Connected Vehicle Large-Scale Field Operational Testing:
The US “Safety Pilot”

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Connected Vehicle Technology
Connected Vehicle Technology Applications

- **Vehicle to Vehicle Communication (V2V)**
  - Forward crash warning
  - Electronic emergency brake lamps, several ahead
  - Intersection movement assist

- **Vehicle to Infrastructure Communication (V2I)**
  - Emergency vehicle signal preemption
  - Dynamic signal phase adjustments
  - Road surface condition

- **Vehicle to Everything Else (V2X)**
  - Pedestrians, cyclists, trains at grade crossings
The Safety Pilot is:

- Model for a national deployment of DSRC technology for both vehicles and infrastructure
- Designed to determine the effectiveness of the safety applications at reducing crashes
- Determine how real-world drivers will respond to the safety applications

Safety Pilot will also test mobility and sustainability applications

- $22 Million, 2½-year program
- Launched on 21 August 2012
Safety Pilot Test Conductor Team
USDOT Safety Pilot Vehicle Integrators

Video and animation developed and provided by the Crash Avoidance Metrics Partnership (CAMP)

CAMP

Vehicle Safety Communications 3

Mercedes-Benz
Research & Development North America, Inc.

GM

TOYOTA

HONDA
Honda R&D Americas

Ford

NISSAN

HYUNDAI-KIA MOTORS
Hyundai·Kia America Technical Center, Inc.

KIA

VOLKSWAGEN
GROUP OF AMERICA

Intelligent Transportation Systems

Battelle
The Business of Innovation
Program Schedule Overview

Task 1: Program Management

Task 2: Safety Pilot Planning

Task 3: Preparation of Vehicle Fleets and Drivers

Task 4: Infrastructure Preparation

Task 5: Pre-Model Deployment Testing

Task 6: Model Deployment

Task 7: Model Deployment Closeout

Task 8: Outreach and Showcase

NHTSA Deployment Decision

8/18/2011 - 2/18/2012: Planning

2/18/2012 - 8/21/2012: Pre-Model Deployment

8/21/2012 - 8/18/2013: Model Deployment

8/18/2013 - 2/14/2014: Closeout
Scope

- 2,450 cars, commercial trucks, and transit vehicles
- 73 lane-miles of roadway instrumented with 29 roadside-equipment installations
- A variety of different devices
  - Vehicle Awareness Devices
  - Aftermarket Safety Devices
  - Integrated Safety Systems
  - Retrofit Safety Devices
  - Roadside Equipment
Vehicle Awareness Devices (VAD)

- Only sends the basic safety message.
- Does not generate warnings.
Devices Types

Aftermarket Safety Device (ASD)

- Sends and receives the safety messages.
- Has a display.
- Issues audible or visual warnings to the driver.
Devices Types

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Example ASD Unit Installations
Devices Types

Retrofit Safety Devices (RSD)

- Similar to the Aftermarket Safety Device
- But is connected to a vehicle data bus
- Can provide information from in-vehicle sensors
Devices Types

Integrated Safety Systems (ISD)

- Designed into vehicles by the vehicle manufacturer
- Connected to a vehicle data bus.
- Sends and receives the safety messages
- Issues warnings to the driver
Devices Types

Roadside Equipment (RSE)

- Devices installed into the infrastructure
- Both send and receive safety messages
- Can interface with traffic control systems
Infrastructure Installations
Applications

- Forward Collision Warning (FCW)
- Emergency Electronic Brake Light (EEBL)
- Intersection Movement Assist (IMA)
- Blind Spot Warning (BSW)
- Do-Not-Pass Warning (DNPW)
- Left Turn Across Path (LTAP)
- Right Turn in Front Warning
- Curve Speed Warning (CSW)
- Pedestrian Detection
# Vehicles Deployed

