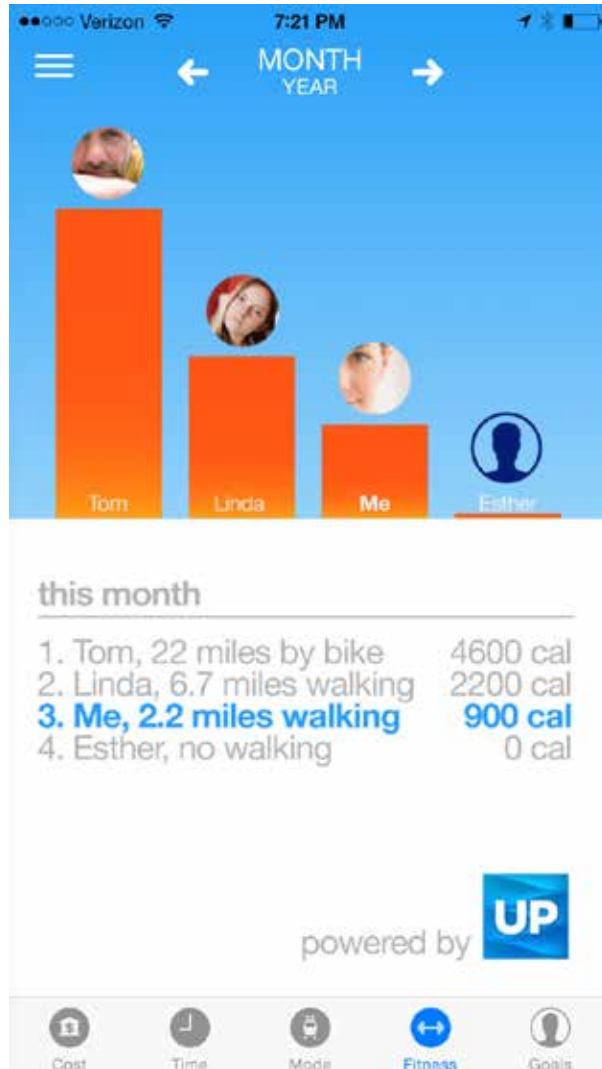
**7:49pm-9:22pm (1h 33mins)**  
Board 53 bus and 117 bus

