



**INTELLIGENT  
TRANSPORTATION**  
S Y S T E M S

# Transportation System Operations and Intelligent Transportation Systems

Oregon Department of Transportation

ODOT Transportation Engineering Conference

Presented by:

Galen McGill, PE; Intelligent Transportation Systems Manager

April 29, 2015



# A smart transportation system

Three key trends

Instrumented



Interconnected

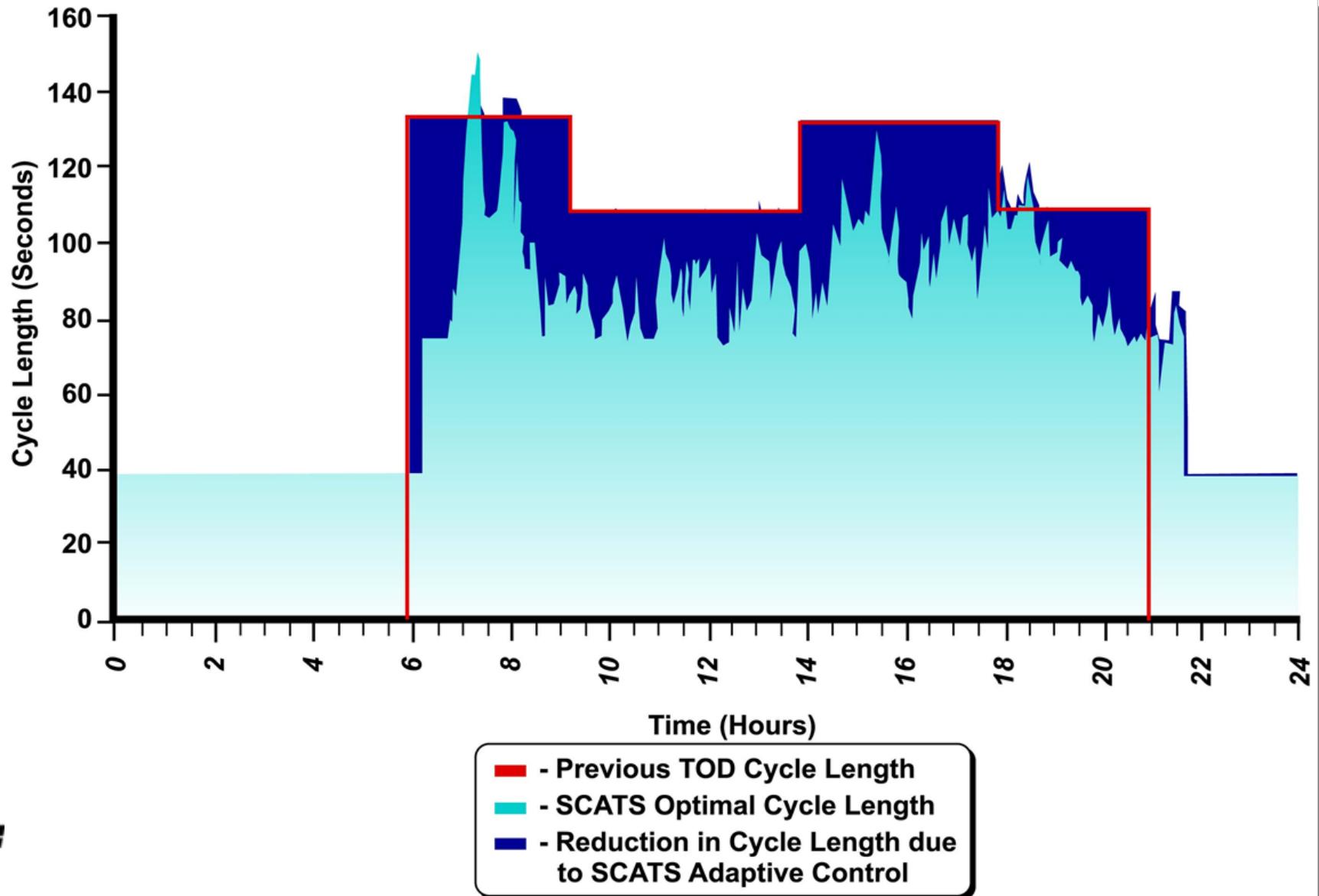
Intelligent





Advanced Signal Software

# Typical Adaptive vs. Time of Day (TOD) Graph



# Innovative Traffic Signal Projects

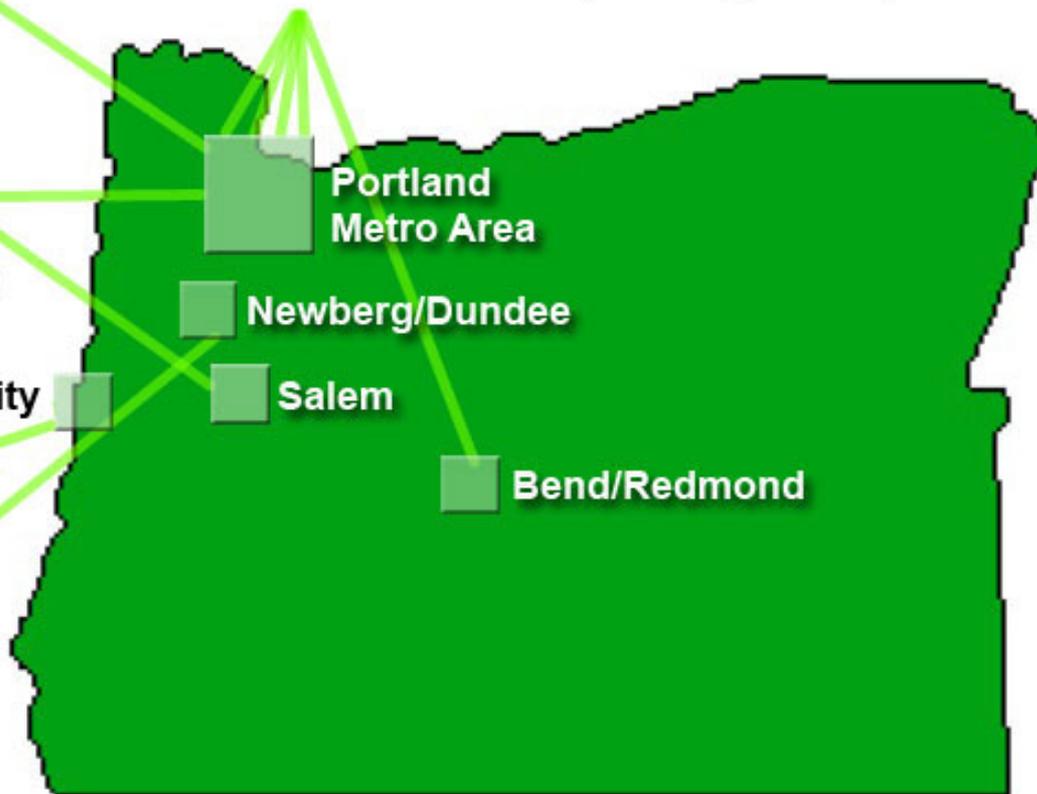
- InSync Adaptive Signal Control
  - Cornell Rd (City of Hillsboro)

- Sydney Coordinated Adaptive Traffic System (SCATS)
  - Burnside Rd. (Gresham)
  - Bend/Redmond (ODOT)
  - Powell Blvd. (City of Portland)
  - Farmington Rd. (Beaverton)
  - Tualatin-Sherwood Rd. (Washington Co.)

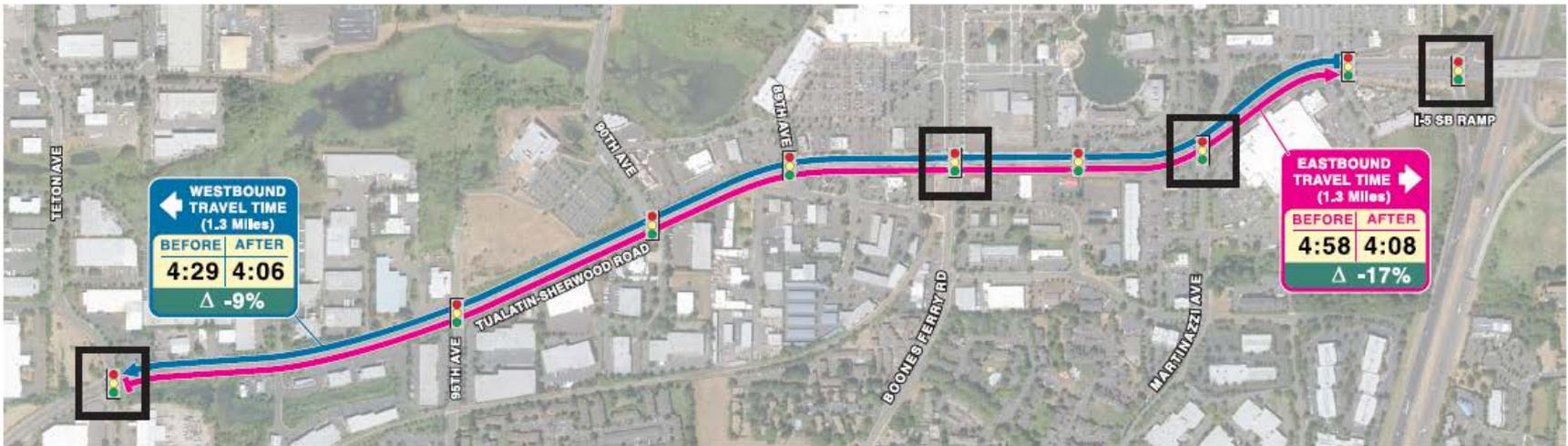
- Voyage (Advanced Features)
  - 99W in Tigard (ODOT)
  - Mission St. in Salem (ODOT)

