Today's Learning Objectives

- Definition of ITS
- ITS successes
- Critical role of DOT staff in bringing stakeholders together
- ITS components and integrated systems
- Uniqueness of ITS
- Existing forums for regional cooperation
- Participation in planning for funding

What are Intelligent Transportation Systems (ITS)?

- The application of advanced sensor, computer, electronics, and communications technologies and management strategies – in an integrated manner – providing traveler information - to increase the safety and efficiency of the surface transportation system.

ITS is...

- Weather Information Systems
- Commercial Vehicle Electronic Clearance

ITS is...

- Global Positioning Systems

ITS is...

- Real-Time Traveler Information
ITS is...

...Traffic and Transit Management

ITS is...

...Traffic Signal Systems

Our Goals Are Not New

- What we have been doing:
  - Traffic Engineering
  - Transportation Systems Management (TSM)
  - Travel Demand Management (TDM)
  - Commercial Vehicle Operations (CVO)
  - Transit Management

What is New?

- What we are doing now:
  - Improving productivity through advanced technology and management techniques
  - Operating existing programs more efficiently
  - Integrating systems
  - Providing travel information

Timeline of the ITS Program


- Accident Cost Savings (44%)
- Time Savings (41%)
- Emissions/Fuel (6%)
- Operating Cost Savings (5%)
- Agency Cost Savings (4%)
- Other (< 1%)

Source: Apogee Report on Global ITS Benefits
What's it Worth? Identified Benefits

- Time Savings
- Improved Throughput
- Reduced Crashes and Fatalities
- Cost Avoidance
- Increased Customer Satisfaction
- Energy and Environmental Benefits

Major ITS Areas

- Multimodal Travel Management and Traveler Information
- Commercial Vehicle Operations
- Advanced Vehicle Control and Safety Systems

Multimodal Travel Management and Traveler Information

- Multimodal Regional Traveler Information
- Freeway Management
- Traffic Signal Control
- Transit Management
- Electronic Toll Collection
- Electronic Fare Payment
- Incident Management
- Emergency Management
- Highway Rail Intersection Safety

Multimodal Regional Traveler Information

Freeway Management

Transit Management
Traffic Signal Control

Incident Management

Emergency Management

Electronic Fare Payment

Highway Rail
Intersection Safety

Electronic Toll Collection
ITS in Transit
Advanced Public Transportation Systems

- Transit Management Systems
  - Increase customer service
  - Improve schedule reliability and operating efficiency
  - Make transit a more attractive alternative
- Traveler Information Systems
  - Provide real-time, accurate travel information to the public
  - Give people valid choices to make transportation decisions
- Electronic Fare Payment Systems
  - Greatly reduce cash handling costs
  - Enhance security
  - Improve passenger convenience
  - Facilitate intermodal transfer

ITS in Transit
TRANSIT FLEET MANAGEMENT SYSTEMS

- Vehicle Diagnostics
- Automated Vehicle Location and Vehicle Identification
- Automated Fare Collection and Passenger Counting
- Driver Information Display
- Silent Alarm
- Adaptive Signal Timing and Communication Control
- Route Destination Display
- Smart Card Reader
- Automated Vehicle Location and Vehicle Identification

ITS in Transit
TRAVELER INFORMATION SYSTEMS

- Information Kiosks at Transportation Center
- Real-time Transit and Multimodal Information
- Work / Home Interactive Video Display

ITS in Transit
ELECTRONIC FARE PAYMENT SYSTEMS

- Turnpike Authority
- Local Bus
- SMART CARD

Advanced Public Transportation Systems Technologies

- Vehicle Diagnostics
- Silent Alarm
- Real-Time Transit Information
- Dispatch Information Center
- Smart Vehicles
- Bus/Transit Priority

The Key is Integration and Communications

- Emergency Response Management Systems
- Traffic Signal Control Systems
- Electronic Toll Collection Systems
- Freeway Management Systems
- Highway Rail Intersection Safety
- Incident Management Systems
- Electronic Fare Payment Systems
- Traveler Information Systems
- Customers
Rural Issues
Safety, Mobility, Transit

ITS Enhancements:
- Incident management/Mayday system
- Transportation management in congested areas:
  - Tourist sites
  - Seasonal harvesting areas
  - Construction zones, etc.
- Integrated traveler information: tourist/road/weather/traffic conditions

Major ITS Areas

- Multimodal Travel Management and Traveler Information
- Commercial Vehicle Operations
- Advanced Vehicle Control and Safety Systems

Commercial Vehicle Operations

- Achieve safe, simple, and cost-effective commercial vehicle operation through cooperation and advanced technologies
- Meet demands by:
  - Automating operations and technologies
  - Networking systems and information sources
  - Changing traditional public/private sector processes, roles and relationships

Commercial Vehicle Operations

ITS Enhancements:
- Commercial vehicle electronic clearance
- Automated roadside safety inspection
- Onboard safety monitoring
- Commercial vehicle administrative processes
- Hazardous materials incident response
- Freight management
- International border crossing applications
Commercial Vehicle Operations