53 117 23mins  
**\$1.75** 0.1kg CO<sub>2</sub> 102 calories

Transport Report an issue



# LA Go: Gamification



# Demonstration Corridors

## Priority Demonstration Zones

■ Powell-Division Corridor
 ■ Columbia Corridor

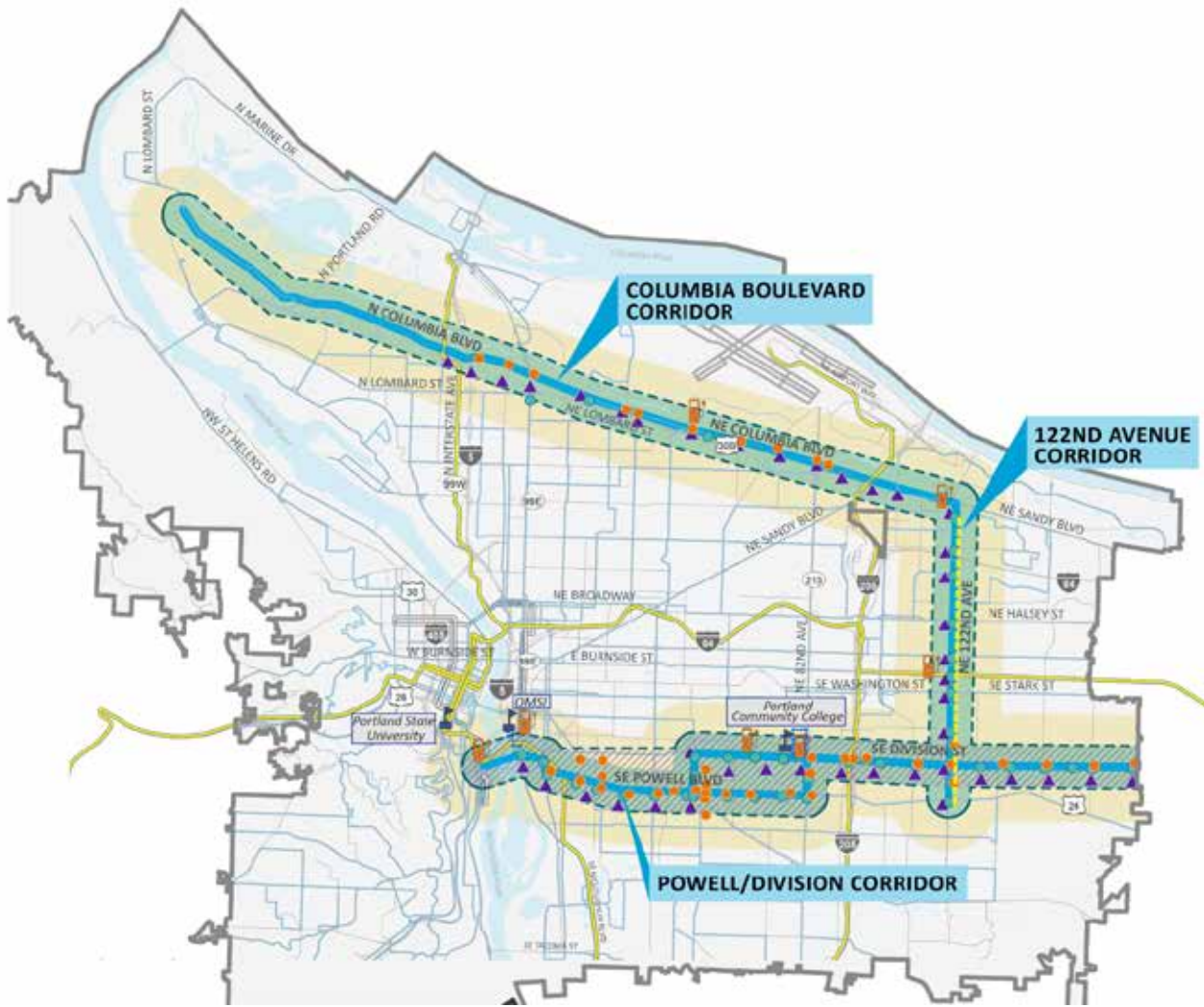


**COLUMBIA BOULEVARD CORRIDOR**

**122ND AVENUE CORRIDOR**

**POWELL/DIVISION CORRIDOR**

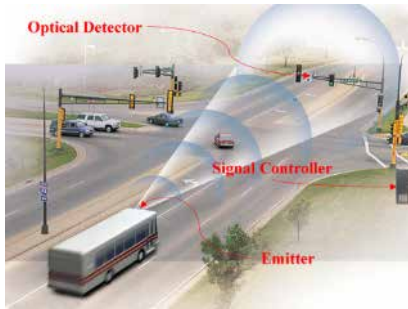
- Freight Priority Zone
- Enhanced Mobility
- Downtown
- Innovation Quadrant
- Columbia Boulevard
- Light Rail Corridor
- Bus Corridor
- Street Car Line
- Light Rail Line
- Bus Line
- Dedicated Short Range Communications (DSRC) at each corridor signal
- Electric Vehicle Charging Location
- Copper and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