- MaxTime Adaptive
  - US101: Lincoln City

- Currently under development
  - Newberg-Dundee Bypass



# Sample Results – Tualatin-Sherwood; Weekday PM Peak - SCATS Adaptive Timing



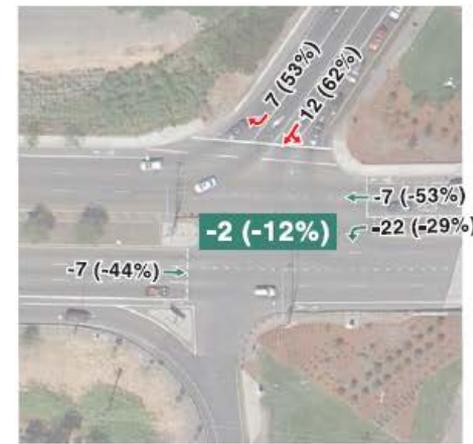
Average Delay  
Tualatin-Sherwood Road/  
Teton Avenue



Average Delay  
Tualatin-Sherwood Road/  
Boones Ferry Road



Average Delay  
Tualatin-Sherwood Road/  
Martinazzi Avenue



Average Delay  
Tualatin-Sherwood Road/  
I-5 SB Ramp



# BENEFIT SUMMARY OF ADAPTIVE SIGNAL CONTROL IN OREGON

## Tualatin-Sherwood Road (SCATS)



Up to 17%  
Travel Time  
Reduction



Up to 15%  
Reliability  
Improvement



Up to 70% Reduction  
in Waiting through  
>1 Red Light

## Cornell Road (InSync)



Up to 21%  
Travel Time  
Reduction



Up to 8%  
Reliability  
Improvement



Up to 50% Reduction  
in Waiting through  
>1 Red Light

## Powell Blvd - US 26 (SCATS)



Up to 10%  
Travel Time  
Reduction



Up to 20%  
Reliability  
Improvement



Up to 50% Reduction  
in Waiting through  
>1 Red Light

## 99W (Voyage Advanced)



Up to 4%  
Travel Time  
Reduction



Up to 35%  
Reliability  
Improvement



Up to 20% Reduction  
in Waiting through  
>1 Red Light

## US 97 - OR 126 (SCATS)



Up to 14%  
Travel Time  
Reduction



Up to 40%  
Reliability  
Improvement



Up to 90% Reduction  
in Waiting through  
>1 Red Light



Traffic incident management

# Oregon Traffic Incident Management Training



# SHRP 2 Training Progress

## Oregon's TIM Responder Training at a Glance

Reported as of April 25th, 2015

Training Statistics			Responders Trained by Discipline		
Number of TIM Trainers in Oregon		67	Discipline	Number	Percent
Number of Trainers Actively Training		42	Law Enforcement	483	24%
Percent of Trainers Active		63%	Fire / Rescue	716	34%
Responder Training Types	Sessions Conducted	Trained	Towing & Recovery	209	10%
4-Hour Version	66	1743	EMS	43	2%
Other (Selected Lessons)	10	217	DOT, Transportation & Public Works	488	23%
Train-the-Trainer Sessions Conducted	2	67	Other Disciplines	88	4%
On-Line	(On-Line sessions not tabulated)	66	On-Line Participants	66	3%
<b>Total (including TtT Sessions)</b>	<b>78</b>	<b>2,093</b>	<b>Total</b>	<b>2,093</b>	<b>100%</b>





# Oregon 911 Computer Aided Dispatch (CAD) Interconnect Project

# Benefits of ODOT/911/OSP Integrated Dispatch Project in Deschutes County



**Incident Response Time**  
**Reduced by 30%**  
(8.5 Minutes)



**Incident Duration**  
**Shortened by 38%**  
(25 Minutes)



**Dispatch Response Time**  
**Reduced by 25%**  
(54 Seconds)



**Improved Dispatch Efficiency**  
**Interagency Calls reduced by 60%**  
Significantly Less Time On-Hold

Shared Incident Notes  
Between Dispatchers

Improved  
Pinpoint Locating  
No More Lost Ambulances!



