The background is a collage of transportation-related images. On the left, there's a vertical strip showing a control room with a person at a console, a traffic light, and a highway interchange. The rest of the background is a faded, blue-tinted image of a multi-lane highway with traffic.

Vehicle Infrastructure Integration

SAE Government Industry Meeting

Washington, D.C.

May 10, 2005

Raymond Resendes

**Vehicle Safety Technology Research
National Highway Traffic Safety Administration
U.S. Department of Transportation**





Presentation Outline

- **What is VII?**
- **Why Deploy VII?**
- **Who is Involved?**
- **What's Happening?**

Vehicle Infrastructure Integration

Vehicle
Infrastructure
Integration

Connecting Vehicles and Infrastructure



*Creating an “enabling
communication
infrastructure”*



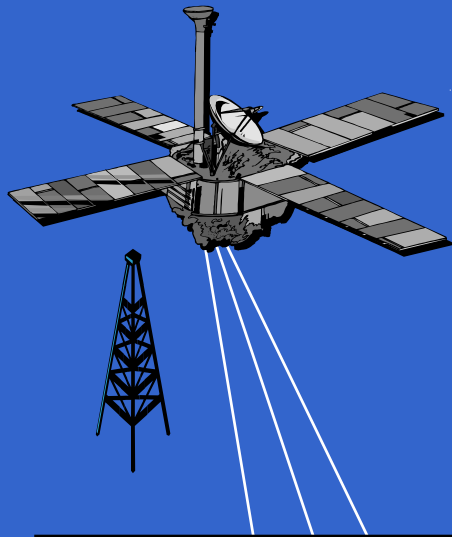


Basic Premise

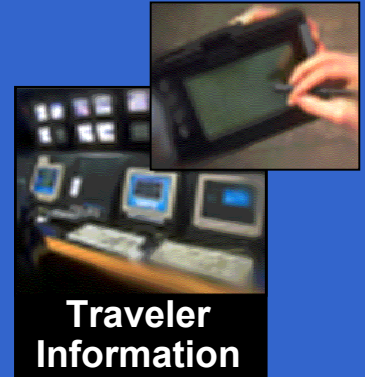
- All new vehicles would be equipped with DSRC at 5.9GHz and GPS.
- A nationwide roadway-based communications network will be created.