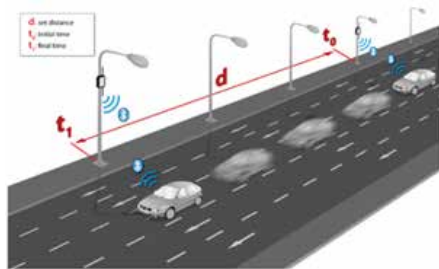
# Sensors



Smart LED Street Lights



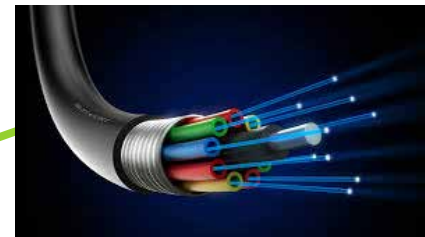
Transit Signal Priority



Traffic Detection Sensors



Air Quality Sensor



Fiber Communications

# Sidewalk Labs & Intersection





RIGHT TURN ONLY

NO TURN ON RED

Get Ready for Super Fast Free Wi-Fi

JUSTICE CENTER CO. OPTICAL SHOP

rain-shine

Quinn St

50th St

rain-shine eat rain-shine gather rain-shine

rain-shine eat rain-shine drink gather

# Corridors & Demonstrations

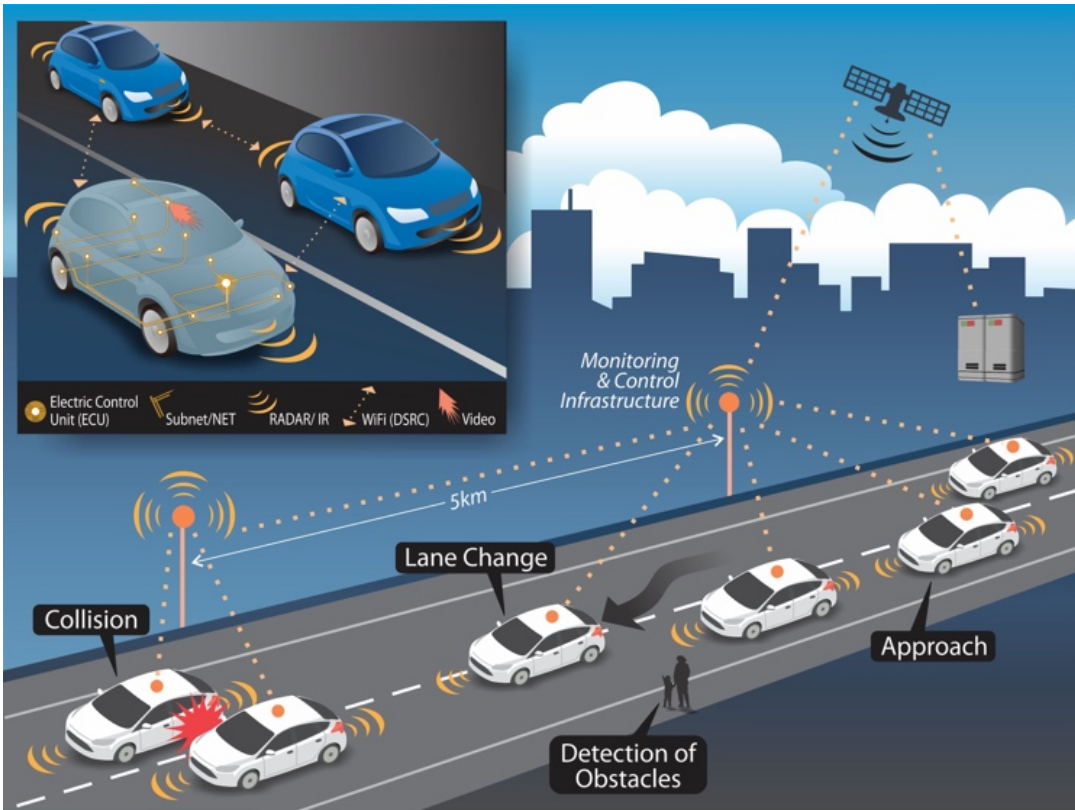


n **C**onected

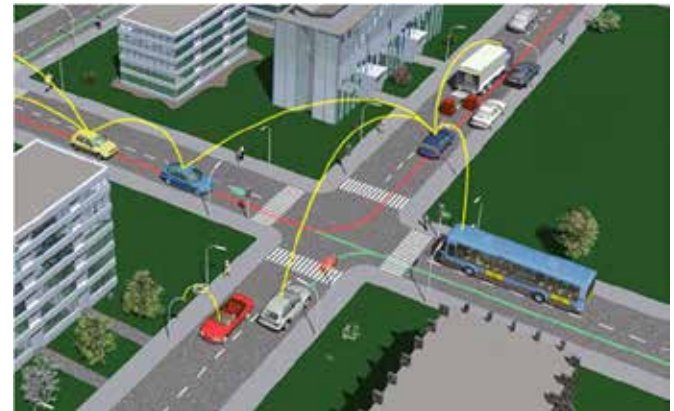
n **A**utomated

n **E**lectric