Ability to Alert  
Construction Crews of Danger

# INSTANT DISPATCH TOWING PROGRAM (INTERSTATE 5, INTERSTATE 405, PORTLAND, OR)



**Faster  
Tow Truck Arrival  
12 Minutes Faster**



**Increased  
Passenger Car Capacity  
~ 450 More**



**Incident Response Truck  
With Tow Capability**

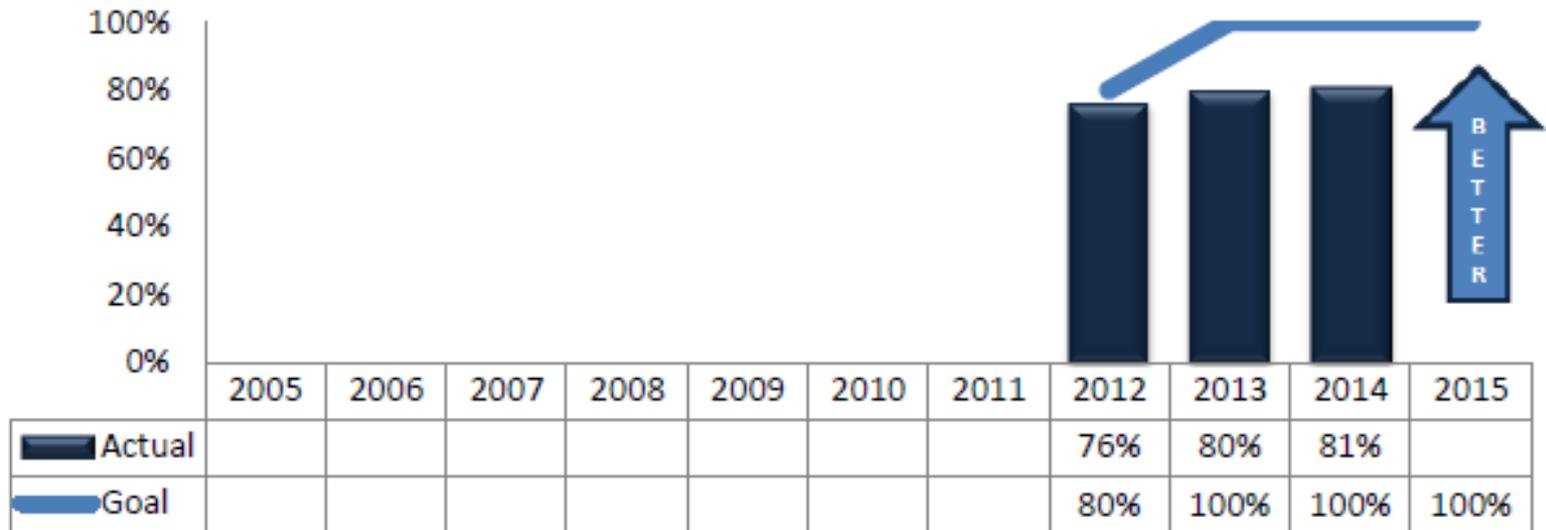
**Further  
Enhancement  
Ideas**



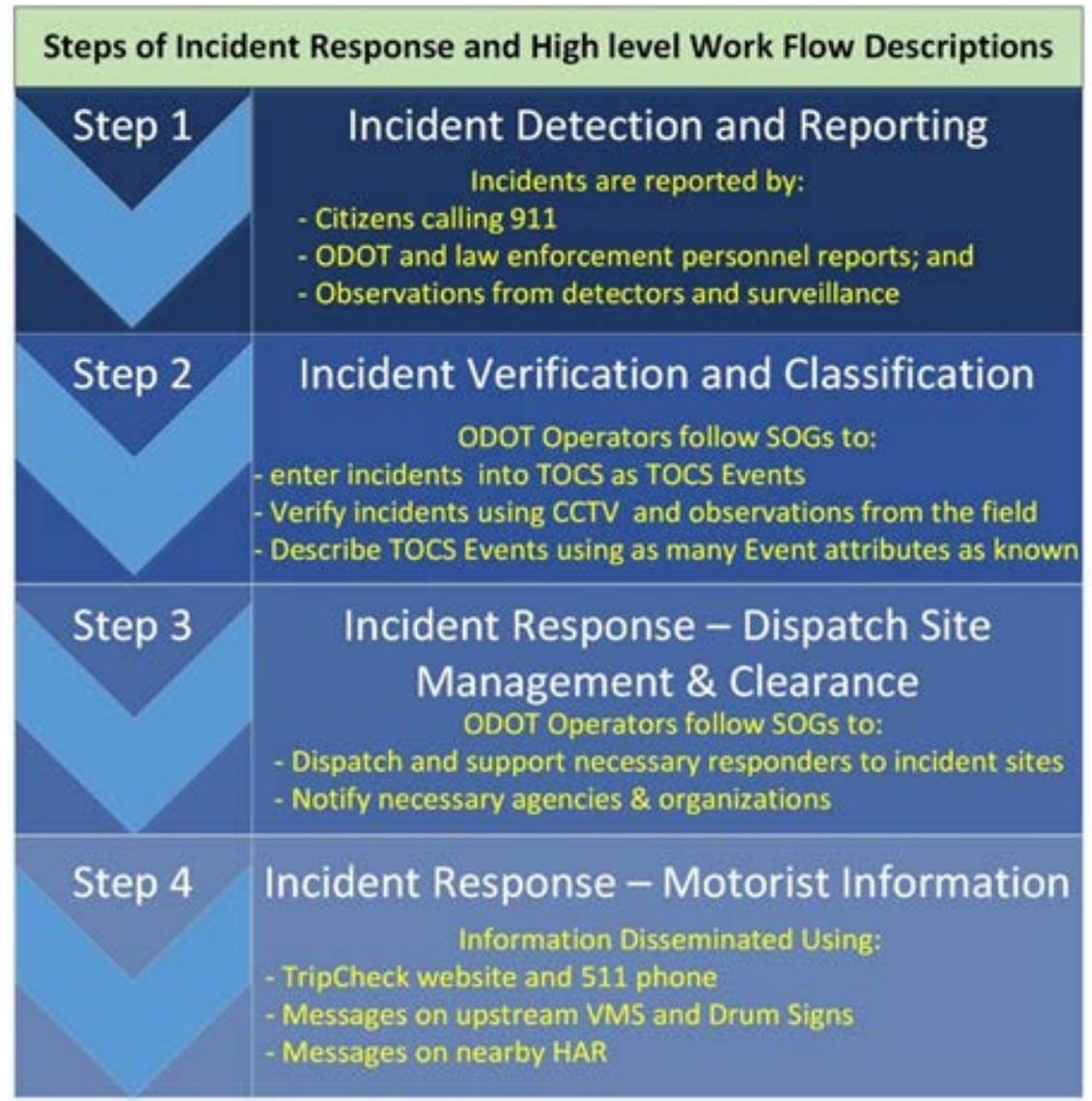
**Tow Dispatch  
Provides Best Route**

# Roadway Clearance Duration

**Incident Response - Percent of lane blocking crashes cleared within 90 minutes**



# TOCS – Incident Response System





# Traveler Information Systems

## US20 at Tombstone

Updated: Mar 01 2012 11:10 AM

Looking East



ODOT

Elevation 4252 [TripCheck.com](http://TripCheck.com) Milepost 63.64

Temperature 24.6F Wind SE MPH 0

## US97 at Chemult

Updated: Nov 30 2011 8:55 AM

Looking South



ODOT

Elevation 4776 [TripCheck.com](http://TripCheck.com) Milepost 202.80

Temperature 30.9F Wind N MPH 1



# TripCheck TV

## Oregon Department of Transportation

I 205

I-205, Oregon Washington Border

Expect delays of up to 20 minutes.

Single lanes may be closed from 8 a.m. to 3 p.m. on NE Airport Way Monday, March 10 through Friday, March 14.

03/08/2014 at 04:35 am  
Event: 154897

I 5



### I-205 at Government Island



2:44 PM

### US26 at Sylvan Interchange - Skyline



2:44 PM

ALERTS

» ALERTS: There are no high impact con





Road & Weather

Travel Center

Transportation Options

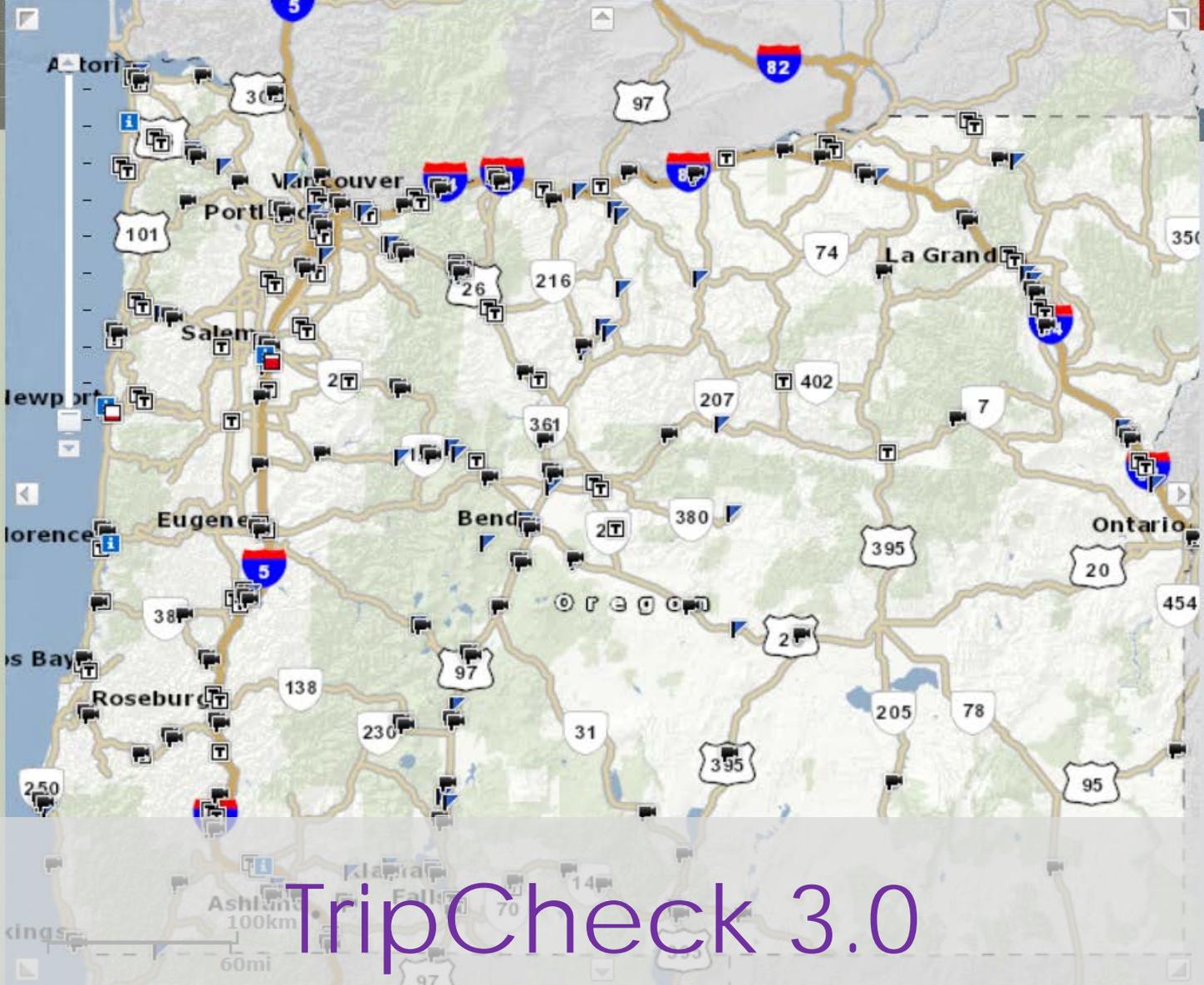
About TripCheck

On The Go

Contact Us

- Base Maps +
- Quick Links +
- My Maps +
- Map Legend -

- Road cameras
- Road closed
- > 2hr delay
- 20mn-2hr delay
- < 20mn delay
- No to Min. delay
- Unconfirmed
- Informational
- Weather hazard
- Weather warning
- Snow zone
- Weather stations
- Construction
- Truck restrictions
- Local road cond.
- Special area
- Parking lot