<table>
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<th>Integrated Vehicles</th>
<th>Retrofit/Aftermarket Devices</th>
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<th>Vehicle Awareness Devices</th>
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</tbody>
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- **Data Acquisition System (Video, CAN, Warnings, Messages)**
- **Basic Messages Only**
- **All Messages and Warnings**
Ann Arbor as the Deployment Site

- A good mix of high-volume, multi-modal traffic
- Urban, suburban and rural roads
- A variety of roadway characteristics
- Weather variation to examine events, applications, and equipment durability
- Proximity to vehicle manufacturers and suppliers
Driver Recruitment in Ann Arbor

- Maximize vehicle exposure to the site/other vehicles
- Large potential recruitment population
  - 114,000 city population
  - 40,000 UM employees, VA Hospital, EPA, etc.
  - Community-based recruitment via public schools to increase exposure and probability of vehicle interaction
- Two trucking firms
  - Con-way Freight and Sysco Foods
- Two transit agencies
  - Ann Arbor Transit Authority and UM Transit
- Other organizations
Infrastructure Installations

- Strategy for site location
  - Capture all traffic operating in Northeast Ann Arbor, with focus on local commuters, and all other trips
- Roadside Equipment at:
  - 21 signalized intersections
  - 3 curves
  - 5 freeway sites
- 2 SPaT enabled corridors
  - 12 intersections, 6 per corridor
Model Deployment Launch

- Over 250 guests
- 40+ members of the media
- Examples of all of the technologies
- Each of the platforms
- UMTRI’s partners and community representatives
Before We Take Questions…
Detroit ITS World Congress
7-11 September 2014

Cobo Center  Michigan
September 7-11, 2014

Reinventing Transportation in Our Connected World
2014 World Congress Update

• Date and Theme
• Vision for 2014
• Tentative Timeline
• The Organizing Committee
• Where to Stay – What to Do
• Event Venues
• ITS Infrastructure and Plans in Detroit
Reinventing Transportation in Our Connected World

• Guiding Principles
  – Immersive experience
  – Greater integration of program, exhibits and demonstrations
  – More emphasis on personal, vehicle and infrastructure connectivity
  – More emphasis on consumers and youth
  – Leverage the presence of the auto industry
The Story of Reinvention

People
- Drivers
- Riders
- Pedestrians
- Operators
- Maintainers

Vehicles
- Cars
- Commercial Vehicles
- Transit Vehicles

Infrastructure
- TMCs
- Traditional ITS

Mobile Devices
- Affordable
- Mode-agnostic

Program
Exhibits
Other Events
Technology Showcase
Tentative Timeline

- Website Opens – April 2013
- Exhibit Sales Launch – October 2013
- Papers Due – January 2014
- IPC Meetings – January and March 2014
- Registration Open – Spring 2014
Headquarters Hotel

- Detroit Marriott at the Renaissance Center
Other Detroit Hotels
Baseball, Golf and More
Our Gems
Our Heritage

Automotive Innovation
Worldwide Center for Automotive R&D
Our Venue – The New Cobo Center
VIP Dinner Venue
Gala Venue
ITS in Greater Detroit

- More than 200 miles of freeway instrumentation
- Adaptive traffic control
- Smart border crossings with Canada
- Traffic Management Centers (TMCs)
  - Road Commission for Oakland County TOC
  - Macomb County Roads TMC
  - City of Detroit TMC
  - Southeast Michigan Transportation Operations Center (SEMTOC)
Southeast Michigan Transportation Operations Center
ITS in the Motor City

- 30 Downtown Intersections on Centralized Control
- 11 CCTV Cameras
- 9 System Detection Cameras
- Redundant Hybrid Communications Backbone
- Two TMCs
- New DSRC Deployment Underway
Technology Showcase

• Seven working themes
• Integrated with other elements of the World Congress
• Stakeholder workshop held on October 2nd
• Concepts being refined
Tokyo-Detroit World Congress Partnership
Thank you from Your Detroit World Congress Hosts!
or Detroit ITS World Congress

Questions?

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