

VII Strategy for Safety and Mobility

James P. Vondale & Stephan J. Speth

*Center for Automotive Research
Wireless Vehicle Communication Systems*

August 8, 2006

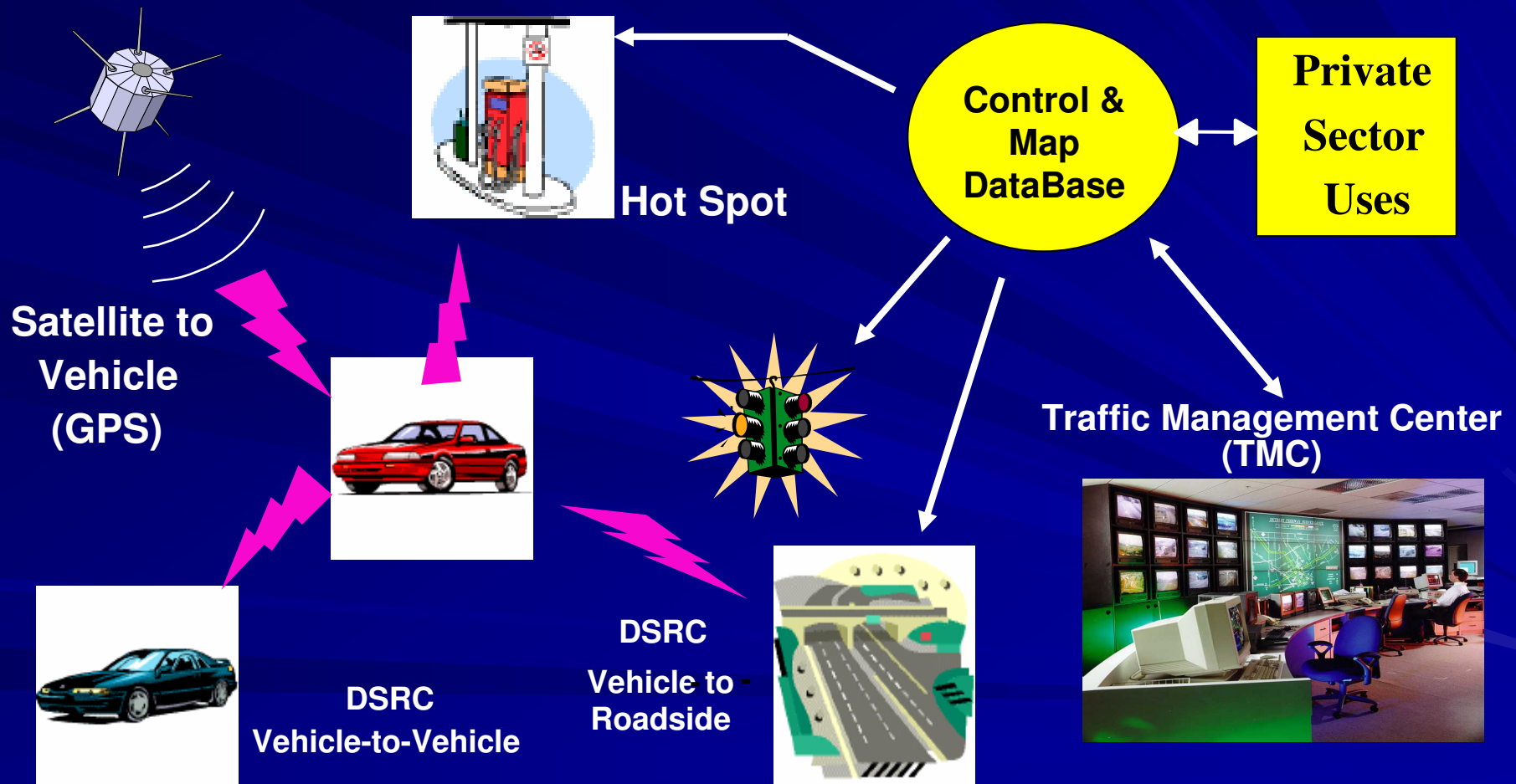
VII Concept

James P. Vondale

Director - Automotive Safety Office

Ford Motor Company

Vehicle Infrastructure Integration (VII)



VII Goals

Reduce Societal Costs of CRASHES

NHTSA Administrator Nicole Nason has stated...