Alerts

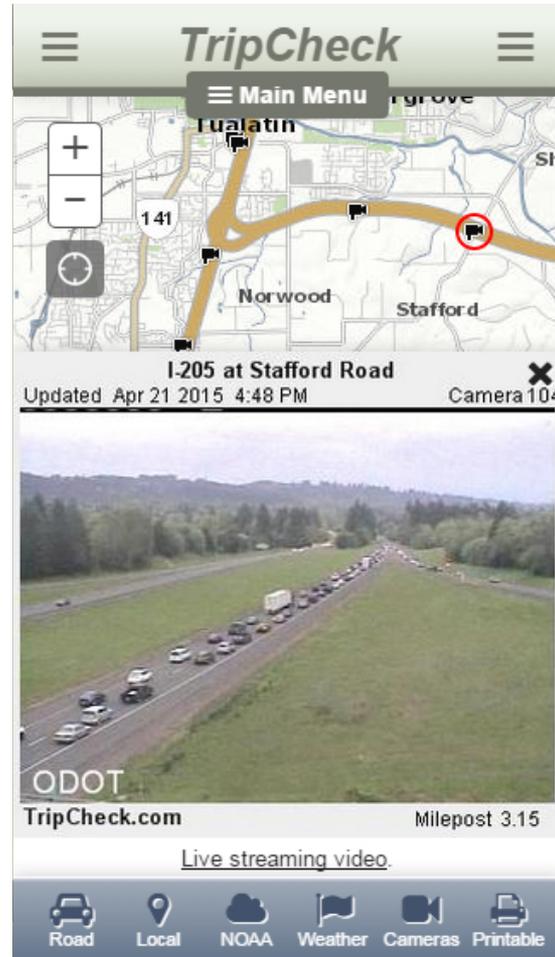
Evacuation Notice  
Test \ test

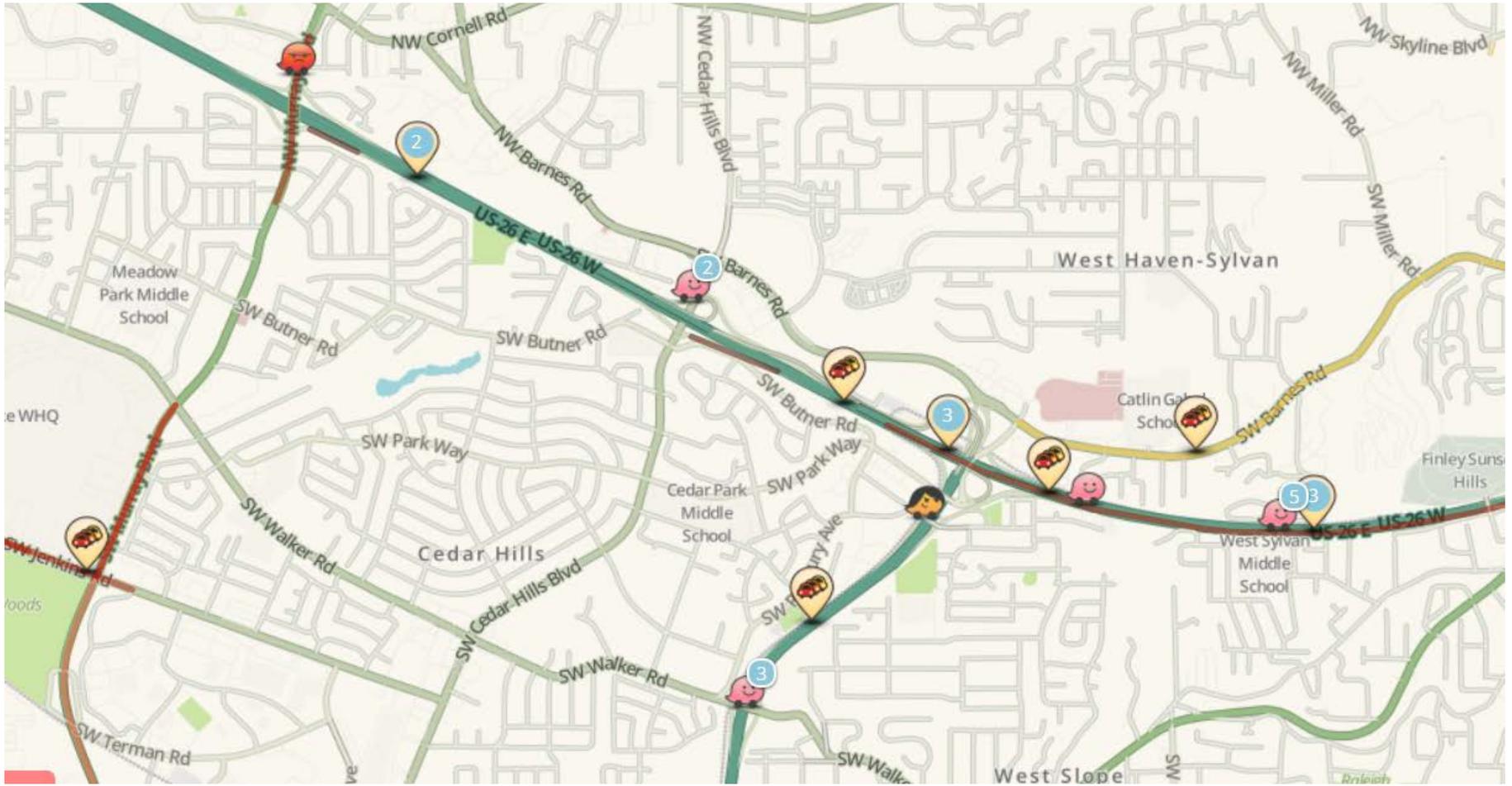
Announcements

**NEW**  
**SPEED**  
**MAP**  
CLICK TO VIEW

TripCheck 3.0

# TripCheck 3.0 – Responsive Design







ADVISORY  
SPEED  
35

ADVISORY  
SPEED  
35

TRAVEL TIME:  
I-5 11 MIN  
I-205 15 MIN

NEXT RIGHT  
FOOD

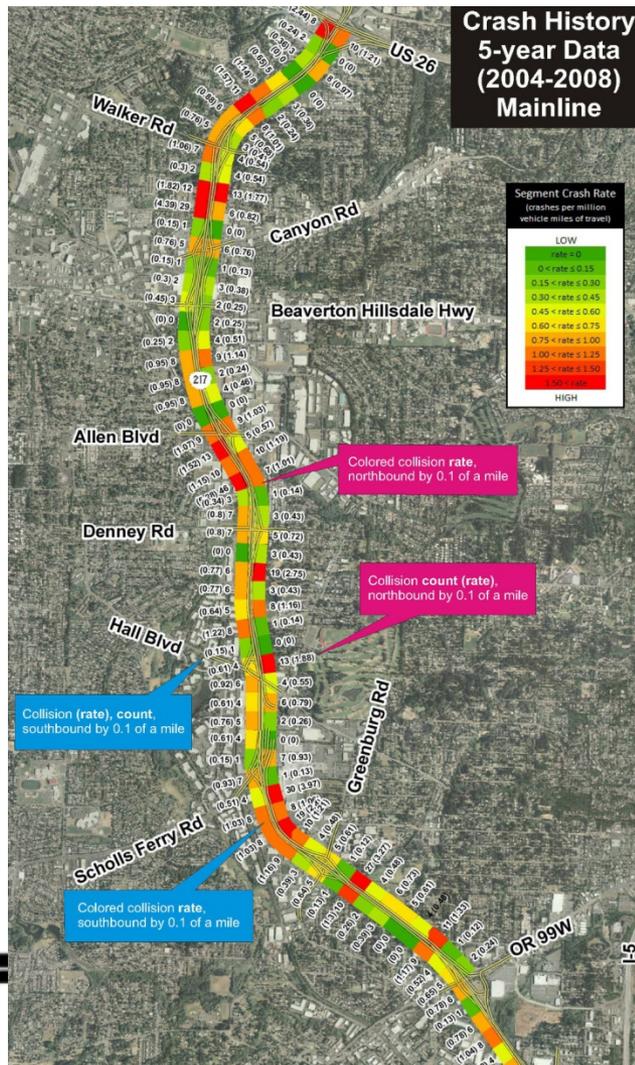
BURDEVILLE

SUBWAY  
SUBWAY

Tacofime

# Active Traffic Management

# High Crash Frequency on OR217

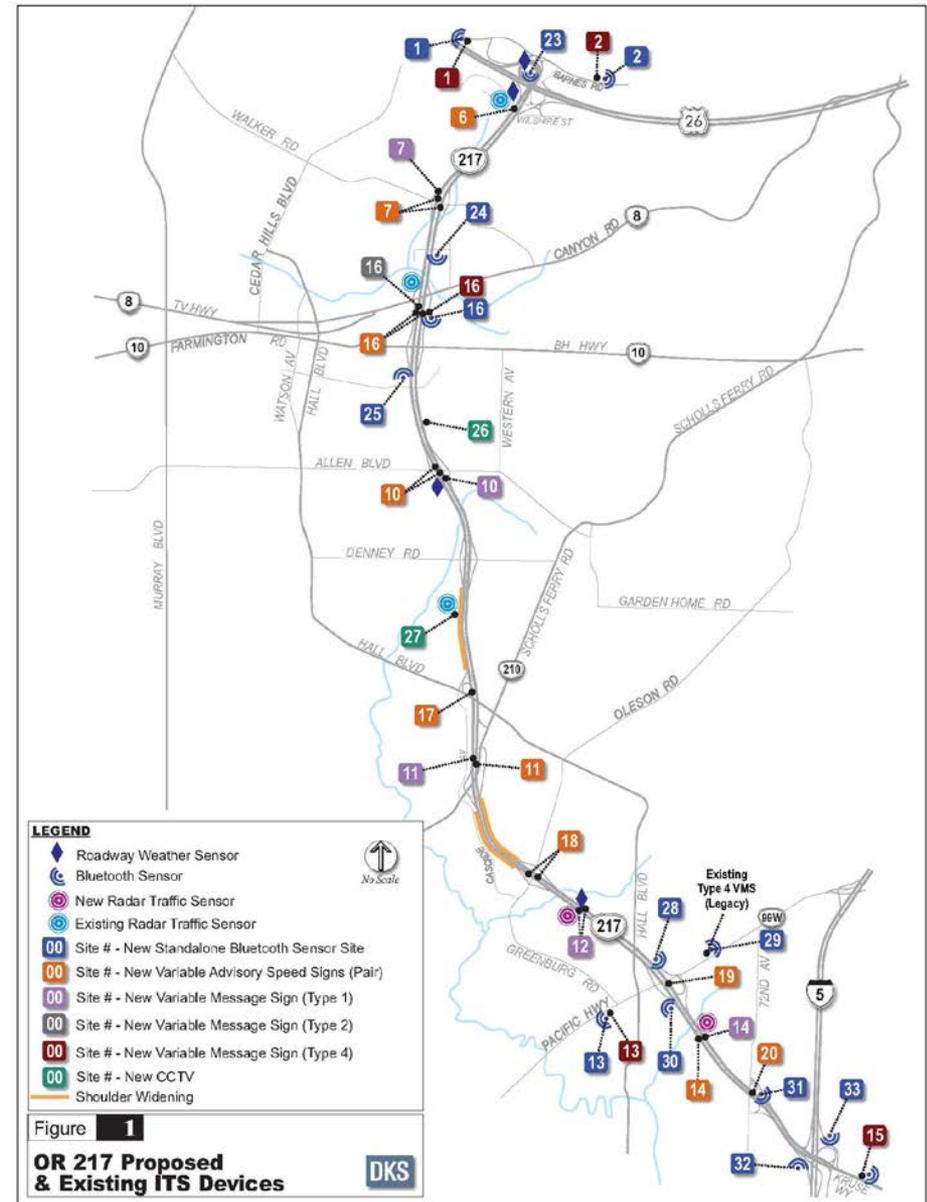


- 265 crashes per year
- 70% rear-end crashes
- Most during peak periods



# ITS Equipment

- 28 variable advisory speed signs
- Six mainline VMS
- Six arterial VMS (one existing)
- Five dynamic curve signs
- Five RWIS grip factor sensors
- Five radar traffic sensors (three existing)
- 12 Bluetooth sensors
- 20 mainline dual-loop stations



