Michigan Connected Vehicle Working Group Meeting Packet

July 30, 2012

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MICHIGAN CONNECTED VEHICLE WORKING GROUP

Monday, July 30, 2012

Southeast Michigan Transportation Operations Center
1060 W. Fort Street
Detroit MI 48226

Note: Access to the parking lot is off 5th street or 6th street (both have gates into the lot)

MEETING AGENDA

(1) Welcome and Introductions (9:00-9:15 AM)

(2) Overview of the Southeast Michigan Traffic Operations Center (SEMTOC), Matt Smith, MDOT (9:15 to 9:45 AM)

(3) Tour of the SEMTOC Facility, Matt Smith, MDOT (9:45 to 10:15 AM)

BREAK

(4) Results from Ongoing CAR Connected Vehicle Research for MDOT, Richard Wallace, CAR (10:30 to 11:00 AM)

(5) Autonomous Vehicle Technology Discussion (11 to 11:15 AM)

(6) Update on the V2V Safety Pilot, Scott Shogan, PB (11:15 to 11:45 AM)

(7) Update on Planning for the 2014 ITS World Congress, Jim Barbaresso, HNTB (11:45 to noon)

MICHIGAN CONNECTED VEHICLE WORKING GROUP

The July 2012 meeting of the Michigan Connected Vehicle Working Group was held at the Southeast Michigan Transportation Operations Center (SEMTOC) in Detroit, Michigan.

MEETING NOTES

After a brief welcome and introductions led by Richard Wallace of the Center for Automotive Research (CAR), Matt Smith from the Michigan Department of Transportation (MDOT) gave an overview of the SEMTOC facility, including a description of the planning process for creating it. At SEMTOC, the MDOT traffic operations center for the Metro area is co-located with state police dispatchers and serves the three-county region of Macomb, Oakland, and Wayne. Matt then introduced Sarah Gill of MDOT, who further described the facility and its capacity for meetings, events, and partnerships. Sarah directed the attendees through a tour of the facility, including the operations center and the building's many conference and meeting rooms.

After a break, Richard Wallace discussed results from two research projects that CAR has completed for MDOT: "Ethics of Government Use of Data Collected via Intelligent Transportation Systems" and "Public Perceptions of Connected Vehicle Technology." Richard's presentation discussed the premise of these papers and some of their results. After the update on CAR's research, Richard led a working group discussion on autonomous vehicle technology. It was noted that the recent laws enabling testing in Nevada and Florida (with some progress in California, though nothing signed into law yet) are largely for public relations purposes, and that testing of such vehicles on the road is not necessarily disallowed in other states. Furthermore, in Michigan, laws already allow non-production vehicles to use roadways. During the discussion, some attendees expressed the concern that Michigan may need to ensure that laws provide functional rules, rather than technology rules, so that companies have flexibility in design of autonomous vehicles.

Following the autonomous vehicle discussion, Scott Shogan of Parsons Brinkerhoff discussed the federal V2V Safety Pilot Field Test in Ann Arbor, Michigan. The official launch date for the Safety Pilot Field Test is August 21, 2012, with a rolling start scheduled for completion by December 4, 2012. Deployment will increase from five roadside equipment units in the first stage to 29 in the second stage. The backhaul network has presented significant challenges as the network design and routing is more complex than anticipated. Recruitment for participants has been successful through the school system though it has been lower than expected among medical complex employees.

The meeting closed with an update from Jim Barbaresso on the ITS World Congress 2014. The event will be held from September 7-11, 2014. Portions of the program will be virtual, thereby making it more accessible to interested parties across the world. Cobo Hall will be divided into different sections based on topic; exhibits will be grouped together by topic (e.g., traffic information providers in one place, and roadside cameras exhibits in another) and flow from one to another in a logical manner. The event's focus is more on the consumer; the plan is to make the technology relevant and unavoidable for both attendees and others in the area and to provide firsthand technology experiences for the average person.