# Connected Vehicles (V2X)



**V2V: Vehicle-to-Vehicle**



**V2I: Vehicle-to-Infrastructure**

KS

# Mobileye Crash Avoidance

DKS

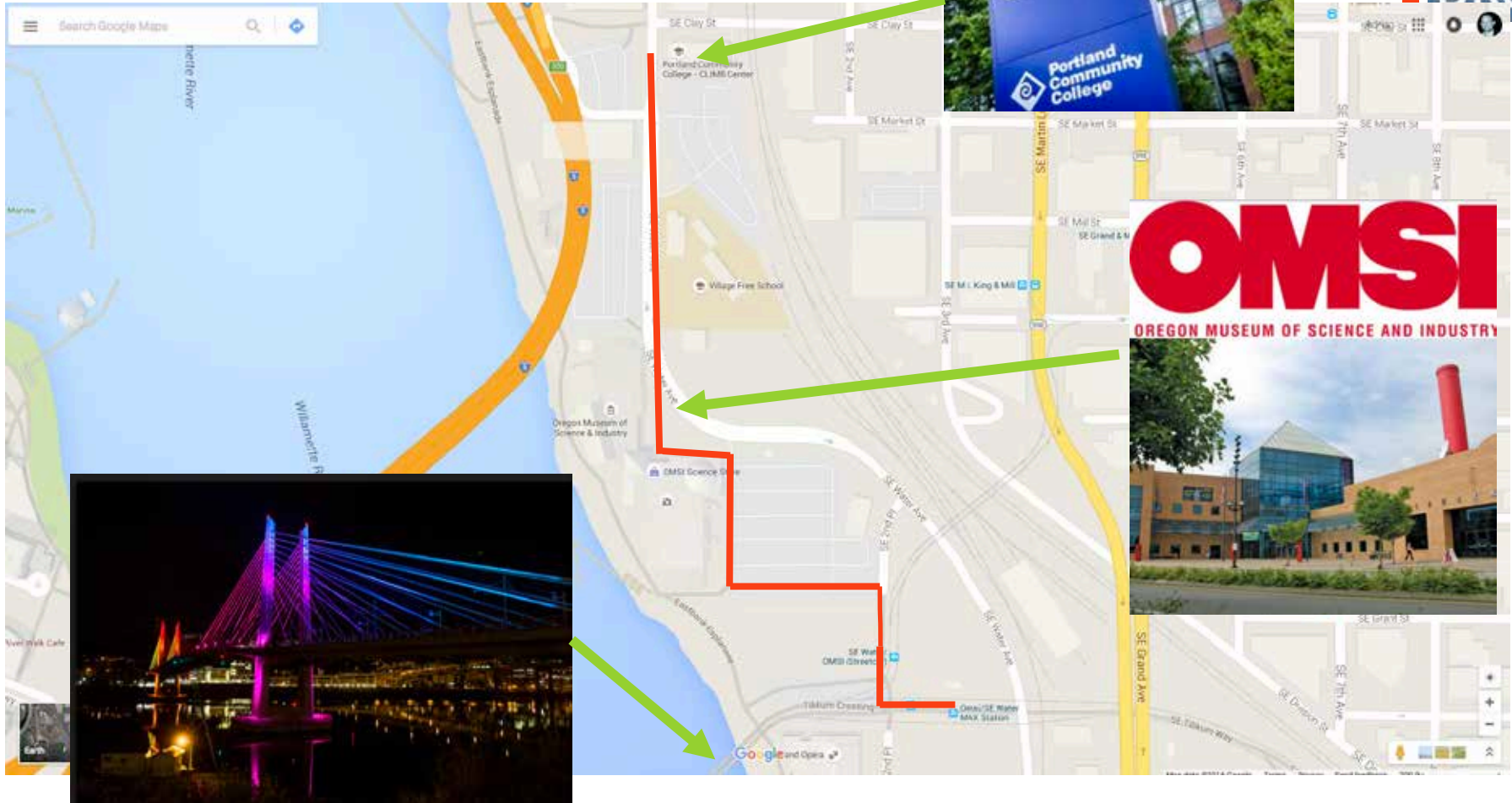




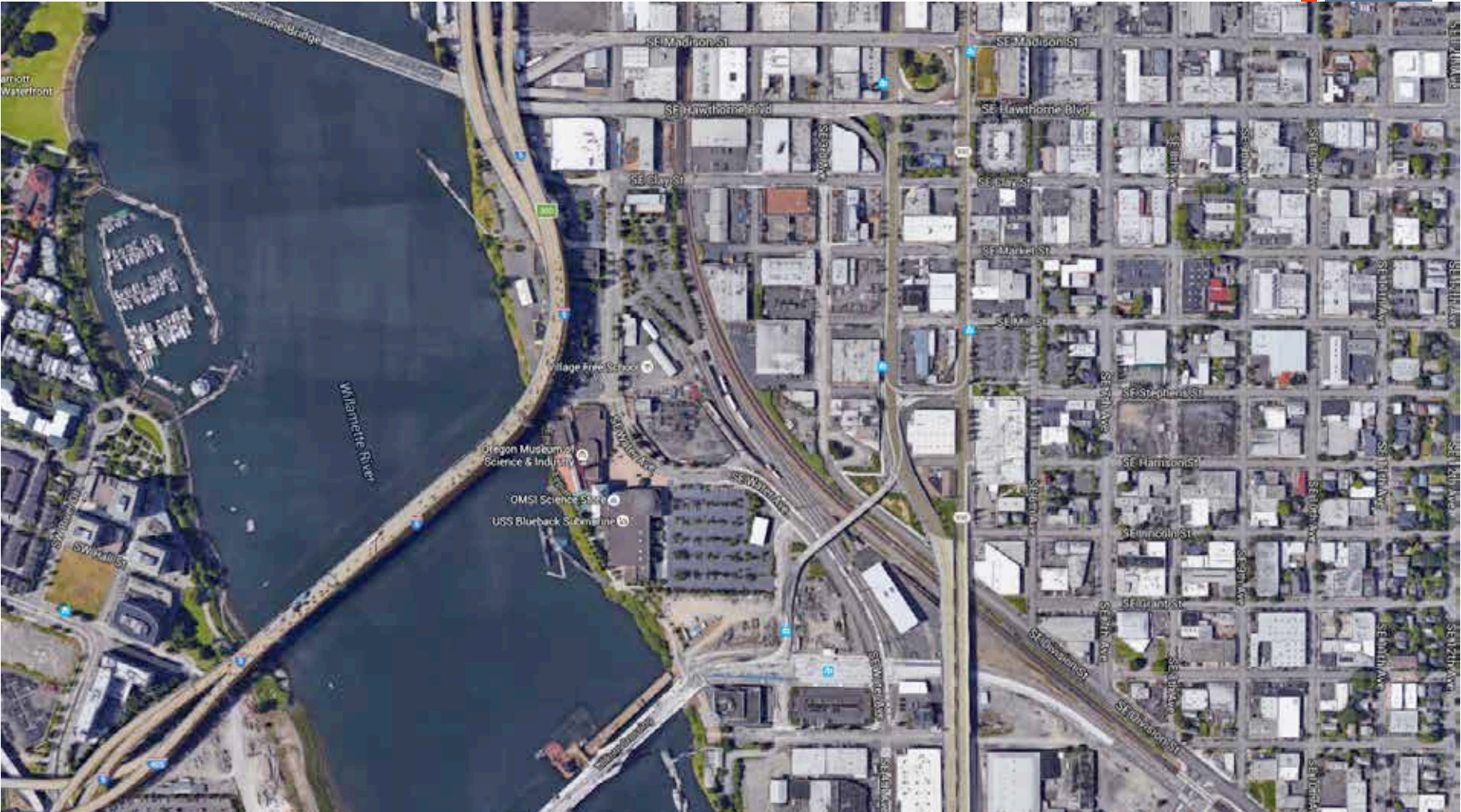
# Autonomous Shuttles



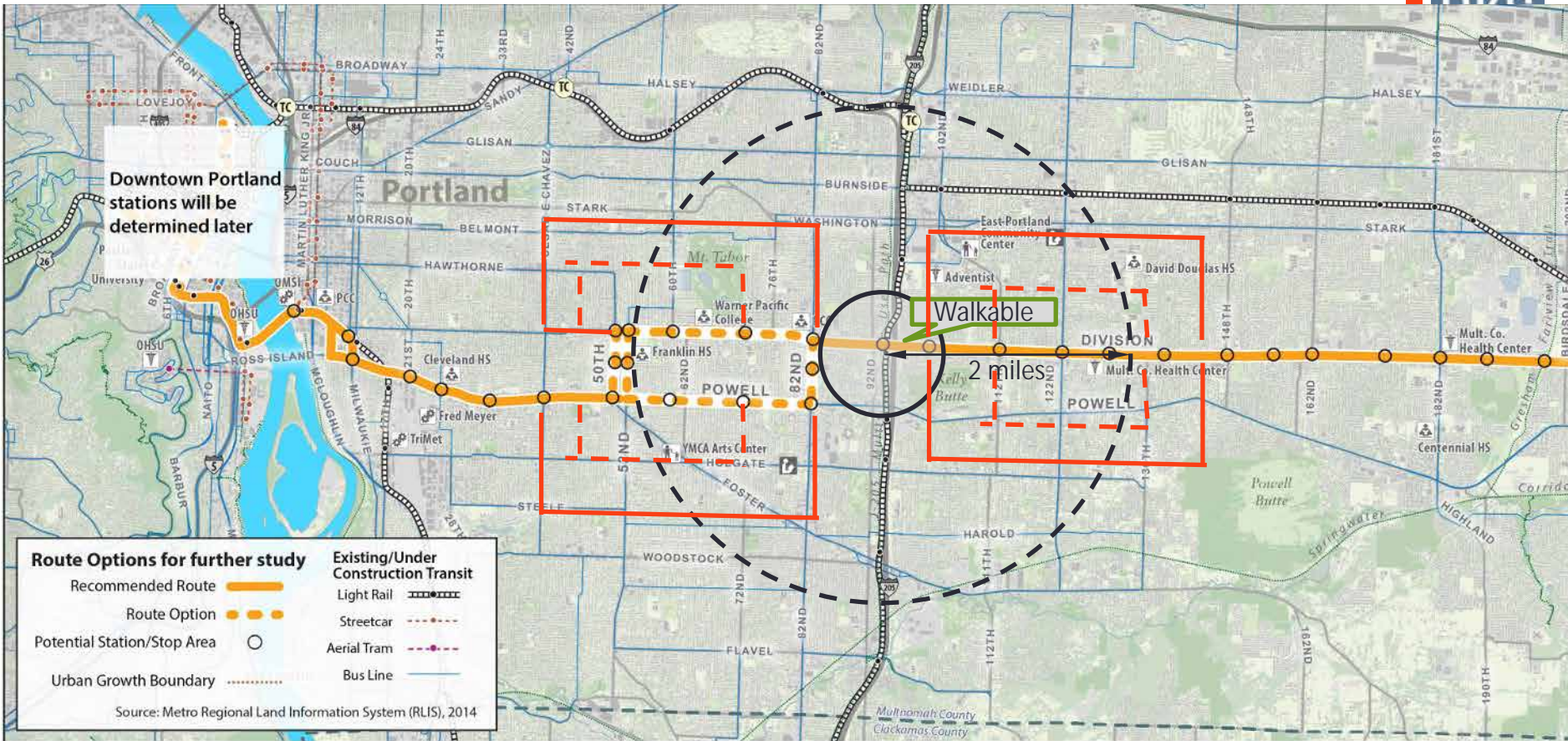
# Example Routes for Shuttle



# OMSI & Innovation Quadrant