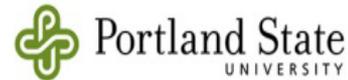


# Weather Responsive Variable Speed

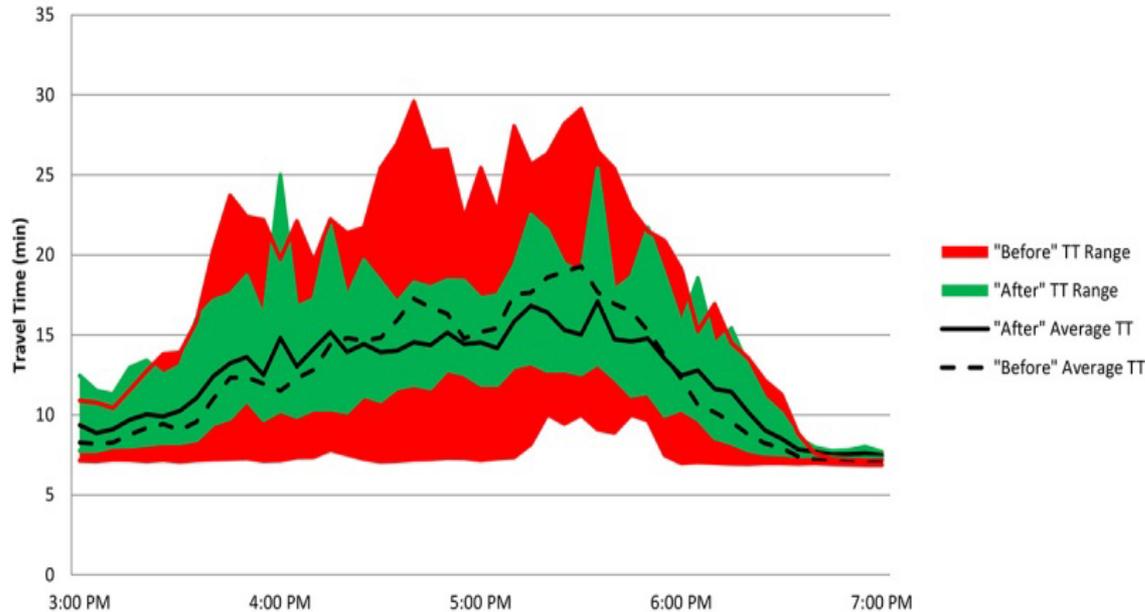


# Early Results

## Travel Time Reliability Improvement



Before and After Travel Time Reliability, OR-217 NB Left Lane



**9%**  
Reduction in travel times during morning and evening peaks

**8% to 18%**  
Reduction in midday travel times

**50%**  
Reduction in travel time variability

**Speeds**  
Increased during peak periods

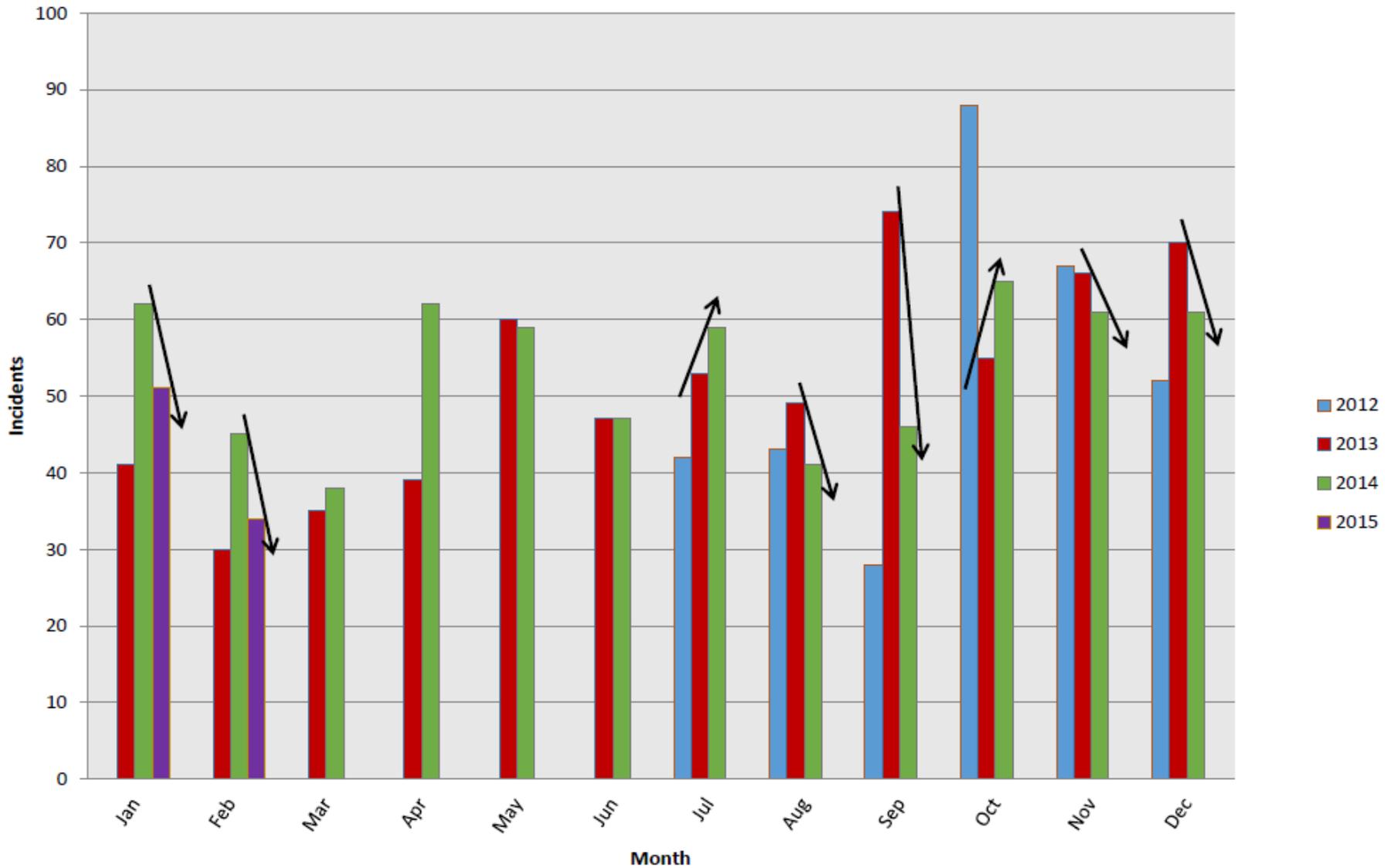
**25%**  
Reduction in crash-related incidents in November 2014



- Average Buffer Index before VAS = 48.8%
- Average Buffer Index after VAS = 27.64%
- Before = July 2012 midweek days
- After = Midweek days from the past three weeks



# OR217 NB/SB Incident Data (WCCCA)

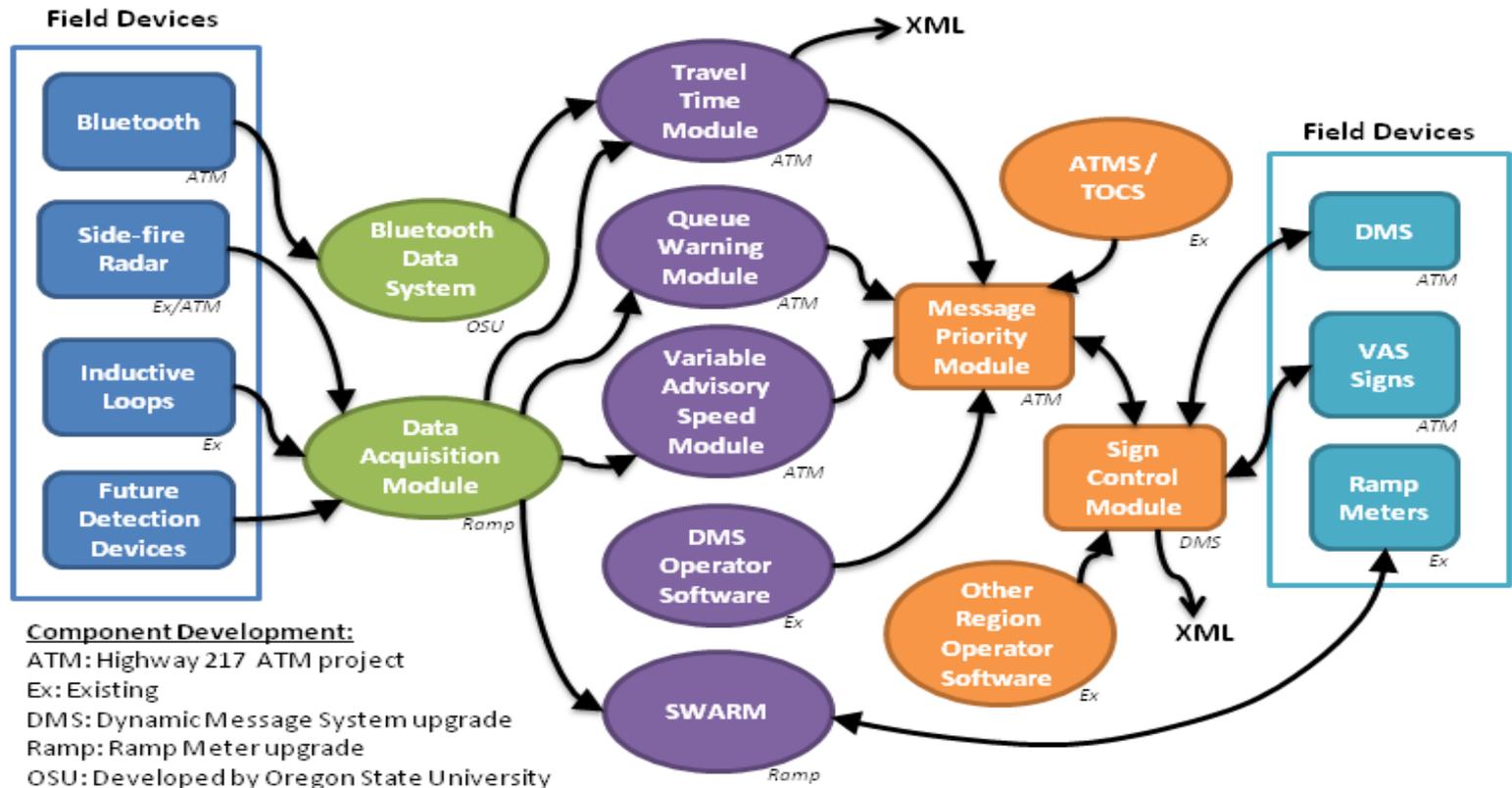


# Curve Warning System

- Activates at similar grip factor thresholds as the weather responsive variable speed system



