



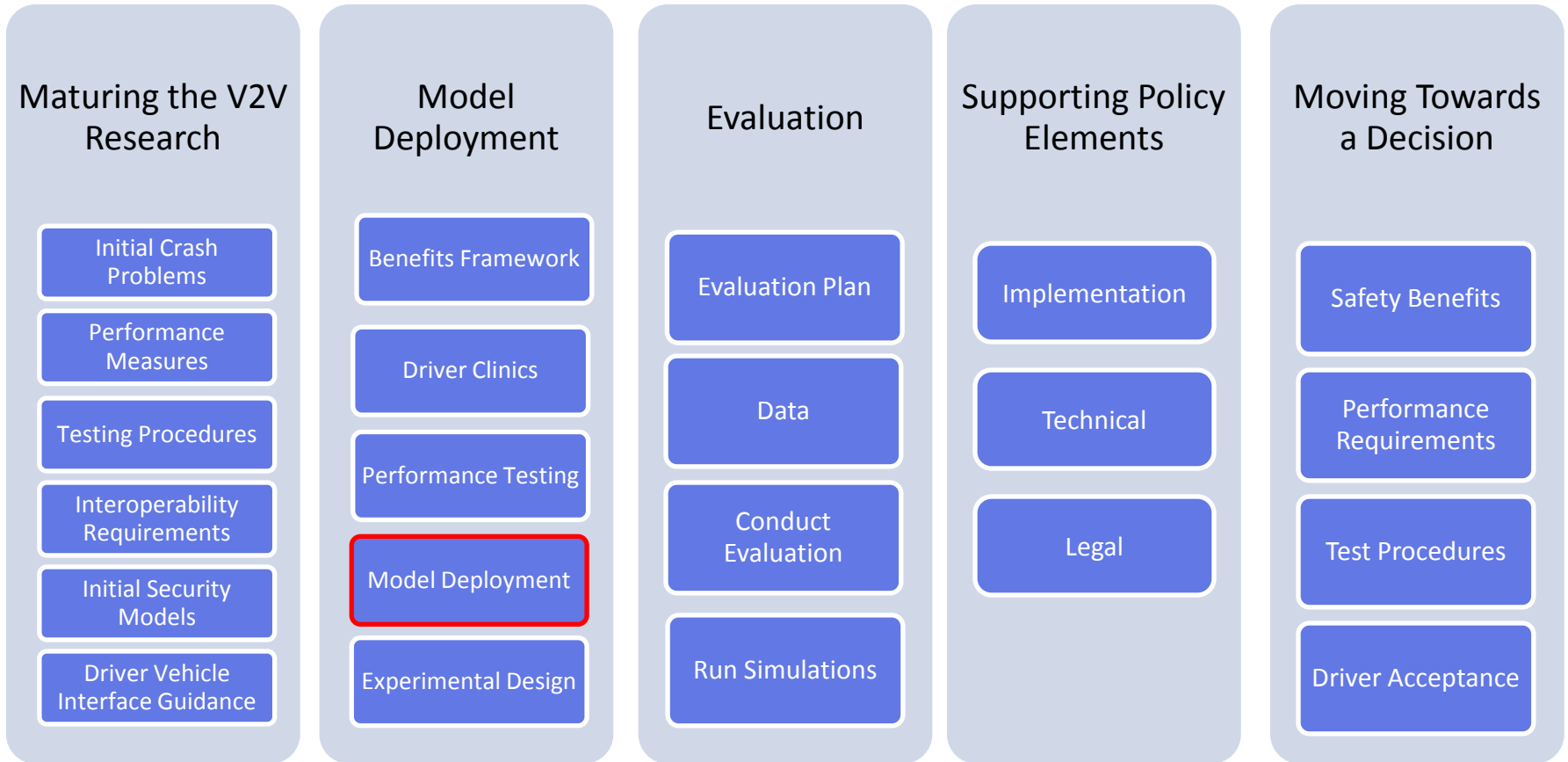
UNITED STATES
DEPARTMENT OF TRANSPORTATION