- 43,000 deaths / year
- 2.7 million people injured / year
- \$230 billion social cost

Reduce societal costs of CONGESTION

- Personal and business hours lost in traffic
- Inconvenience of missed flights, meetings, schedules
- Gasoline wasted
- Freight costs higher, lost productivity

VII Technologies Enabling Cooperative Highways

- Critical SAFETY Technologies
 - *DSRC radio* for fast, interactive communications (Vehicle-to-Infrastructure and Vehicle-to-Vehicle)
 - Accurate and fast **vehicle positioning** sensing
 - Precision **roadway database**
- Critical MOBILITY Technologies
 - *Real-time probe* vehicle data (speed, direction, location, situational variables)
 - **Data processing and information dissemination**

DSRC Radio Enabler

- In 1999, FCC allocated 75 MHz of bandwidth for transportation safety
 - Final Rule & Order on licensing (Dec 2003)
 - Other uses allowed on a lower priority basis
- Standards developed for Dedicated Short-Range Communications (DSRC) protocol and message format
 - Variation of WiFi radio (802.11p)
 - Optimize communications protocol for transportation safety purposes (high-speed, low-latency)
 - Establish common message formats for vehicle data parameters

Potential VII Features Over Time

Reduce CRASHES

Improve Driver Situational Awareness

- Emergency Vehicle Warning
- Inter-Vehicle Warning

Minimize Effects of Driver Error

- Intersection Collision Avoidance
- Curve Speed Deceleration

Increase Automation?

- Automatic Driver Assistance?
- Vehicle Platooning?

Examples

Reduce CONGESTION

Improve Traffic Information

- Real time traffic information
- Alternative route guidance

Improve Situational Roadway Awareness

- Dynamic roadway condition info.
- Emergency situation management

Manage Traffic Flow?

- Dynamic flow control?
- Dynamic roadway pricing?

Examples

Timeline →

Intersection Collision Avoidance

-- *CONCEPT* --

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Emergency Vehicle Warning

-- *CONCEPT* --

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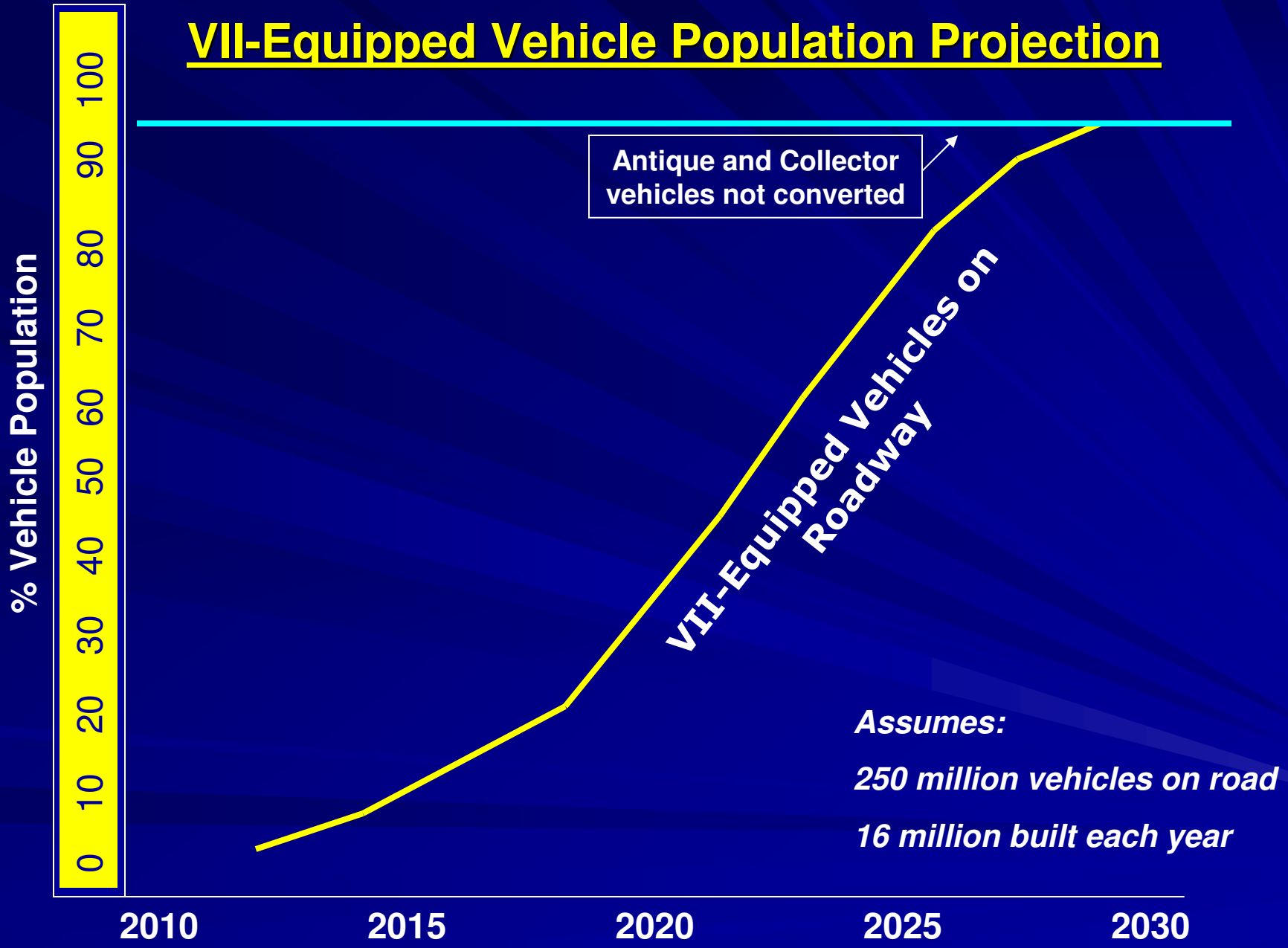
Inter-Vehicle Hazard Warning