# Active Traffic Management Software



# National Operations Center of Excellence

www.transportationops.org



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## UPCOMING NOCOE WEBINARS

### Past Webinars:

#### "Securing Transportation Systems" Webinar

This webinar introduced the issues and concerns related to securing three types of ITS technologies. Presenters shared best practices to help mitigate some of the potential vulnerabilities. The webinar was hosted by Ray Murphy, ITS Specialist with FHWA Office of Technical Services. [The webinar recording is available here.](#)

#### "Post TRB Annual Meeting Research" Webinar

We've recently completed the "Post TRB Annual Meeting Research" webinar. [CLICK HERE FOR "TSM&O Research Themes" document.](#) [This webinar recording is available here.](#) [Click here to begin or join a discussion on this topic in the Discussion Forum.](#)

#### "NOCOE/AASHTO NPMRDS Webinar Series Part 1: Introduction to the NPMRDS"

Designed for managers, directors, and executives, the webinar series highlights the data available to state DOTs, how the National Performance Management Research Dataset



## FIND IT FAST

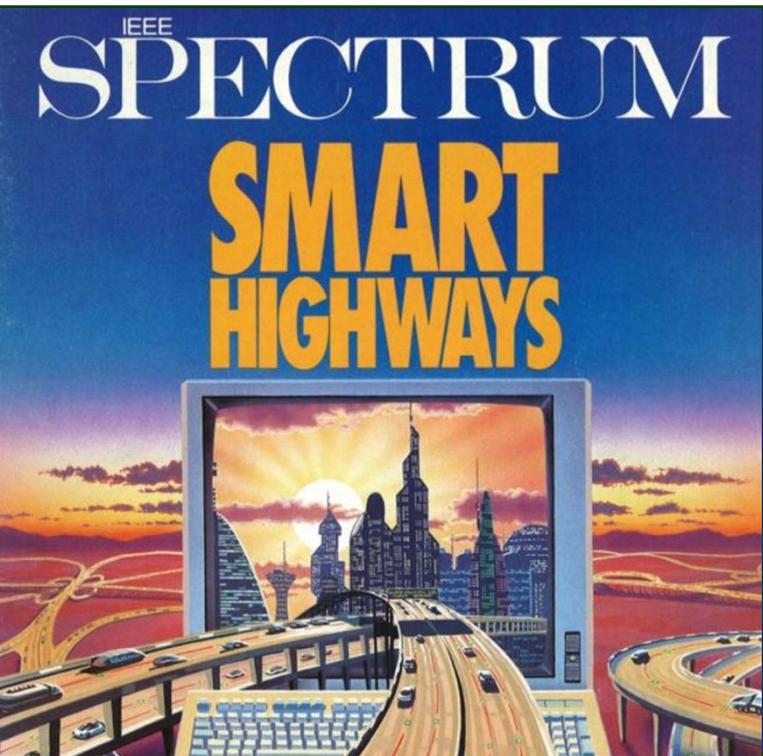
- [SHRP2 Products & Tools](#)
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# Connected & Autonomous Vehicles

How technology is transforming transportation



# Intelligent Drive

Self-driving features that debuted on the 2014 Mercedes-Benz S class:

Active Blind Spot Assist

Active Lane Keeping Assist

Collision Prevention Assist with Adaptive Brake Assist

Parktronic Plus with Rear Collision Protection

Magic Body Control: adjusts suspension for uneven roads

Distronic Plus: Steering assist uses cameras to help the driver keep the vehicle centered in the lane

Cross-Traffic Assist



# In vehicle technology





21ST WORLD CONGRESS  
**DETROIT**  
2014  
INTELLIGENT TRANSPORT SYSTEMS

ReInventing Transportation in Our Connected World  
September 7-11, 2014 | COBO Center | Detroit, Michigan  
[www.itsworldcongress.org](http://www.itsworldcongress.org)

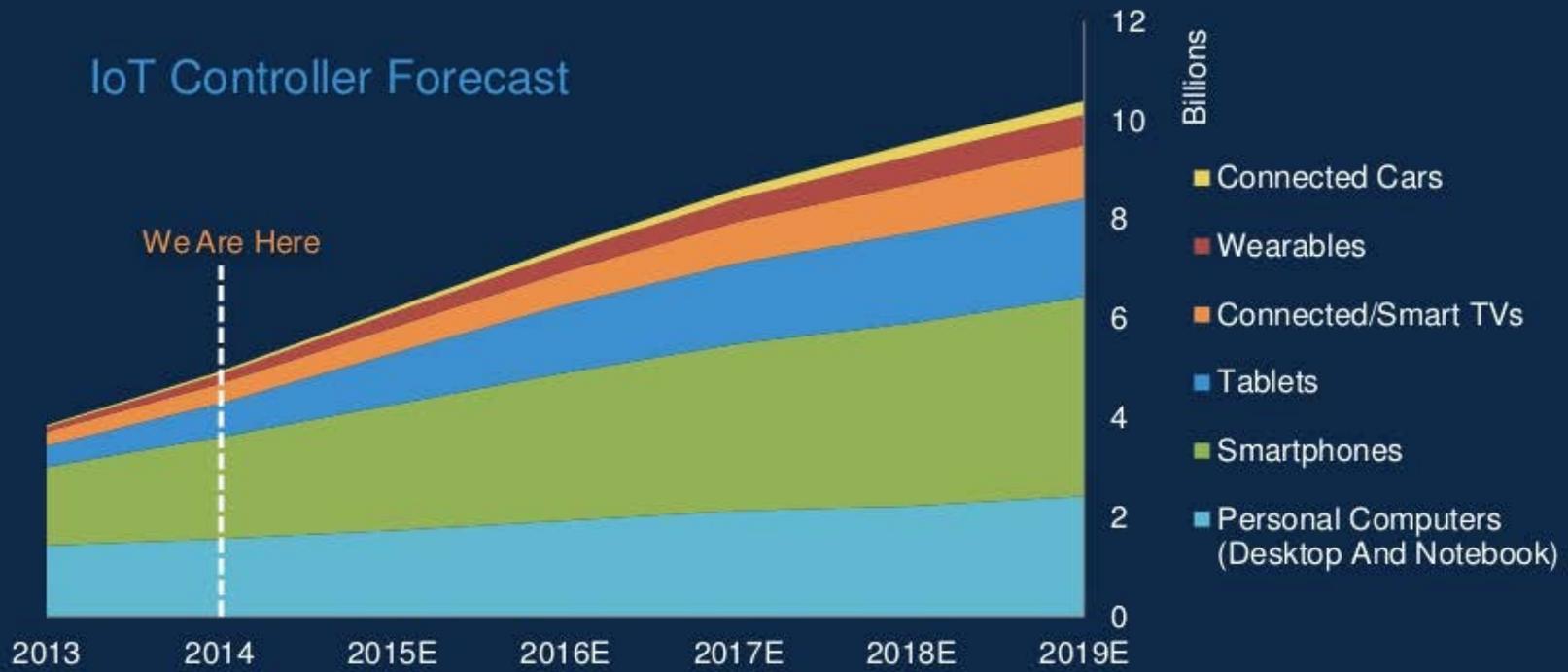
**“We are on the threshold of a transformation in mobility that the world has not seen”**