MICHIGAN CONNECTED VEHICLE WORKING GROUP

ATTENDANCE LIST

First	Last	Organization	Email
Jim	Barbaresso	HNTB	jbarbaresso@hntb.com
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Robert	Bucciarelli	Visteon	rbucciar@visteon.com
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Gary	Piotrowicz	Road Commission for Oakland County	gpiotrowicz@rcoc.org
Scott	Shogan	Parsons Brinckerhoff	shogan@pbworld.com
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Jeff	VanWashenova	NXP	jeff.vanwashenova@nxp.com
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MICHIGAN CONNECTED VEHICLE WORKING GROUP

PRESENTATIONS

Michigan
Connected Vehicle Working Group

Southeast Michigan Traffic Operations Center

Detroit, MI

July 30, 2012

Agenda for This Morning

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Working Group Mission

- Cooperatively pursue projects and other activities that are best accomplished through partnerships between multiple agencies, companies, universities, and other organizations and that ultimately advance Michigan's leadership position in connected vehicle research, deployment, and operations.
  - Benefit our state and our industry (automotive and more)
  - Enhance safety and mobility in Michigan and beyond

Upcoming Connected Vehicle Events in Michigan

- Michigan Connected Vehicle Working Group
  - Planning for October (hope to hold it at MIS)
- CAR Management Briefing Seminars
  - Aug. 6-9, Grand Traverse Resort and Spa, Acme (Connectivity on 6th)
- V2V Safety Pilot Kick-off
  - August 20

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Results from Two Recent Connected Vehicle Studies for MDOT