# Last Mile Solutions



# Phasing of Local Circulator Shuttles





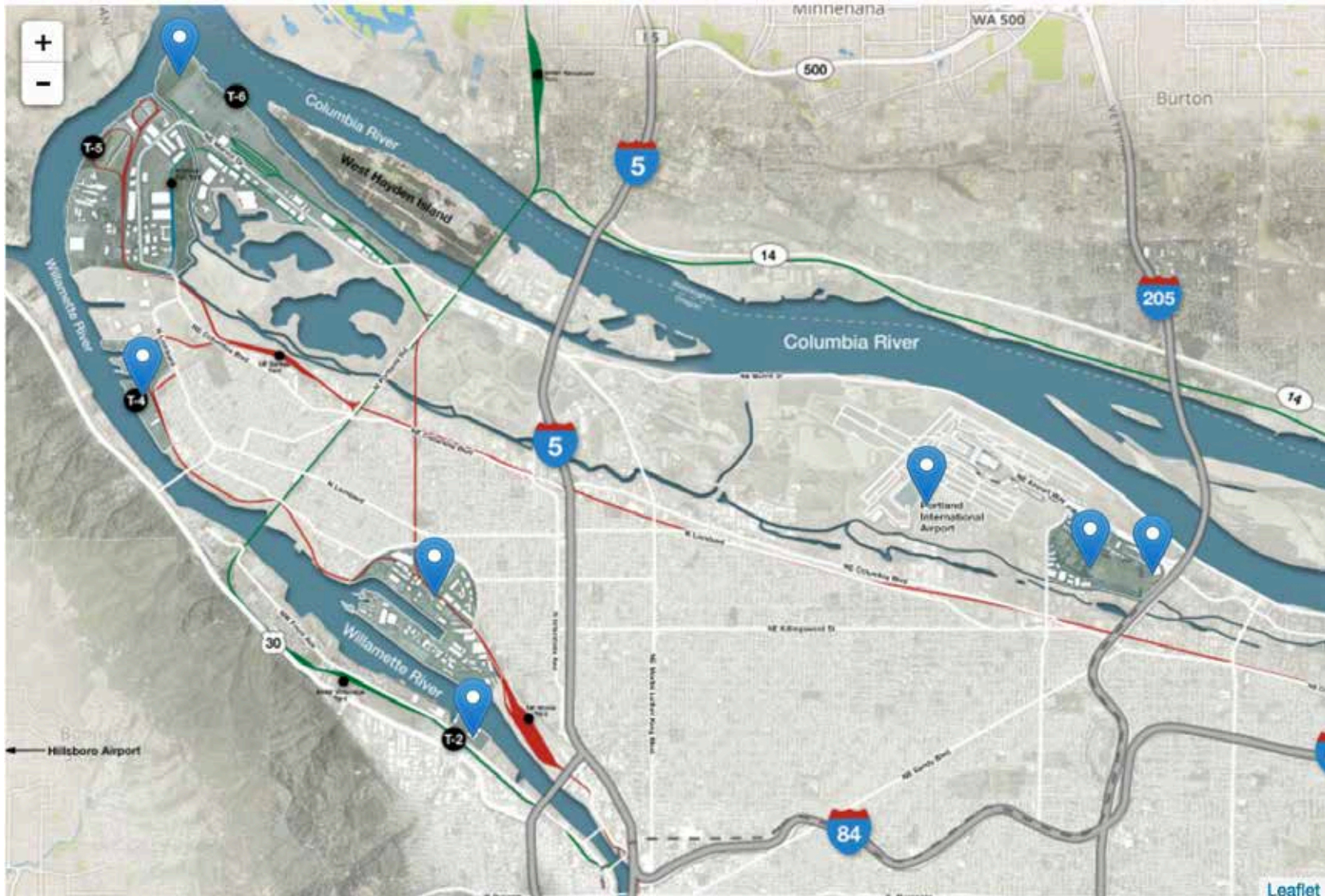
# Ladders of Opportunity

GM



Lyft

# Freight Corridor Testing





# Connected & Autonomous Freight



Source: Daimler Trucks North America

© GRAPHIC NEWS

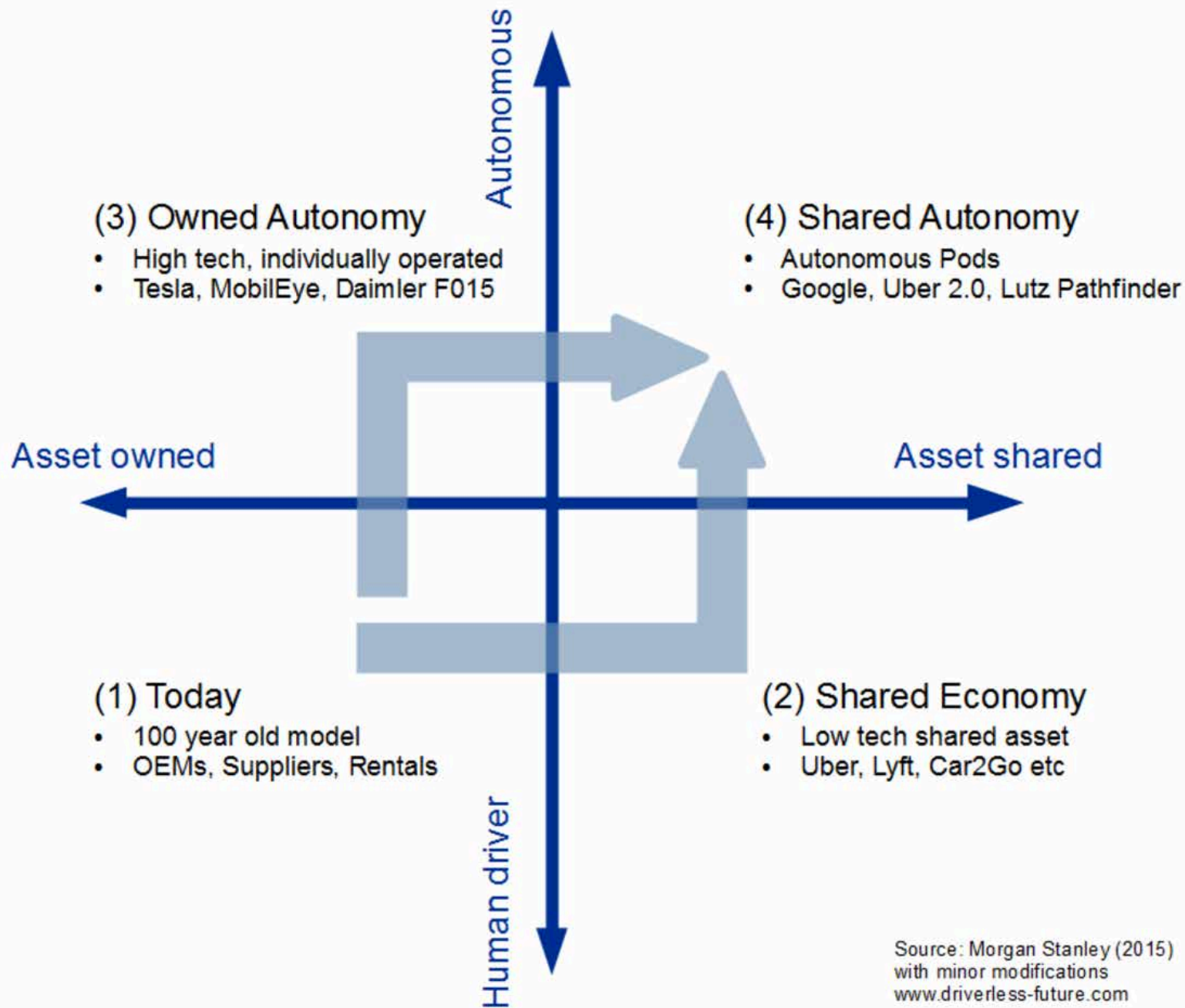
# Questions?