- Lowell McAdam, CEO, Verizon  
2014 ITS World Congress



# Internet of Things Growth

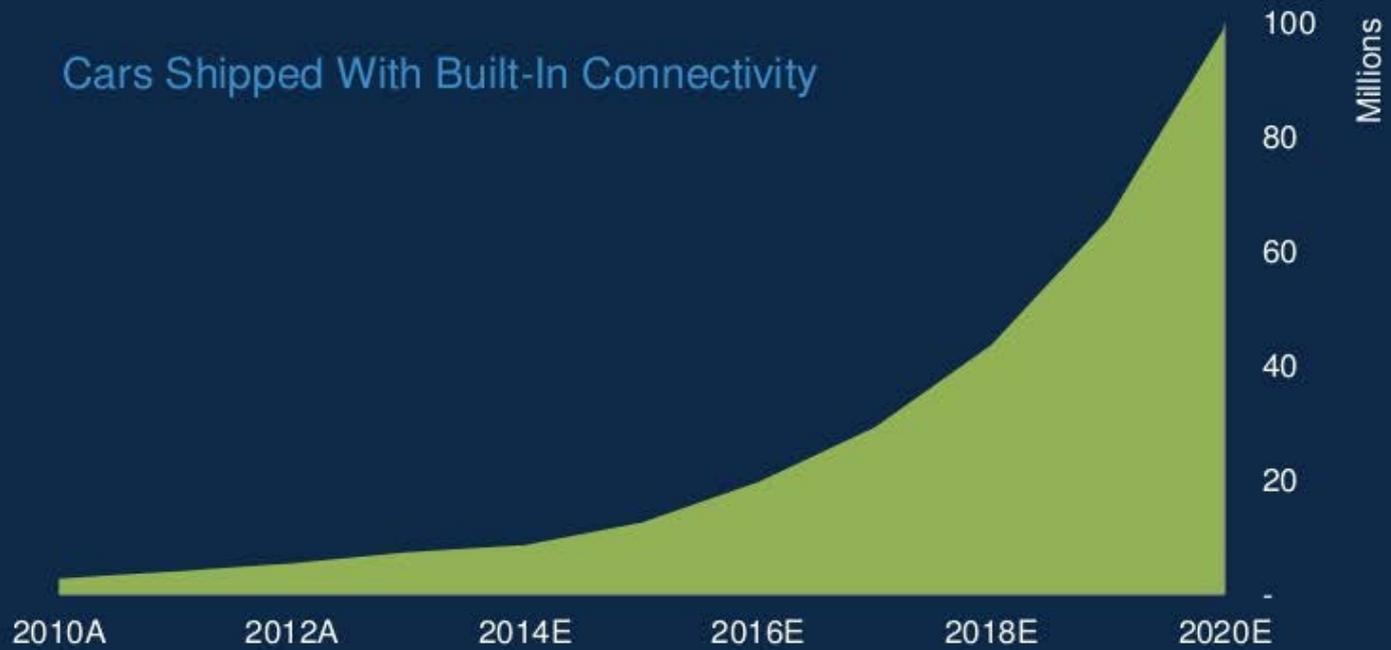
Mobile And Other Connected Devices  
Will Help Us Control The IoT



BI INTELLIGENCE

# Connected Cars

By 2020, 100 Million New Cars Will Have Their Own Internet Connections



BI INTELLIGENCE

# Consumer Interest

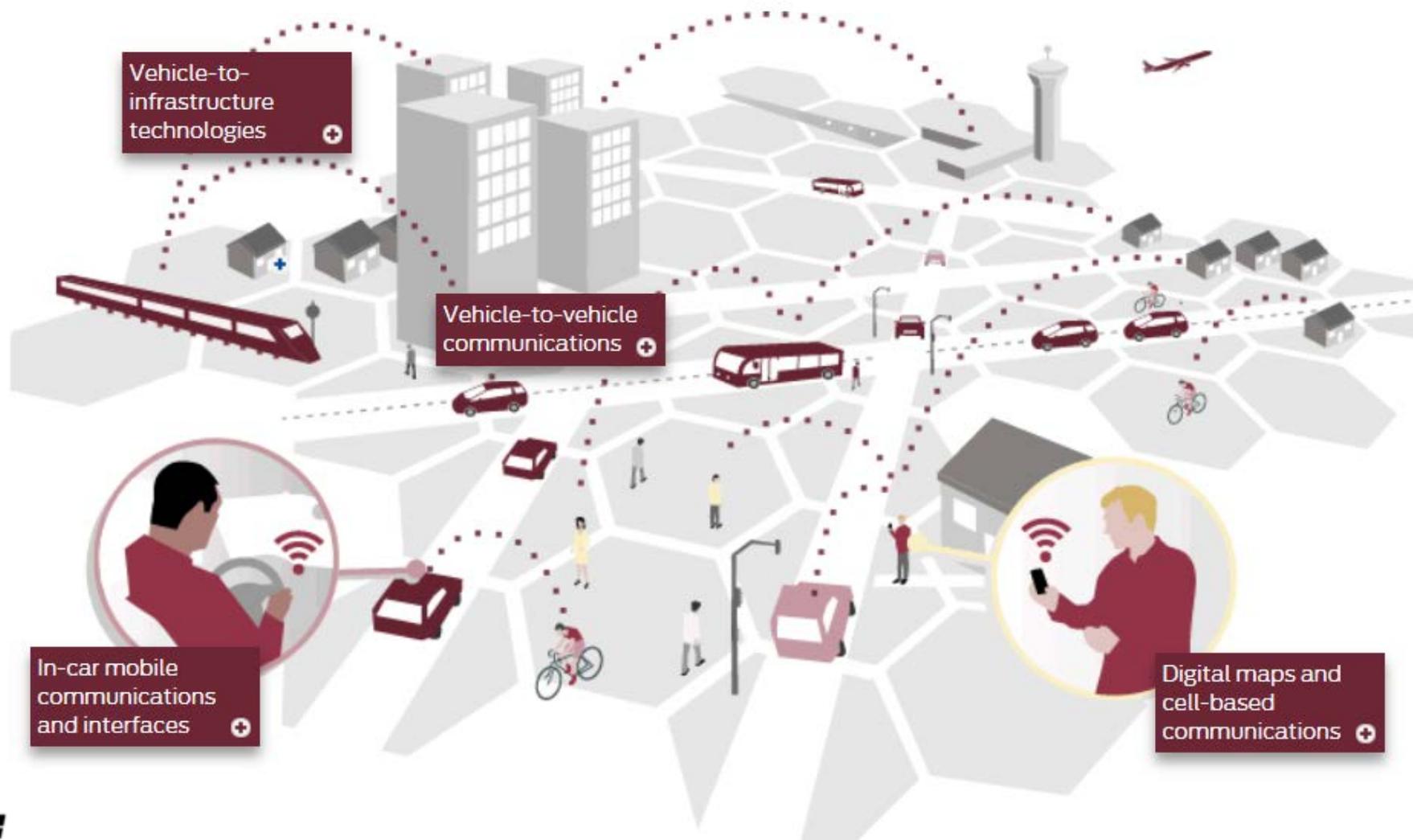
## The Most Desired Connected-Car App? Music Streaming By A Mile ...

Which Of The Following Services Do You Think Is Important For Your Passengers (Partner, Children, Etc.) To Have Access To In The Car?



BI INTELLIGENCE

# Ford blueprint for mobility



# GM announcement – Mary Barra, CEO

4G LTE  
Connectivity

Connected  
Vehicle  
commitment

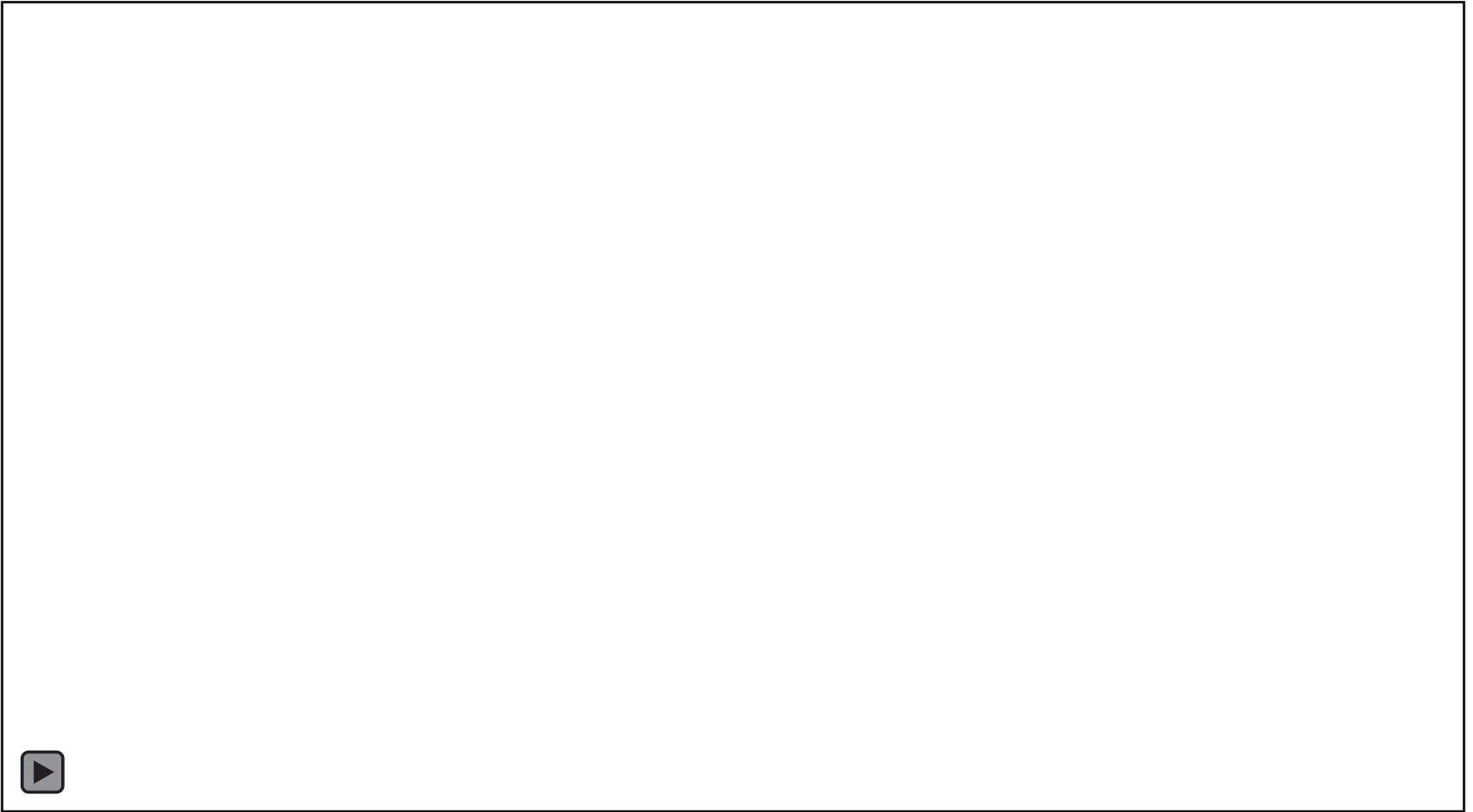
“Super Cruise”