Presentation to Michigan Connected Vehicle Working Group Meeting

July 30, 2012

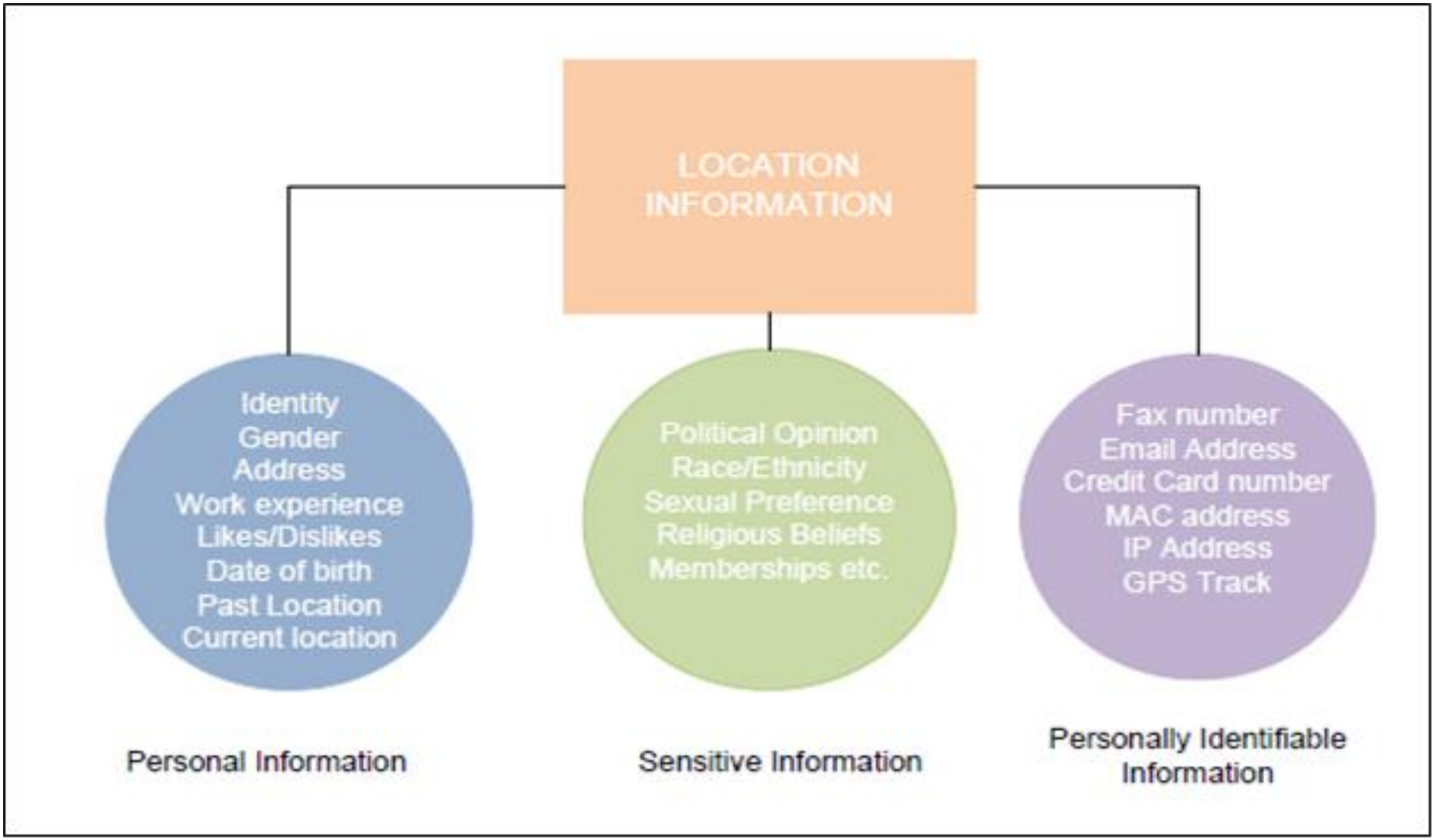
Introduction

- As part of ongoing work for MDOT, the CAR research team recently delivered two final reports to MDOT
  - Ethics of Government Use of Data
  - Public Perceptions of Connected Vehicle Technology
- This presentation highlights findings from both of these efforts
- More work is underway
  - At MDOT's discretion, findings from these efforts, too, will be presented at future working group meetings

Ethics of Government Use of Data

- Purpose
  - ITS applications (including connected vehicle technology) introduce ethical concerns and raise questions about tracking and privacy
  - As a prerequisite to deployment, issues regarding the collection, management, and use of data will have to be addressed to the satisfaction of all parties
- Overview of report
  - General background on ethics and privacy
  - Legal environment: laws, court cases, and organizational policies
  - Applications, data collection techniques, and issues
  - Recommendations and lessons for Michigan and beyond
- Credit due: Qiang Hong and Josh Cregger

Different Types of Location Information with Ethical Implications



Source: Muhammad Usman Iqbal. Location Privacy in Automotive Telematics. The University of New South Wales. 2009

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Legal Environment

- United States lacks an overarching information privacy law to govern both government agencies and private businesses
- Issue of data protection is a patchwork of legal provisions that has largely been left to individual states and the court system
- Fourth Amendment protects citizens from unreasonable search and seizure by government officials without due process (relevant for criminal and some civil court cases)
- Federal and state laws regulate the collection and management of personal information within government agencies
- Federal and state laws regulate consumer data use in specific industries (e.g., telecommunications, cable television, and banking)
- Private sector information privacy protection is largely provided through voluntary self-regulation and use of contracts

Selected U.S. Supreme Court Cases of Interest

- Katz v. United States (1967): the court clarified that intrusion via technology is a search
- United States v. Knotts (1983): court ruled that electronic beepers could be used for tracking from a short distance without a warrant
- United States v. Karo (1984): ruled that such tracking without a warrant is permitted on public roads, but tracking inside a residence without a warrant violated the Fourth Amendment
- United States v. Kyllo (2001): court ruled that use of thermal imaging to monitor heat radiation [from individuals] is a search and requires a warrant
  - Several states use thermal imaging for HOV enforcement
- United States v. Jones (2012): court found that police should have obtained a warrant to place a GPS-tracking device on Jones's car, but the ruling did not address the issue of when physical trespass is not required for surveillance

Tracking Cases Outside the Supreme Court

- Numerous, seemingly conflicting cases decided recently
  - In 2011, U.S. District Court in New York ruled that police need a warrant to track an individual using cell tower triangulation
  - Three months later, U.S. District Court in Washington, D.C. ruled that police do NOT need a warrant for cell phone tracking, arguing that a reasonable person knows that his or her phone is tracked by the cellular network provider
  - Another month later, U.S. District Court in Texas ruled that a warrant is necessary to force service providers to share data that reveals location
- Also in 2011, a New Jersey appellate court ruled that GPS tracking can be used by private citizens to track their spouses
- No doubt, more cases headed to the Supreme Court

Federal Agency Policies

- FHWA focused on having effective safeguards to prevent data being used for identification of individual vehicles, drivers, or owners; vehicle tracking; and traffic enforcement applications
- NHTSA policies aimed more at preventing activities such as jamming or tampering, transponder fraud, etc.—focused on maintaining integrity of system operation
- RITA developing principles for user protection in the connected vehicle environment, as we heard from Valerie Briggs last time
  - The environment must provide consumers with appropriate advance notice of and, for opt-in systems, opportunity to provide consent for information collection, use, access, maintenance, security and disposal.
  - The environment will limit the collection and retention of personally identifiable information to the minimum necessary to support stakeholder and operational needs.