VII Can Enable a Wide Range of Safety & Mobility Applications

Vehicle
Infrastructure
Integration



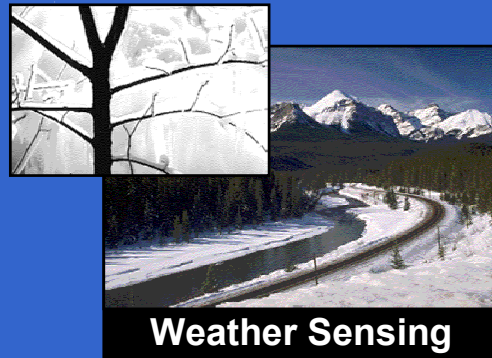
Traffic Management



**Traveler
Information**



**Intersection Collision
Avoidance**



Weather Sensing

...for example



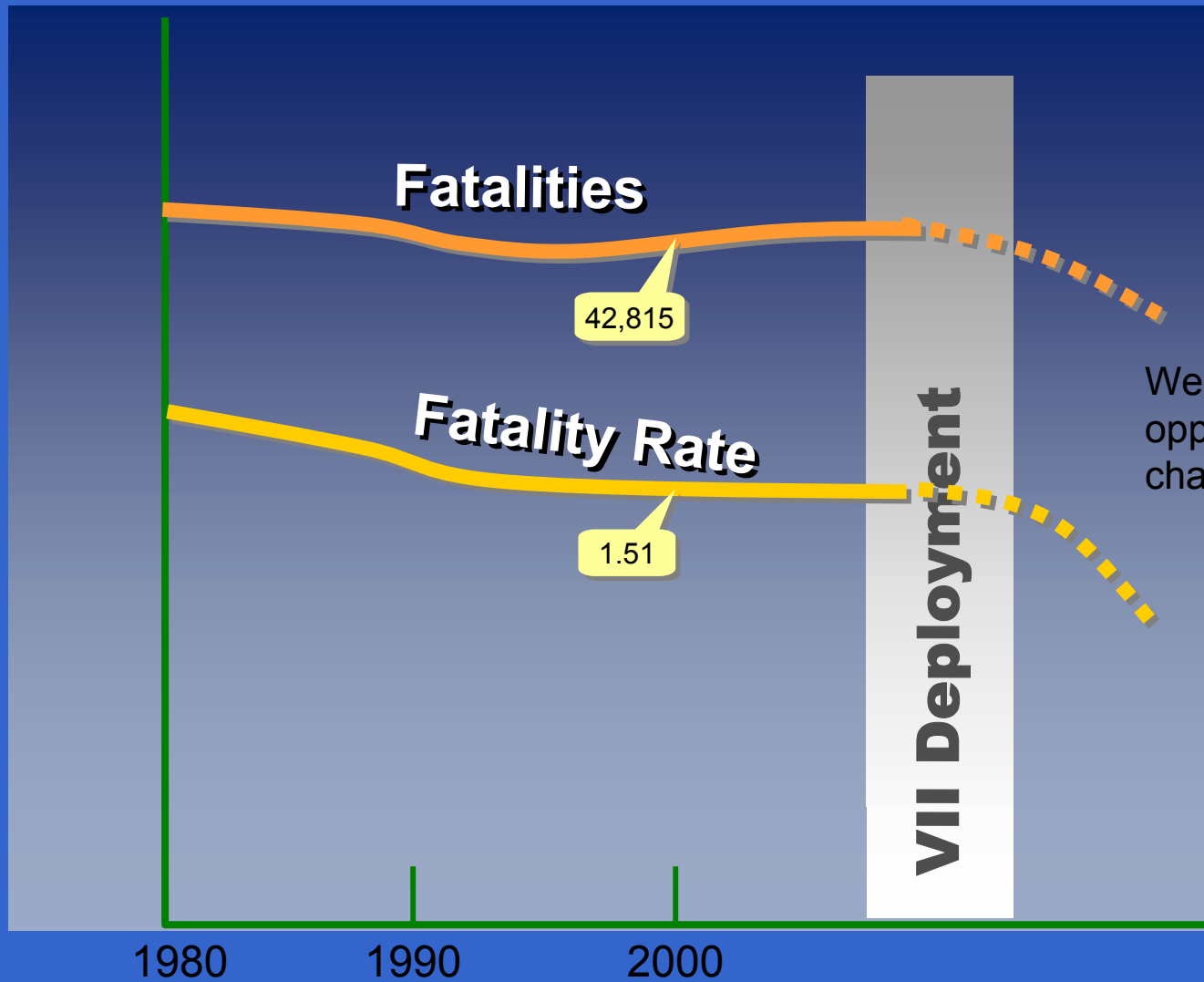
How We Got Here

The Confluence of Three Activities Have Presented an Opportunity

- **Advancements Under the ITS Vehicle Safety Program (Intelligent Vehicle Initiative-IVI).**
- **Growing Emphasis on Roadway System Management and Operations.**
- **Evolution of Communications Technology.**

Driving Forces: Safety

Vehicle
Infrastructure
Integration





Exceeding the Safety Challenge

- While crashworthiness standards have been and will continue to be very important, we are reaching the point of diminishing returns by focusing only on crashworthiness. The biggest return on investment in terms of lives saved and injuries prevented in the future will come from accelerated development and deployment of crash avoidance technologies.