# Autonomous vehicles



# Autonomous Vehicles



# Connected vehicle applications

V2V

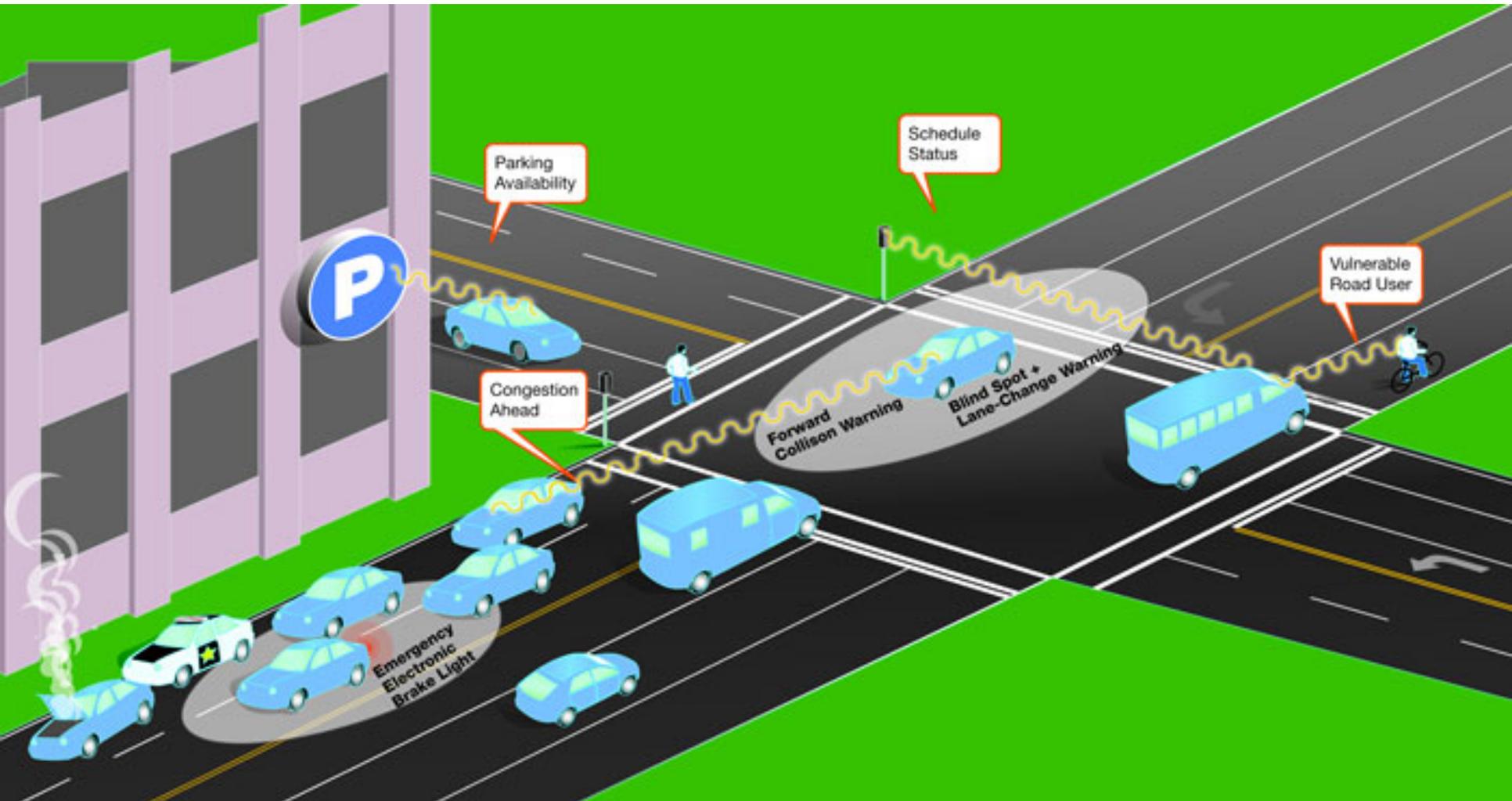


V2I

V2P

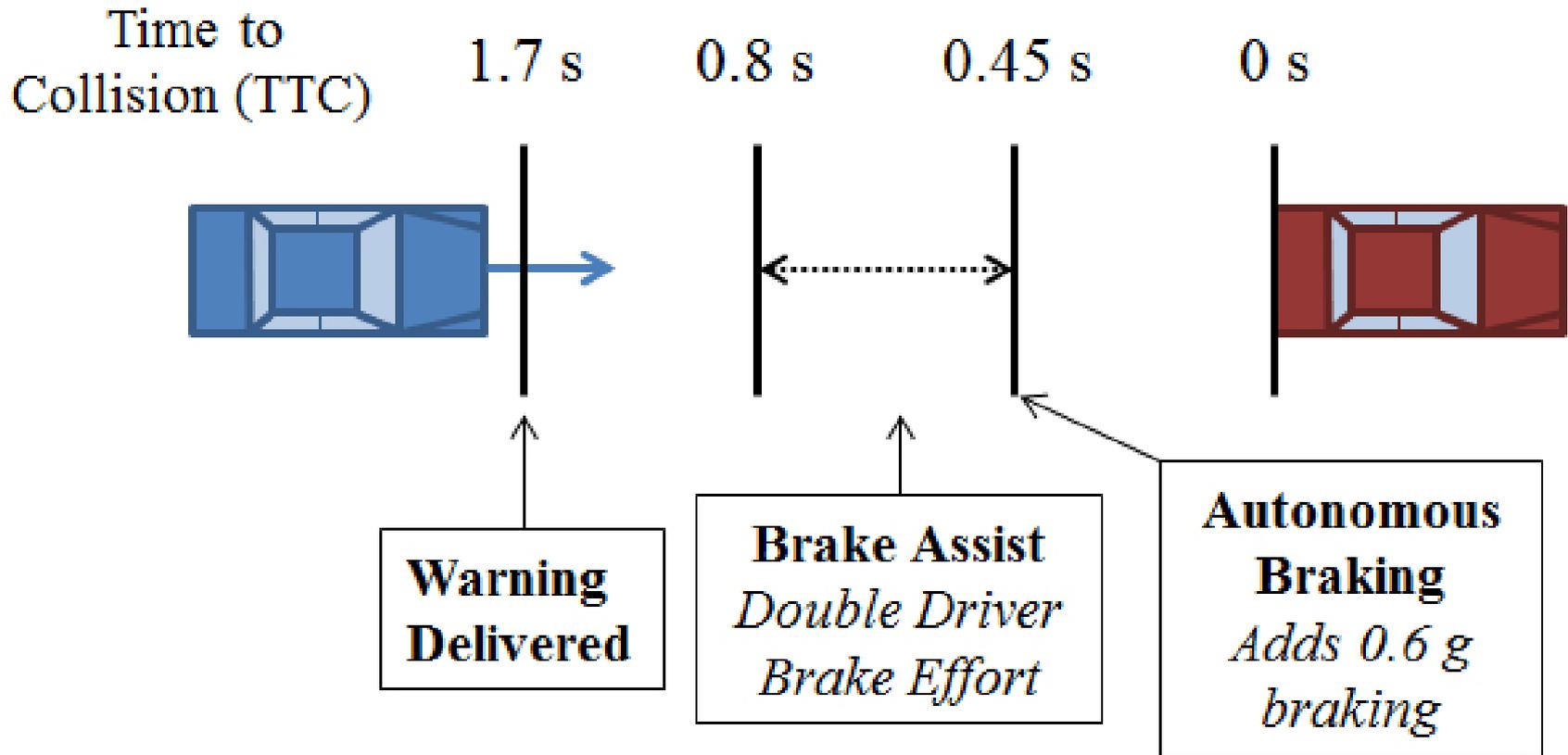


# Connected vehicle concepts



# “The vision of a collision free world is within reach.”

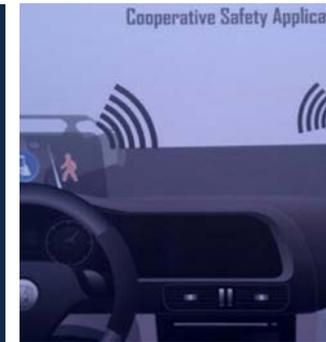
- Frank Pollock, Honda R&D  
2014 ITS World Congress



# 2025 Intelligent Transportation Vision



1. Automated Highway Driving
2. Partially Automated for Urban Driving
3. V2V Capabilities
4. V2P Reduces Ped/Cyclist crashes
5. 4G LTE Connectivity
6. Intelligent Infrastructure Investment





here.com

here

Maps for Life

# Possible agency impacts

# Key trends

Internet of things

Big Data

Public vs Private  
Sector Roles

Safety  
improvements

Changing skill  
sets



# ODOT Connected/Autonomous Vehicle Strategic Framework Initiative

Agency  
Readiness

Prioritize CV  
Applications

Engage  
Nationally