ITS Categories and Applications

ITS Category	Examples of Specific ITS Applications	Applicable in Michigan
1. Advanced Traveler Information Systems (ATIS)	• Real-time Traffic Information Provision	Yes
	• Route Guidance/Navigation Systems	Yes
	• Parking Information	Yes
	• Roadside Weather Information Systems	Yes
2. Advanced Transportation Management Systems (ATMS)	• Traffic Operations Centers (TOCs)	Yes
	• Adaptive Traffic Signal Control	Yes
	• Dynamic Message Signs (or "Variable" Message Signs)	Yes
	• Ramp Metering	No
3. ITS-Enabled Border Crossing Program	• Advanced Traveler Information System	Yes
	• Variable Toll Pricing	No
	• Electronic Screening System for Trucks and Buses	Yes
4. Advanced Public Transportation Systems (APTS)	• Real-time Status Information for Public Transit System	Yes
	• Automatic Vehicle Location (AVL)	Yes
	• Electronic Fare Payment (for example, Smart Cards)	Yes

ITS Categories and Applications

ITS Category	Examples of Specific ITS Applications	Applicable in Michigan
5. Vehicle-to-Infrastructure (V2I) and Vehicle-to-Vehicle (V2V) Integrations	• Cooperative Intersection Collision Avoidance System (CICAS)	Yes
	• Infrastructure Monitoring and Data Management	Yes
	• Data Use Analysis Processing Project (DUAP)	Yes
	• Signal Phase and Timing Communication System	Yes
	• Vehicle-based Information and Data Acquisition System (VIDAS)	Yes
	• Slippery Road Detection and Evaluation	Yes
	• Intelligent Speed Adaptation (ISA)	Yes
6. Commercial Vehicle Operations	• Driver Communication Systems	Yes
	• Vehicle Monitoring and Safety Management Systems	Yes
	• Cargo Management Systems	Yes
	• Driver Credentialing Systems	Yes
7. Emergency Management	• Emergency Routing Equipment Systems	Yes
	• Roadway Service Patrols	Yes
	• Wide-Area Alert Systems	Yes
8. Maintenance and Construction Management	• Vehicle and Equipment Tracking Systems	Yes
	• Fixed and Vehicle-based Sensors/Probe Monitoring	Yes
	• Work Zone Management	Yes
9. ITS-Enabled Transportation Pricing	• Electronic Toll Collection	No
	• Congestion Pricing/Electronic Road Pricing	No
	• Fee-Based Express (HOT) Lanes	No
	• Vehicle Miles Traveled (VMT) Usage Fees	No
	• Variable Parking Fees	No

ITS Data Collection Techniques and Locational Privacy

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Data Collection Techniques	Functionality of Data Collected	Vehicle Information and Identification	Driver and Occupant Information and Identification		
				Privacy Expectation and Legal Protection	
					Applicable in Michigan
Loop Detectors	Volume, Vehicle Class, Speed, Estimated Travel Time, and Incident Detection	No Individual Vehicle Information Obtained	None	None	Yes
Video Image Detectors	Vehicle Class, Estimated Speed, Volume, and Incident Detection	Individual Vehicle Information Likely Obtained	None	Medium	Yes
Infrared and Thermal IR Cameras	Occupant Observation	Vehicle Identification Likely Obtained	None	Medium	No
Toll Transponder	Origins and Destinations, Volume, and Average Speed	Vehicle Identification Obtained	Possible through Vehicle Registration System	Medium	No
License Plate Reader	Origins and Destinations, Average Speed and Travel Time	Vehicle Identification Obtained	Possible through Vehicle Registration System	Medium	No
GPS-enabled Mobile Phones or Probe Vehicles	Real-time Vehicle Location, Travel Paths, Speed, Origins and Destinations	Vehicle Identification Likely Obtained	Possible through Vehicle Registration System and Telecommunication Records	High	Yes

Recommendations for Use of Data

- Identify data needs and select collection techniques accordingly
- Determine options and participation requirements for anonymity
- Balance tradeoffs between privacy and quality through advanced data architecture
- Make participation voluntary
- Use market incentives to promote adoption
- Resolve equity issues using installation subsidies
- Coordinate outreach and education programs
- Determine governance and ownership of data
- Create public-private partnerships to collect, manage, and disseminate data
- Develop effective information technology strategies
- Integrate its data collection and information sharing policies into existing data management strategies