Adrian Pearmine, National Director for Smart Cities and Connected Vehicles  
Ph: [\(503\) 243-3500](tel:5032433500) | Direct: [\(503\) 972-7879](tel:5039727879) | Cell: [503-784-3750](tel:5037843750) |  
Email: [adrian.pearmine@dksassociates.com](mailto:adrian.pearmine@dksassociates.com)



DKS Associates  
720 SW Washington St., Suite 500  
Portland, OR 97205  
[www.dksassociates.com](http://www.dksassociates.com)



# Case Study: Big Belly Garbage



BigBelly SOLAR

Overview Status Reports Alerts Inventory Manufacturing Users/Accounts Support

Logged in as admin | Log out  
Sep 21, 2011 02:13:38 PM

## Overview - City

Compactors In Service	Fullness Level		
	Green	Yellow	Red
823	612	178	33

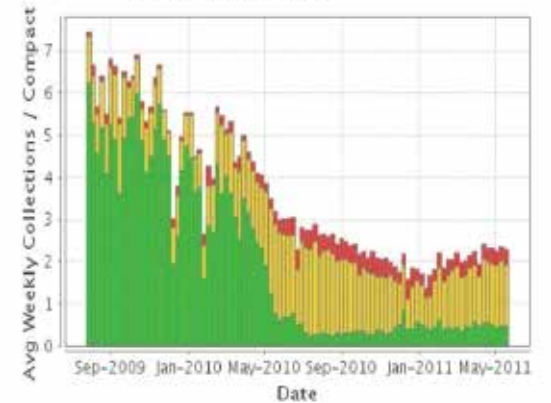
### Status



1M 3M 6M YTD 1Y

From: Aug 15, 2009 To: Jun 04, 2011

### Collections per Week



# Case Study: Intelligent Street Lights



**Citizens**

Better mobile connectivity and data communications

Mobile traffic is expected to grow **10 times** by 2019

Brighter, safer streets with white light from LEDs

70-80% of respondents in a study said they felt safer with LED lighting

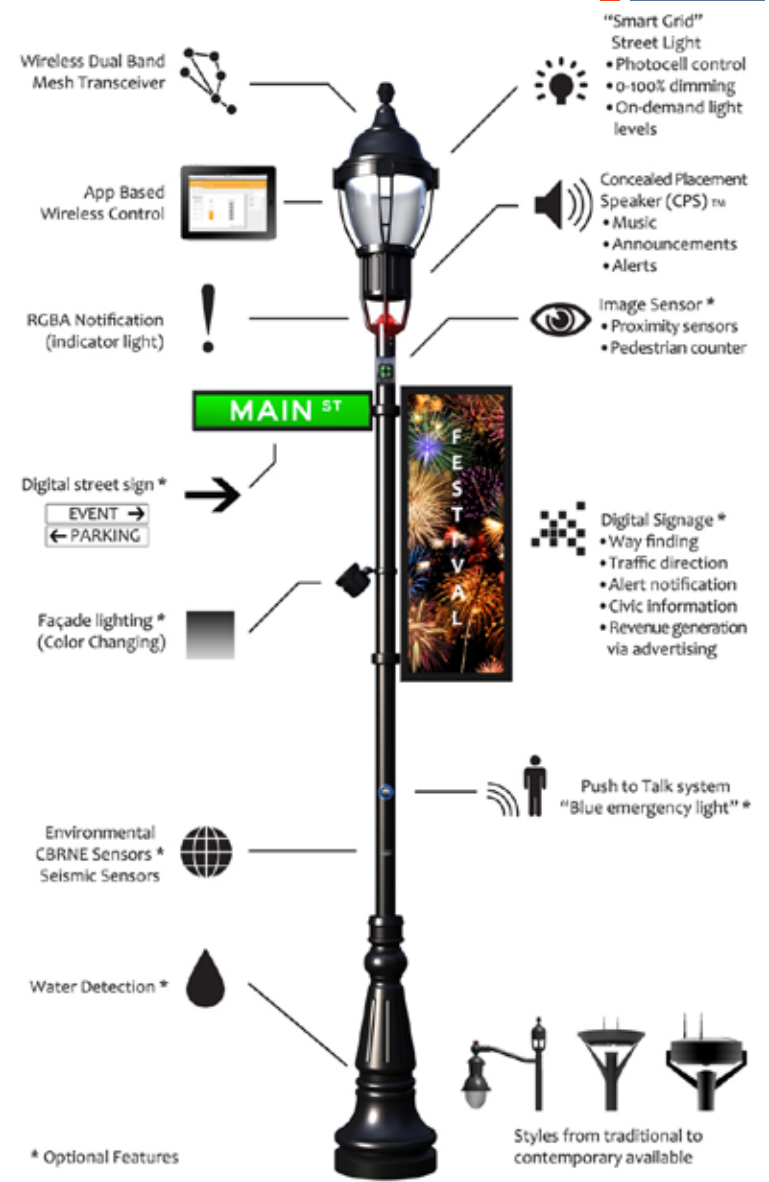
**Cities**

Lower energy costs

LED can generate energy savings of up to 80% with smart controls

Innovative business model makes city infrastructure more affordable

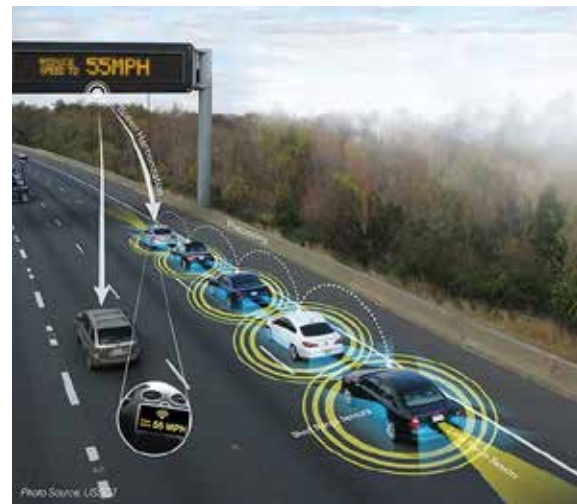
Space in the **smart street light pole** can be rented to mobile operators