-- *CONCEPT* --

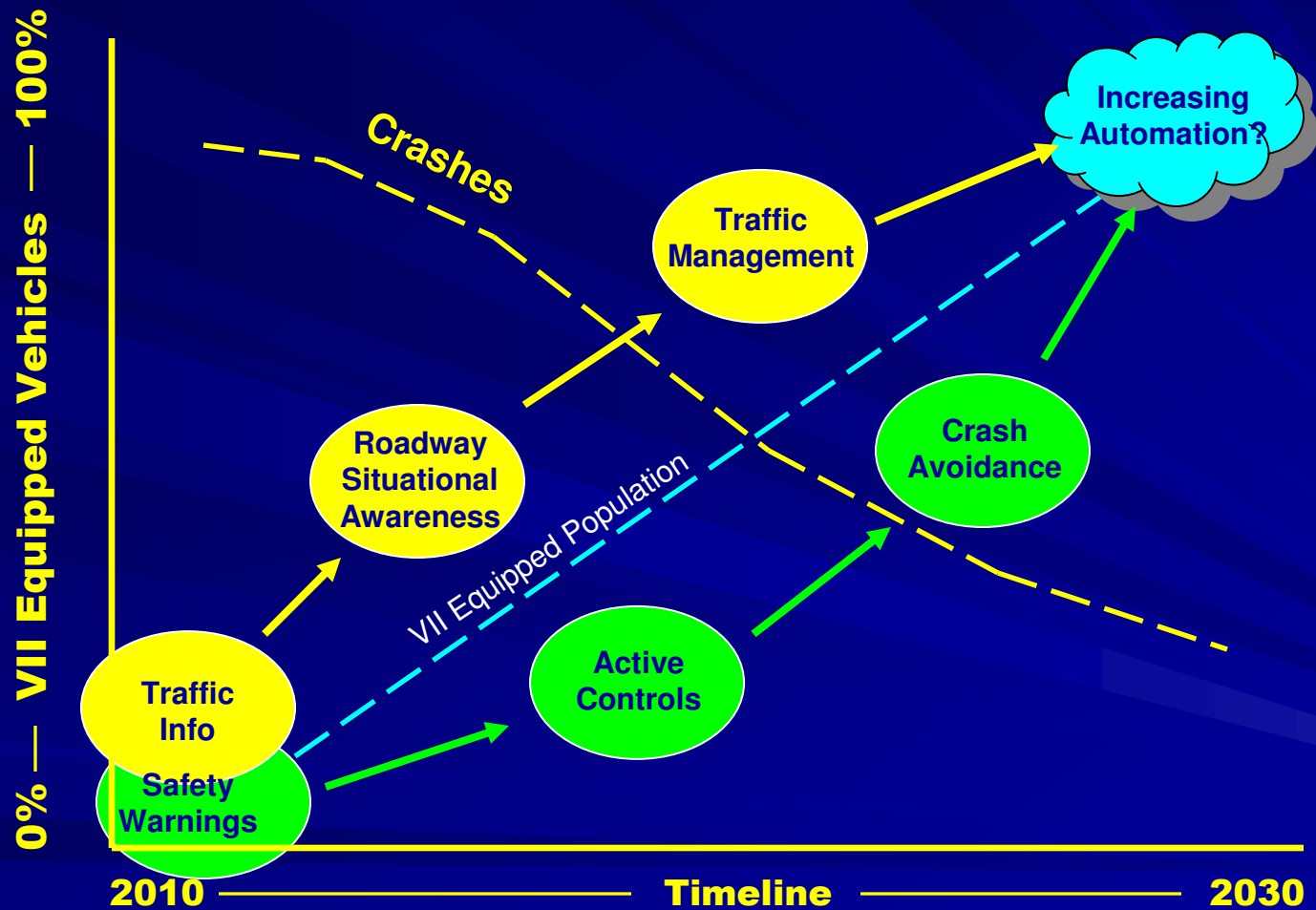
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VII-Equipped Vehicle Population Projection