Public Perceptions of Connected Vehicle Technology Study

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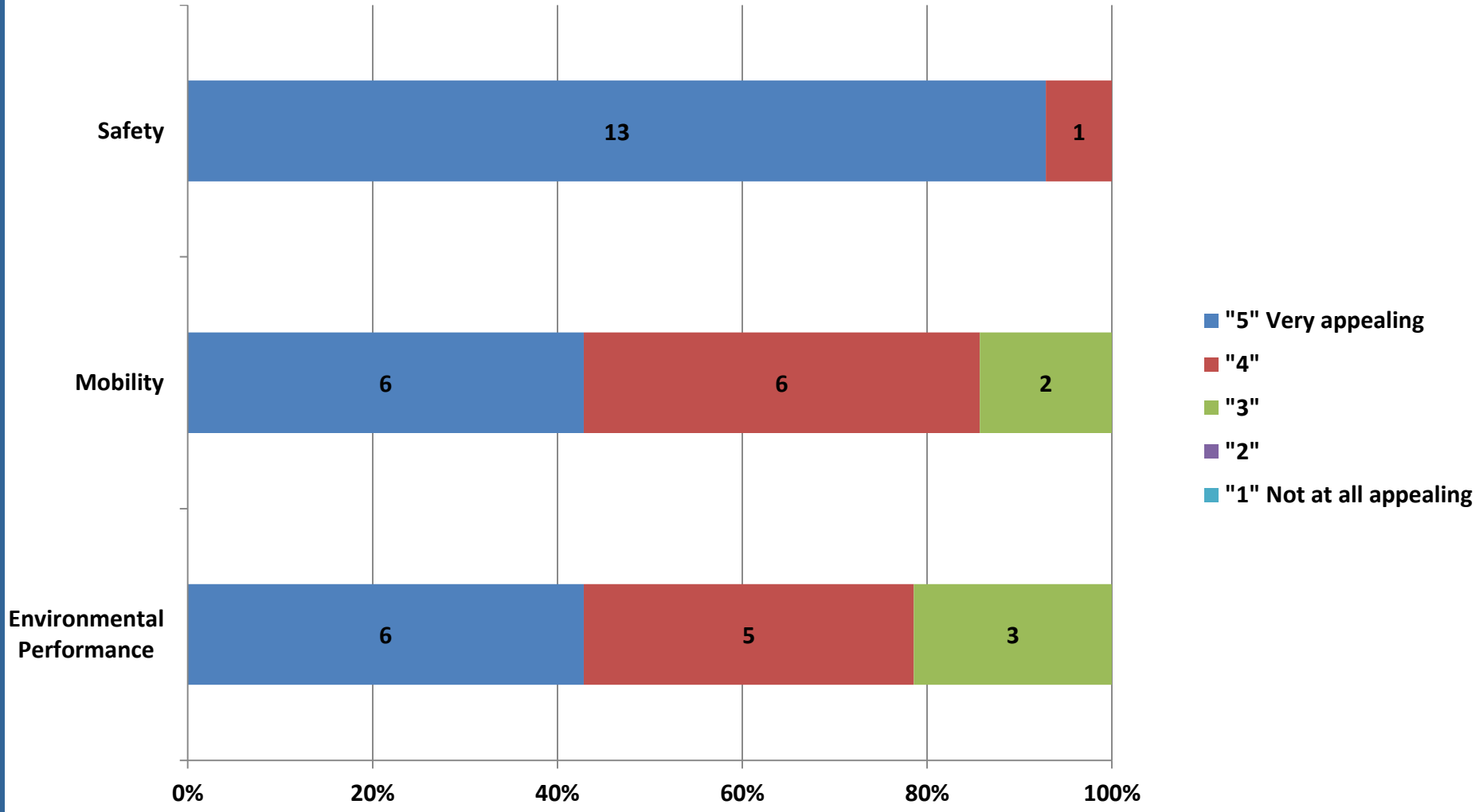
- Purpose
  - Assess public acceptance of, and demand for, connected vehicle technology, because it may be required to encourage the necessary financial support for deployment
  - Outline key benefits and concerns relating to public perceptions of connected vehicles
- Overview of study
  - Literature review
  - Focus groups
  - Future work
- Credit due: Valerie Sathe Brugeman and Josh Cregger