# Autonomous will be Connected

## Connected Vehicles

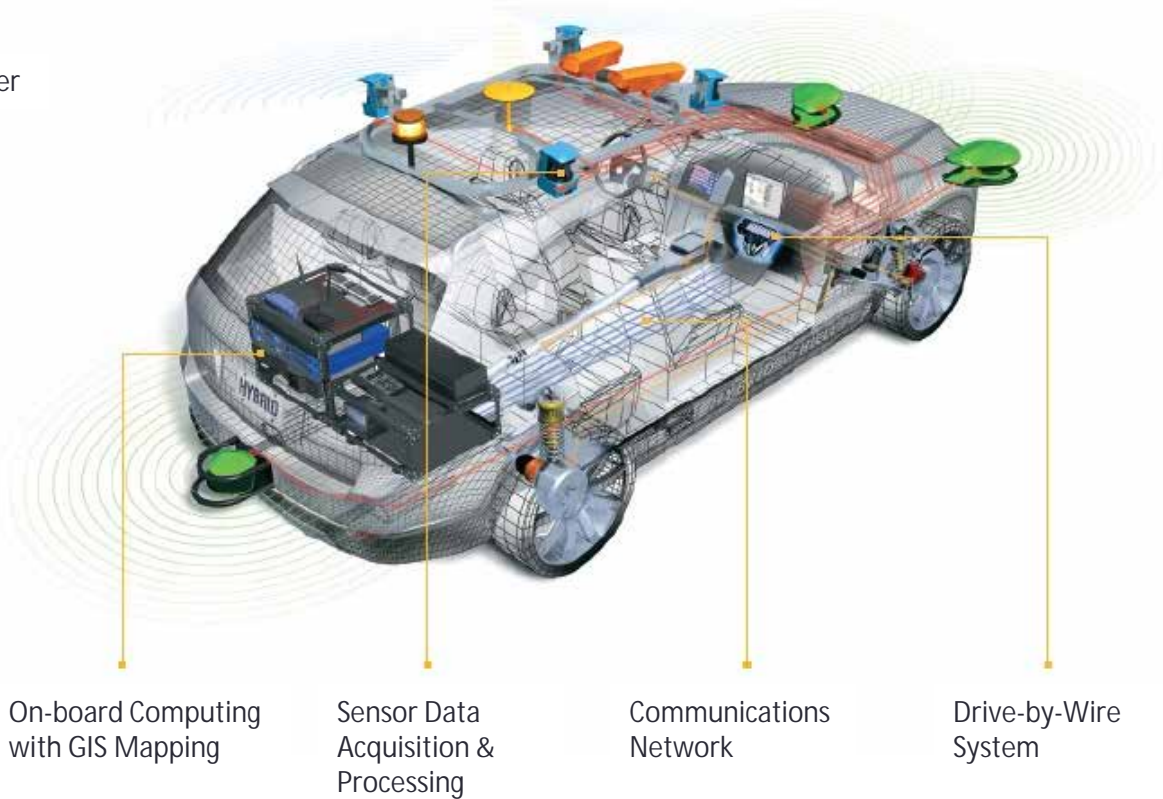
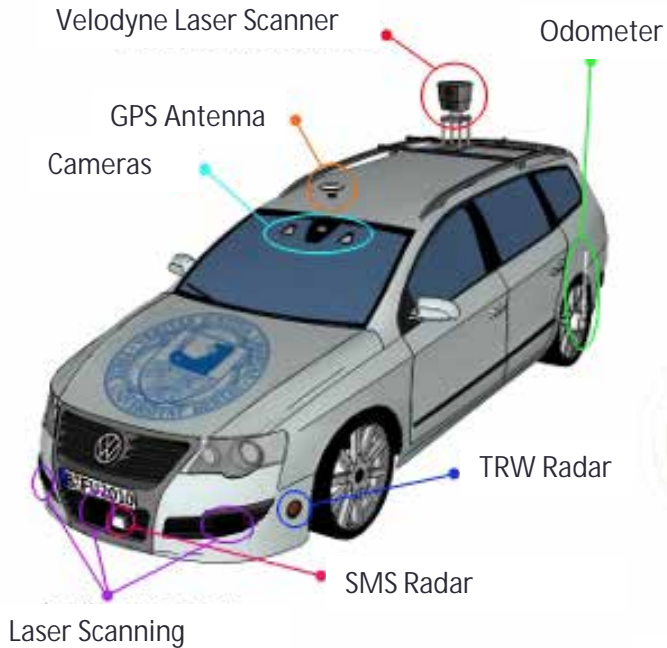
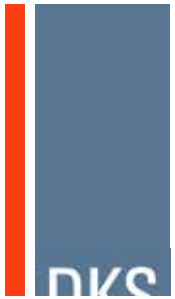
Autonomous  
Vehicles



# NHTSA Defined Levels of Automation

- n **No-Automation (Level 0):** The driver is in complete and sole control.
- n **Function-specific Automation (Level 1):** Automation at this level involves one or more specific control functions.
- n **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.
- n **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.
- n **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?





# Do you believe?

n <http://watchmojo.com/video/id/15178/>