– Jeffrey W. Runge M.D., Administrator NHTSA

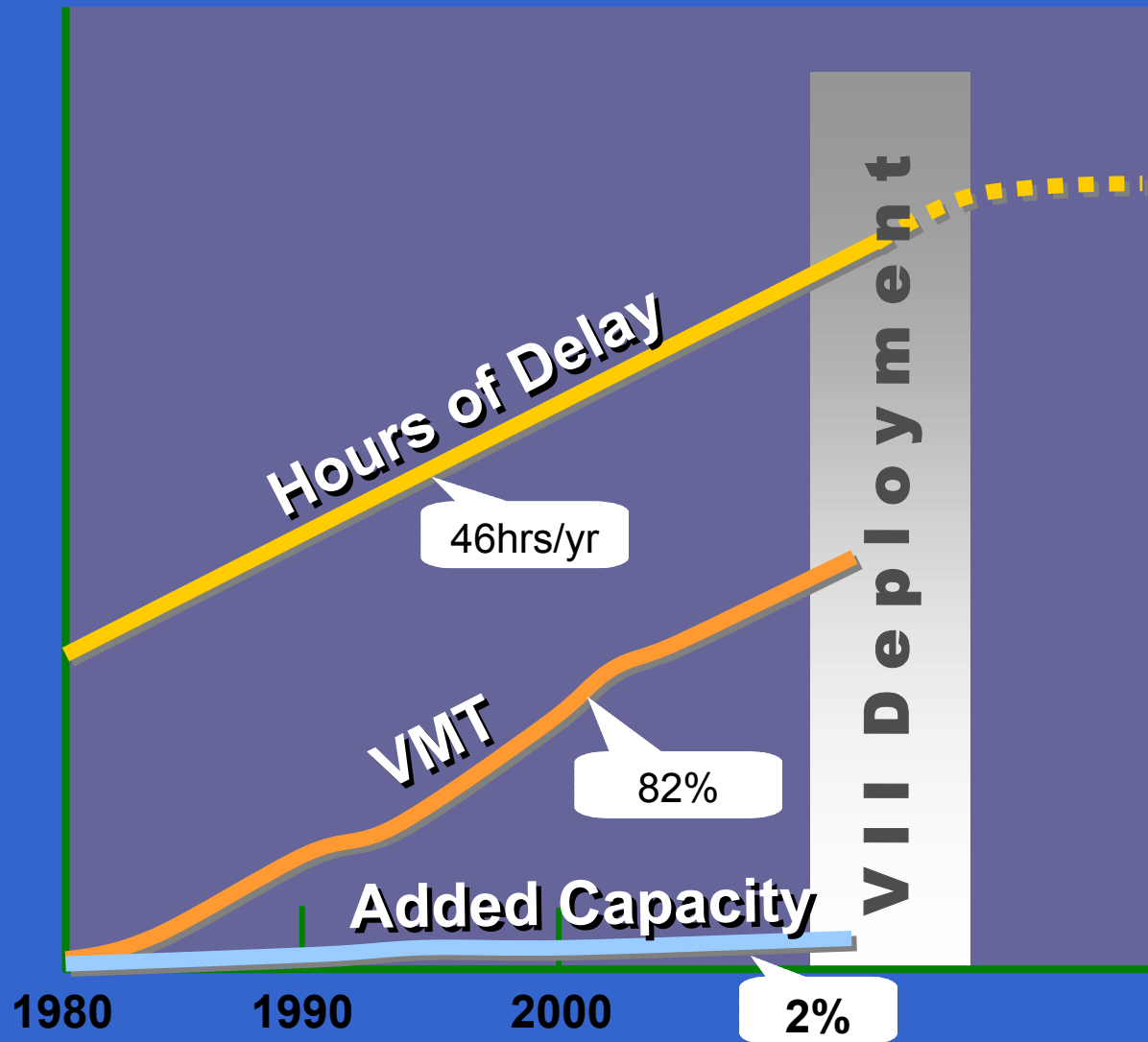


Auto Industry/U.S. DOT Cooperative Research

- **Vehicle / infrastructure cooperation is a critical element for preventing:**
 - *Intersection collisions*
 - *Road departure collisions*