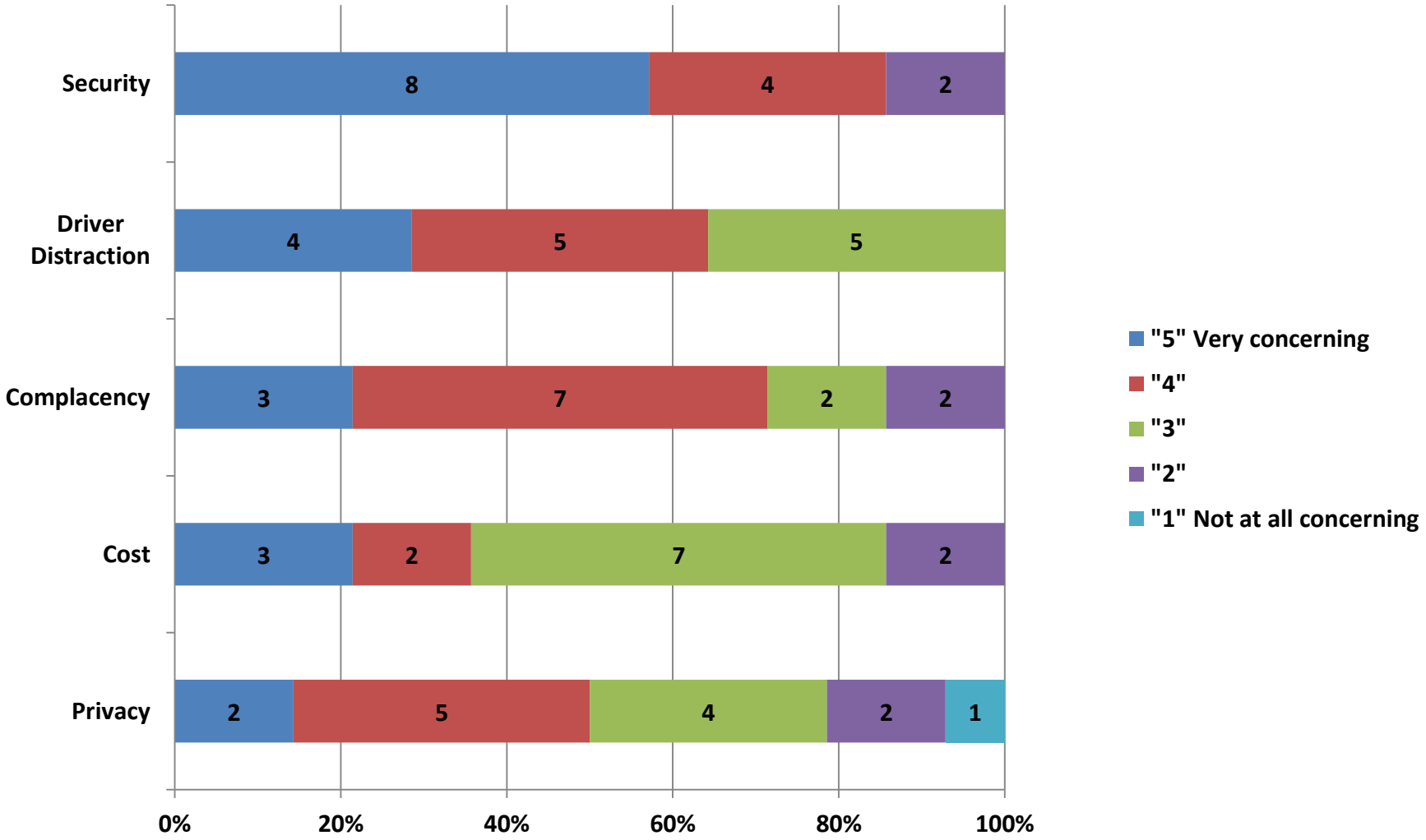
Focus Group Process

- Focus group logistics
  - Held three sessions, 14 people total (4-5 per group)
  - Began all three with a ten-minute, introductory presentation on connected vehicle technology
  - Led and moderated discussion of perceived benefits and concerns
  - Had participants rate dimensions of connected vehicle technology
- Ratings
  - Included dimensions suggested by the moderator, as well as those generated by the participants; thus not always the same set
  - Benefits rated
    - Safety, mobility, environmental performance, others
  - Concerns rated
    - Security, driver distraction, complacency, cost, privacy, others
  - Rated from 1-5 (not at all appealing/concerning to very appealing/concerning)