VII Function vs Density



In Summary

- VII is a broad and complex undertaking that presents many potential opportunities to improve safety and mobility, as well as many challenges.
- The vehicle industry is committed to work cooperatively to explore the opportunities and work to address the challenges.
- Much already has been accomplished through our cooperative efforts with the federal government, state and local DOT's and suppliers.

Program Organization & Public Policy

Stephan J. Speth

*Director, Vehicle Compliance and Safety Affairs
DaimlerChrysler Corporation*

VII Program Initiation

- One of nine major initiatives announced by USDOT in 2004

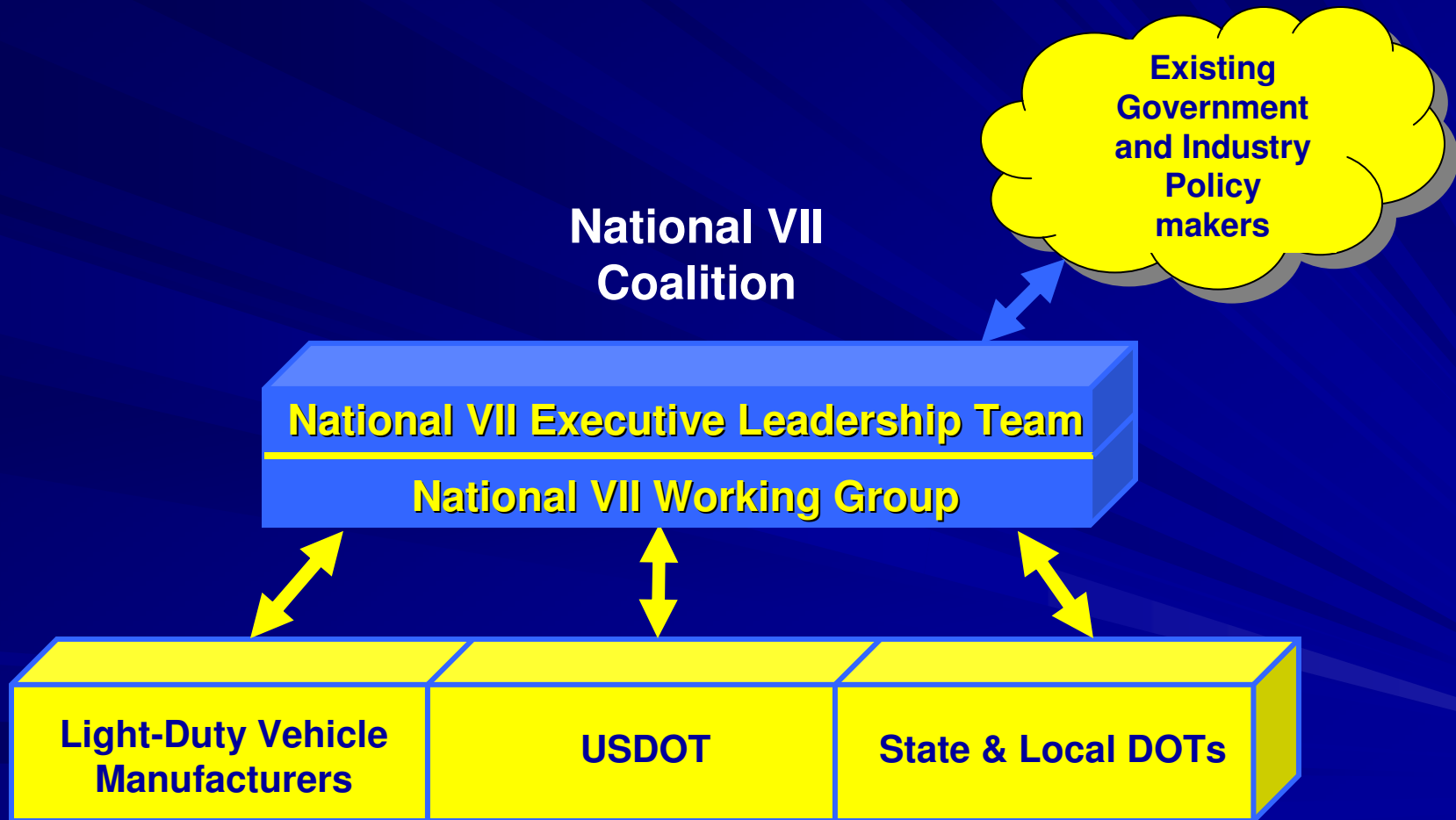
– Vision:

“Nationwide deployment of a communications infrastructure on the roadways and in all production vehicles could improve transportation and the quality of American life in ways not imagined a generation ago.”

(source: USDOT ITS Joint Programs Office)

- National VII Coalition established to oversee program to assess deployment feasibility

National VII Coalition Relationships



National VII Coalition

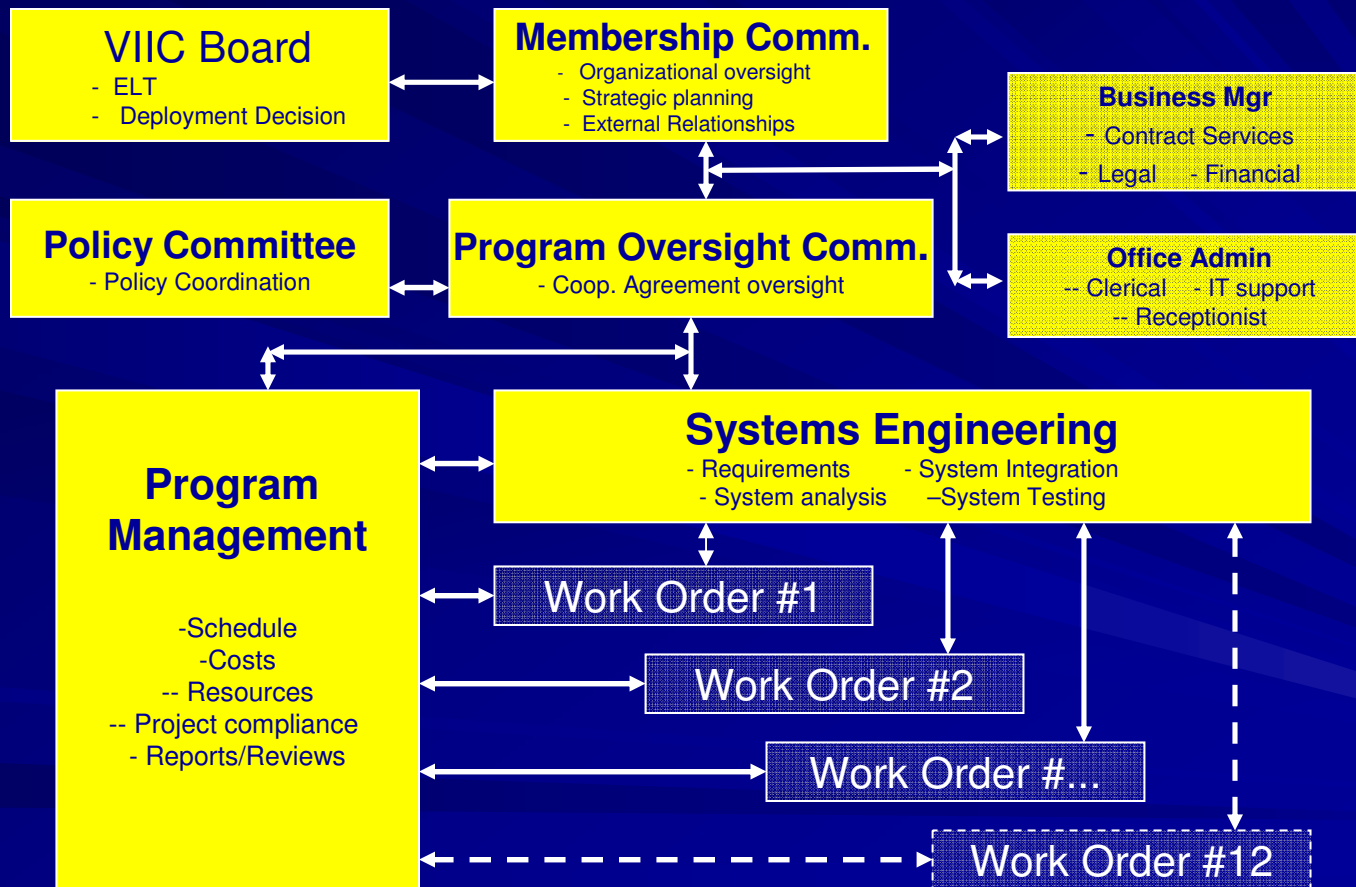
- Subcommittees:
 - Technical/Architecture – Technical Feasibility Analysis
 - Business Models – Economic Feasibility
 - Institutional Issues – Social / Political Feasibility
 - Outreach – Consensus Building
- Reach a consensus decision on whether to collectively recommend national deployment to the US Congress
 - Projected timing – 4QTR 2008