***These two factors
account for 50% of the
crashes and fatalities on our roads***

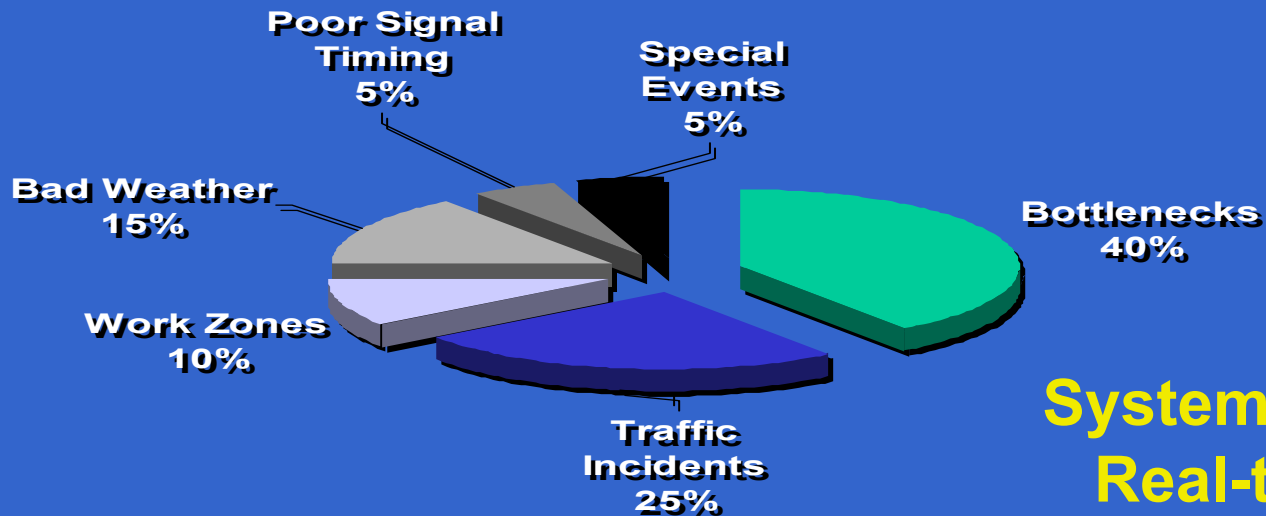
Driving Forces: Mobility



We have the opportunity to create a turning point!

Improving Reliability Through System Management and Operations

Sources of Traffic Congestion



**System-wide
Real-time
Information
is the Key!**



Traffic Management

- **Traffic Management Centers widely deployed in the United States, but surveillance capability is limited.**
- **Ability to improve operations of the highway network could be significantly improved with system-wide availability of real-time information.**
- **Vehicles could provide:**
 - *Average speeds*
 - *Travel times*
 - *Weather conditions*
 - *Incidents*
- **Applications include:**
 - *Traffic signal timing*
 - *Ramp metering*
 - *Emergency response*
 - *Evacuation*
 - *Weather management*
 - *Transit coordination*

Traveler Information

- Current traveler information systems are dependent on limited data.
- Probe vehicles could provide complete network information.
- Tailored information could be provided directly to motorists:
 - *en-route alerts*
(weather, incidents, emergencies)
 - *congestion maps*
 - *dynamic routing*





And Much More . . .

- **Safety**

- Intersection Collision Avoidance
- Roadway Departure Warning
- Emergency Brake Lights
- Cooperative Forward Collision Warning
- Rail Crossing Warning
- Emergency Vehicle Preemption

- **Mobility**

- In Vehicle Signage
- Traffic Signal Control
- Weather alert
- Winter Maintenance
- Traveler Information

- **Consumer & Commercial**

- Electronic Tolls
- Drive thru Payment
- Remote Diagnostics
- Customer Relations Management

VII Coalition

Vehicle
Infrastructure
Integration

- USDOT
 - FHWA
 - FMCSA
 - NHTSA
 - FTA
- AASHTO
 - 10 State DOTs
- Auto Companies
 - BMW
 - Daimler Chrysler
 - Ford
 - GM
 - Nissan
 - Toyota
 - VW