Overall Participant Ratings of Benefits



Overall Participant Ratings of Concerns



Results by Participant Characteristics

- By gender
  - Ratings were similar for both genders for benefits and concerns
  - Males rated benefits as slightly less appealing
  - Females were more concerned about cost
  - Males were more concerned about driver complacency and privacy invasion
- By age group
  - Ratings were similar for both groups (under 40 and over 40)
  - Younger group rated mobility benefits higher
  - Older group was less concerned about driver complacency
- By educational attainment
  - Ratings were similar for both groups (less than a 4-year college degree and 4-year college degree or more)
  - Those with 4-year degrees rated environmental performance as more appealing
  - Those with 4-year degrees were less concerned about privacy and security and more concerned about complacency

Potential Future Work

- Develop strategies to handle the concerns outlined in the report
- Expand on general ideas and case studies, relating to perceptions and adoption of similar transportation technologies (e.g. UBI and ETC) for a better understanding on how to positively influence public opinion on connected vehicle technologies
- Examine the public perception challenges faced by a Michigan connected vehicle deployment and the potential to resolve concerns

Connected Vehicle Safety Pilot Progress Update

Scott Shogan
Infrastructure Team Lead Engineer
Parsons Brinckerhoff

Michigan Connected Vehicle Working Group Meeting
July 30, 2012

What is Safety Pilot

- Safety Pilot is:
  - Model for a national deployment of the technology
  - Designed to determine the effectiveness of the safety applications at reducing crashes
  - Designed to determine how real-world drivers will respond to the safety applications
- Safety Pilot will also tests mobility and sustainability applications
- $18M, 2.5 year program
- 1-year deployment begins August 21, 2012

Test Conductor Team

UMTRI

PARSONS BRINCKERHOFF

MDOT
Michigan Department of Transportation

Mixon Hill

AAA

City of Ann Arbor

HNTB

escrypt
Embedded Security

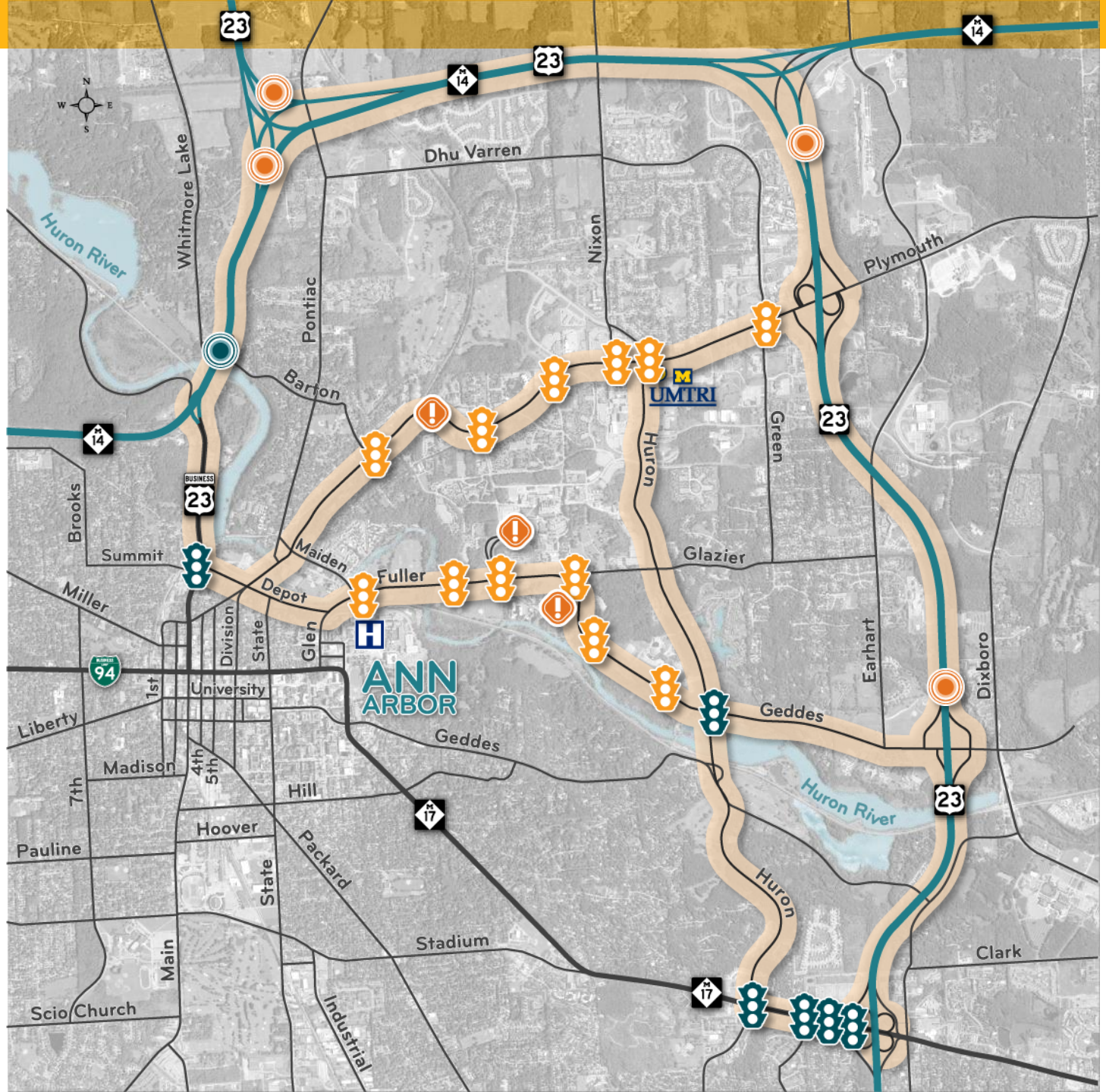
PURE MICHIGAN®
Michigan Economic Development Corporation