Model Deployment Operations and Evaluation

**ITS Workshop on Connected Vehicles:
*Moving from Research Towards Implementation***

September 25, 2012

V2V Safety Framework



Moving Towards an Operation Model

Data Collection

Data Evaluation & Analysis

Establishing an Operational Environment

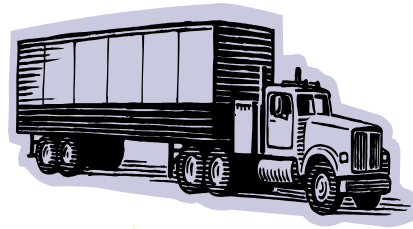
Results

Safety Pilot Model Deployment

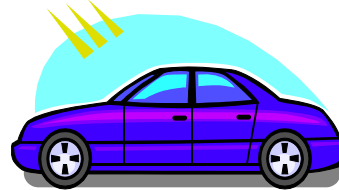
- Major road test and real world implementation involving:
 - Approximately 3000 vehicles
 - Multiple vehicle & device types
 - Roadside infrastructure
- Also to test:
 - Prototype security mechanisms
 - Device certification processes



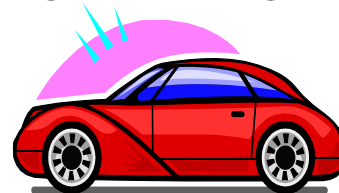
Integrated Vehicles



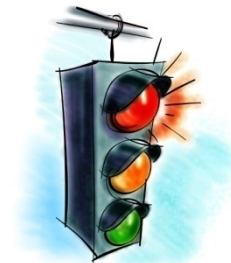
Trucks & Buses



Aftermarket Devices



Vehicle Awareness Devices



Roadside Infrastructure

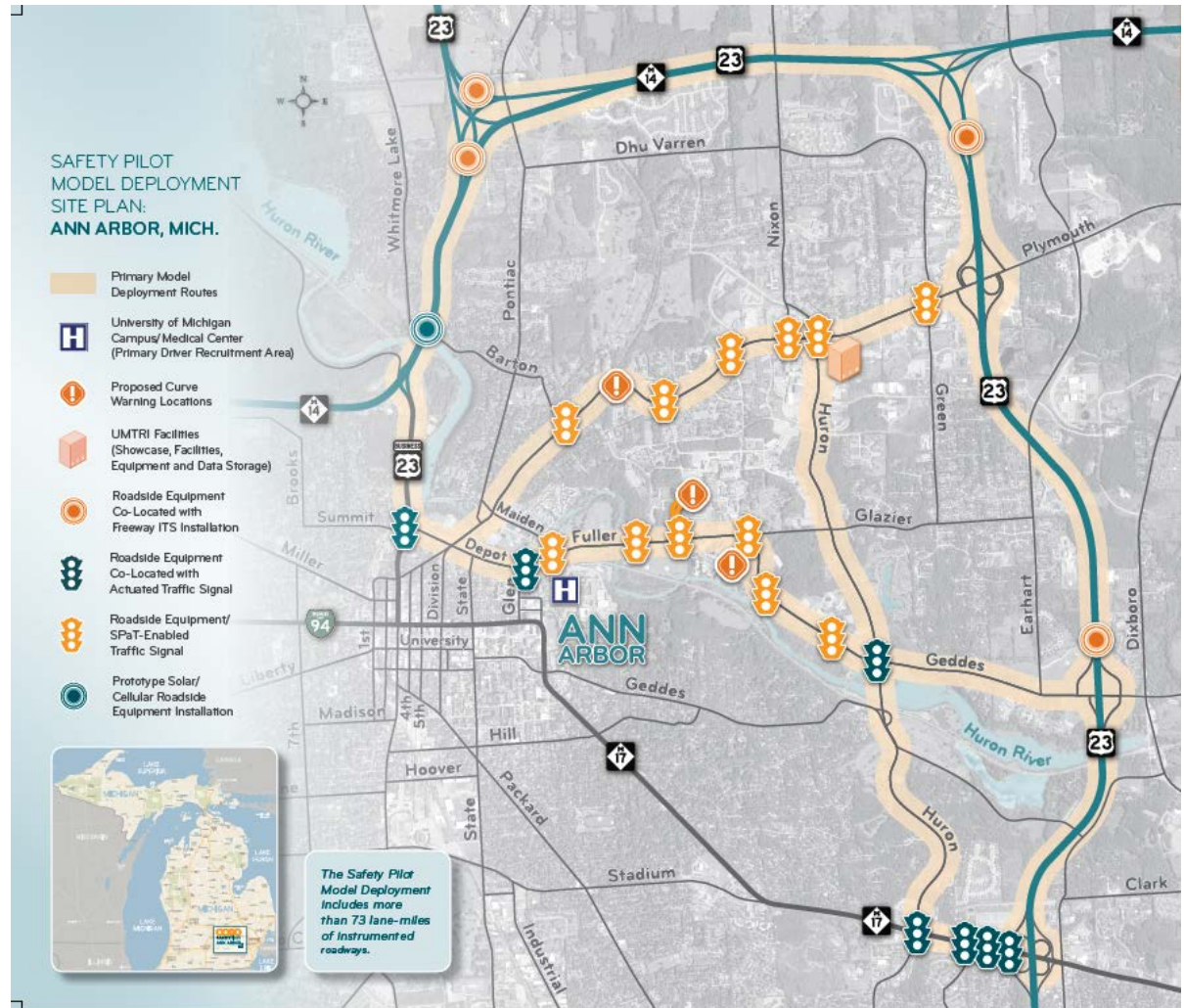
Model Deployment Geographic Area

Key Site Elements:

- 73 miles of instrumented roadway
- 29 roadside units
- ~3000 vehicles
 - Cars, trucks, buses
 - Integrated, aftermarket, and retrofit
- 1 year of data collection

Also:

- Exercising security options
- Vetting device certification process



Model Deployment Fleet at Full

Connected Vehicle Device	Vehicle Type	Vehicle Source	Total Units in Model Deployment
Integrated Devices	Light Vehicles	CAMP	64
Integrated Devices	Commercial Trucks	Battelle Team	3
Vehicle Awareness Devices	Light Vehicles	UM, Ann Arbor	2305
Vehicle Awareness Devices	Local Truck Fleets	Con-Way, Arbor Springs	10
Vehicle Awareness Devices	Heavy Duty	University Fleet	50
Vehicle Awareness Devices	Transit Vehicles	AATA, UM Buses, WISD Buses	85