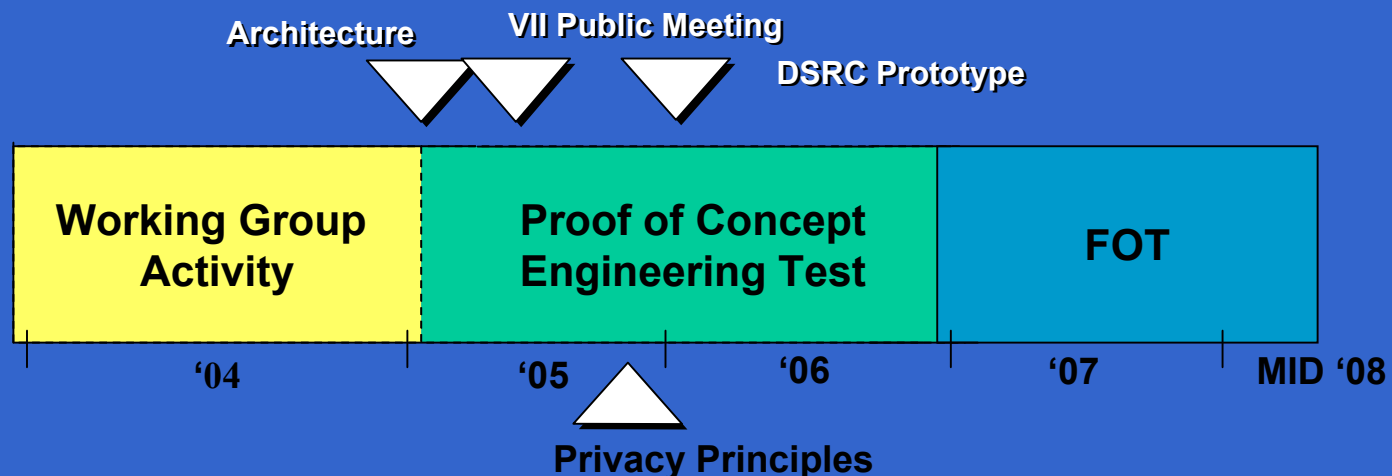
Focus of the Coalition

- **Is the investment necessary to equip new vehicles and the roadway infrastructure with communications warranted?**
- **Can the investment by the public sector and auto industry be coordinated?**

6 Concurrent Program Tracks

- Track 1: Technical Implementation
- Track 2: DSRC Prototype
- Track 3: Business Models
- Track 4: Policy
- Track 5: Outreach
- Track 6: Test Program

Duration of Initiative: FY 04 - FY 08





Technical Summary - Tracks 1 & 2

- **1 Technical**
 - *System Requirements - Complete*
 - *System Architecture - Complete*
 - *Deployment Planning - Initiated*
- **2 DSRC Prototype**
 - *Critical Design Review Complete*
 - *Equipment into test - Fall '05*



Track 3: Business Model

- **Develop the Requirements for the Deployment of VII**
 - *Basic VII Concepts*
 - *Technical Attributes*
 - *Long Term Sustainability Requirements*
- **Identify Business Options Satisfying those Requirements**
- **Tradeoff Various Business Approaches**



Track 4: Institutional Issues

- **Develop approaches to:**
 - *Protect individual privacy*
 - Drafting Privacy Principles
 - *Address liability*
 - *Define data ownership issues*



Track 5: Outreach

- **1st Public VII Meeting**
 - *Feb 9 & 10 in San Francisco*
 - *250+ Attendees – Mostly Private Sector*
- **Begin Scheduling Focused Workshops**
 - *Telecommunications*
 - *Technical Architecture*
 - *Privacy*



Track 6 Testing

- **Test Strategy in Review**
- **Next - Develop Test Objective for each Phase of Testing**



Progress to Date

- **Industry Partnership Created**
- **Technical Feasibility Established**
- **Initial Requirements/Architecture Defined**
- **DSRC 802.11p Standards Nearly Complete**
- **DSRC Industry Consortium Building Prototype**
- **Key Institutional/Deployment Issues Identified**
- **National Public Meeting Held**



Next Steps

- **Address Key Issues**
 - Demonstrate and Document Benefits
 - Business Model
 - Privacy
 - Liability
- **Expand Coalition**
 - IBTTA
 - Local government
 - Other industry partners

Imagine the Possibilities

Connecting Vehicles and Infrastructure



Creating an “enabling communication infrastructure via a Coordinated Investment”



1980

1990

2000