SAIC®
From Science to Solutions

Texas Transportation Institute

Scope

- More than 2,836 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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Maiden
Fuller
Glazier
Depot
Miller
Division
State
Glen
ANN ARBOR
94
1st
University
Liberty
Geddes
Earhart
Dixboro
Madison
4th
5th
7th
Hill
17
Hoover
Pauline
Packard
Stadium
Clark
Main
Scio Church
Industrial

Vehicles & Devices Deployed

	Integrated Vehicles	Retrofit/ Aftermarket Devices	Vehicle Awareness Devices	
Passenger Cars	64	300	2200	
Heavy Trucks	3	16	50	
Transit		3	100	
Medium Duty			100	
	67	319	2450	**2836**

Example Equipment

Two-Stage Deployment

- Stage 1: Launch 1-year V2V deployment
  - August 21st launch
  - Collect data on V2V interactions to support 2013 rulemaking decision
  - Limited infrastructure to support security credentialing
- Stage 2: Full infrastructure rollout
  - “Rolling start” completed by December 4th
  - Full suite of RSEs and V2I apps
  - SPaT rollout

On-track for August 21st launch!!!

Launch Readiness Checklist

- Interoperability testing
- Driver recruitment
- On-board device procurement and installation
- Stage 1 RSE deployment
- Communications backhaul
- Security system and credentialing
- Data management systems
- IRB certification

Challenges and Lessons Learned

- Driver Recruitment
  - Tapping into community through Ann Arbor Schools was hugely successful
  - Response through UM Medical Center not as strong as anticipated
  - Continuing to develop new strategies to entice participants
  - Current recruitment at 2,100

Challenges and Lessons Learned

- Antenna Mounts
  - Differing reliability between internal vs. external antenna mounts for GPS
  - UMTRI evaluating mounting procedures and concerns over potential vehicle damage
  - Evaluation underway of effectiveness of different antenna manufacturers

Challenges and Lessons Learned

- RSE Development
  - Two-stage process necessitated by schedule for RSE development
  - RSEs not fully mature product as anticipated
  - Significant troubleshooting and modification required to bring minimal functionality up for launch

Challenges and Lessons Learned

- Backhaul Network
  - Required to utilize IPv6 for compliance with near-future IP standard
  - IPv6 not yet well supported by Internet Service Providers (ISPs)
  - Network design and communication routing significantly more complex than anticipated

Delivered through Partnership

- Issues addressed through extensive team collaboration between contractors, vendors and public agency partners
- Strong partnership with Ann Arbor, MDOT, key to infrastructure delivery
- Flexible approach to meet challenges and maintain launch date

Upcoming Steps

- August 21st LAUNCH
- Stage 2 interoperability field testing
- Testing of SPaT implementations on-site
- Deploy Stage 2 infrastructure
- Incorporation of additional V2I/I2V applications
  - Transit safety
  - Rail grade crossing

SAFETYPILOT

Questions?

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