Aftermarket Safety Devices	Light Vehicles	UM, Ann Arbor	300
Retrofit Devices	Local Truck Fleets	Con-Way, Sysco	16
Retrofit Devices	Transit Vehicles	UM Buses	3
		Total	2836

Safety Application by Devices and Manufacturers

		Model Deployment						
Manufacturer		EEBL	FCW	IMA	LTA	BSW/ LCW	DNPW	CSW
OEMs	Ford	X	X	X		X	X	
	GM	X	X	X		X	X	
	Honda	X	X	X		X	X	
	Mercedes	X	X	X		X		
	Toyota	X		X		X		
	Hyundai-Kia		X			X		
	Nissan		X		X	X		
	VW-Audi	X	X	X				
Aftermarket Devices	Cohda-Delphi	X	X					X
	Cohda-Visteon	X	X					X
	Denso	X	X					X
Heavy Truck	Battelle Integrated	X	X	X		X		X
	Battelle RSD	X	X	X		X		X
	SWRI RSD	X	X					X
Total	14	12	13	8	1	9	3	6

Model Deployment

- CV Participation Summary
 - 3 Integrated CVs – driven by participating fleets
 - 16 - Retrofit of existing fleet vehicles
 - Sysco (8) Battelle RSD
 - Conway (8) Cambridge RSD
 - 50 – CVs with Vehicle Awareness Devices



Model Deployment

Interoperability Testing

- Interoperability testing focused on the ability of devices to exchange messages and decode, log, and/or forward messages.
- Testing included:
 - Bench
 - Field
 - Pre-Model Deployment
- All Tests Completed
 - All devices passed
 - Some issues resolved during tests, some per software upgrade

Evaluation Data Collection

- Two Levels
 - First level
 - Devices log IP data messages
 - Includes VADs and ASD w/o DAS
 - Second Level
 - Full Data Acquisition Systems (DAS)
 - Collect device and vehicle data
 - Collect video data
- Collection Schedule
 - Integrated light vehicles monthly
 - VADs and ASDs with and without DAS every two months
 - First 6 months data support preliminary analysis.

Light Vehicle Evaluation Schedule