VII Consortium

- Industry consortium founded to develop pre-competitive safety technologies
- Michigan 501 (c6) non-profit
- Eight (8) light-duty vehicle manufacturers

- **BMW of North America, LLC**
- **DaimlerChrysler Corporation**
- **Ford Motor Company**
- **General Motors Corporation**
- **Honda R&D Americas, Inc.**
- **Nissan North America, Inc.**
- **Toyota Motor Engineering & Manufacturing North America, Inc.**
- **Volkswagen of America, Inc.**

VII Consortium Organization



VIIC Program Work Tasks

- WT1 – Program Management
- WT2 – Systems Engineering
- WT3 – Radio (DSRC)
- WT4 – Deployment Analysis & Policy Support
- WT5 – OBE System
- WT6 – Application Development
- WT7 – Positioning
- WT8 – Security
- WT9 – Testing and Lab Facilities
- WT10 – Field Operational Test
- WT11 – Alternative Studies
- WT12 – Network Services

Targeted Milestone Timing

- **DSRC frequency allocation** 2003
- **USDOT adopted VII as major initiative** 2004
- **VII Consortium founded** 2004
- **USDOT/VIIC Cooperative Agreement** 2005
- **Michigan DOT Local Test Bed** 2006-2007
- **VIIC Proof-of-concept testing** 2006-2008
- **Field Testing** TBD
- **VII Deployment Feasibility Determination** Dec 2008

Key Initial Use Cases

1. Signal Violation Warning
2. In-Vehicle Signage
3. Dynamic Traffic Information
4. Roadway Conditions (weather and potholes)
5. Traffic Management and Control
6. Alternative Route Guidance
7. Payment Transactions (tolls, gasoline, parking)
8. Provisioning and Security management

Probe Data Collection

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VII - Public Policy

Must Address Public Concerns and Policy Issues

- A VII system that is technically and economically sound must also be socially and politically acceptable
 - VII must preserve privacy and civil liberties protections
 - Anonymity preserved for non-optional services
 - Secured from unauthorized access
 - Authorized access subject to legal due process
 - Access rules to protect public interest
 - Liability issues addressed
 - Deployment framework meets public standards for good governance

Conditions for Deployment

- Substantial DSRC coverage of major US roadways
- High network availability and reliability
- Predictable, stable and cost-effective access
- National consistency:
 - Policy/legal governance same nationwide (no variability state-to-state, city-to-city)
 - Uniform deployment of standardized, non-proprietary technology

Governance Framework

- Public

- Example: Federal government agency

- Federal Aviation Administration (FAA)
- Federal Communications Commission (FCC)

- OR -

- Public-Private

- Example: Federal government corporation

- Tennessee Valley Authority (TVA)
- Communications Satellite Corporation (COMSAT)

- End of Presentation -