Benefits
- Electronic Data Interchange (EDI):  
  - Improved safety monitoring  
  - Paperwork reduction  
  - Revenue collection improvement
- Electronic Screening/Weigh in Motion:  
  - Stop only high-risk drivers/carriers/vehicles  
  - Simplify/speed up/reduce roadside inspections
- Electronic one stop shopping  
  - Tax payments, licenses and permits

Commercial Vehicle Operations

Benefits
- Rover Vans  
  - Perform safety inspections anywhere
- In vehicle systems:  
  - Equipment malfunction warning systems
- Other:  
  - Electronic toll collection keeps vehicles moving  
  - Cost-effectiveness

Commercial Vehicle Information Systems and Networks (CVISN)

Major ITS Areas
- Multimodal Travel Management and Traveler Information
- Commercial Vehicle Operations
- Advanced Vehicle Control and Safety Systems

Collision Avoidance Program
- Rear-End Collision Avoidance System
- Intelligent Cruise Control
- Road Departure Collision Avoidance System
- Lane Change/Merge Collision Avoidance System

Automated Highway System
- Demo August 1997  
  - Proof of Concept  
  - Adding transit and CVO components
Discussion Questions

- What is ITS?
- What are the benefits of ITS?
- What is one role for US DOT staff that was mentioned?
The ultimate vision for the future is the transformation of surface transportation into an effectively managed, well-integrated, universally available and affordable system which:

- provides for the safe, secure, efficient, and economical movement of people and goods
- enhances customer satisfaction, and
- is compatible with environmental concerns.

Future transportation system will be managed and operated to provide seamless, end-to-end intermodal passenger travel and intermodal freight movement.

Public policy and private sector decision makers will seize the opportunity to make ITS a vital driver in achieving the transportation vision.

Future systems will be secure, customer-oriented, performance-driven, institutionally innovative and responsive in times of crisis.

Safety:
- to reduce transportation related fatalities 15% by 2011, saving 5,000-7,000 lives per year.

Security:
- system well protected against attack.
- respond effectively, enabling continued movement of people and goods.

Efficiency/Economy:
- to save $20 billion per year by enhancing throughput and capacity.

Mobility/Access:
- universally available information that supports seamless end-to-end travel choices for users.

Energy/Environment:
- to save a minimum of 1 billion gallons of gasoline each year and
- to reduce emissions at least in proportion to this fuel savings.
Two sets of thematic areas have been identified to guide future activity:

**Programmatic** outcome-oriented theme areas that reflect opportunities to apply technology to the problems and priorities of surface transportation.

**Enabling** facilitation-oriented theme areas that set the stage and lay the groundwork for the application of technology to surface transportation.

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**Programmatic Themes**

- Integrated Network of Transportation Information
- Advanced Crash Avoidance Technologies
- Automatic Crash and Incident Detection, Notification and Response
- Advanced Transportation Management
- Homeland Security

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**Enabling Themes**

- A Culture of Transportation Systems Management and Operations
- Public Sector Roles, Relationships and Funding
- Federal Policies and Initiatives to Achieve Extensive Private Sector Product Development
- Human Factors

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**Theme Structure**

Each of the theme areas includes:

- a statement of the current status and opportunities
- benefits to be achieved by the fulfillment of theme area
- opportunities challenges to be overcome to realize these opportunities
- research, program, and institution-changing actions

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**Integrated Network of Transportation Information**

Information:
- Travel Conditions
- Incidents
- Weather
- Congestion
- Operator

- Seamless Travel for People
- Seamless Travel for Freight Movement
- Response to Emergencies and Crises

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**Advanced Crash Avoidance Technologies**

- In-Vehicle and Infrastructure Cooperative Systems
- Driver Qualifications
- Automated Enforcement
Automatic Crash and Incident Detection, Notification and Response
- Automatic Crash Notification
- Advanced Incident Management
- Telemedicine
- Mitigation of Traffic Disruption

Advanced Transportation Management
- System management
  - Real-Time Operational Response
  - Regional Coordination
  - Multimodal Integration
- Automation Systems
  - Automation
  - Cooperative Vehicle-Highway

Homeland Security
- Preparedness
- Prevention
- Protection
- Response
- Recovery

A Culture of Transportation Systems Management and Operations
- Customer-Based and Performance-Focused
- Multidisciplinary
- Cross-Modal and Cross-Jurisdictional Cooperation
- Data Security
- Responsive to Incidents and Crises

Public Sector Roles, Relationships and Funding
- Among Current Infrastructure Owners
- Between All Levels of Governmental
- Between Transportation and Non-Transportation Agencies
- Innovative funding
- Deploy ITS Systems on all Publicly-owned Fleets

Federal Policies and Initiatives to Achieve Extensive Private Sector Product Development
- Private Sector
  - Innovators
  - Partners
  - Providers
- Government
  - Encourage customer acceptance and use
  - Remove barriers to Deployment
  - Provide User & Consumer Funding Incentives
  - Study off-shore business models
Human Factors

- Understanding of Basic Driver Behavior
- Abilities of Commercial, Public Transit and Public Safety Operators
- Human-Machine Interface
- Examination of Professional Driver Issues
- Opportunities for Addressing Special Needs
- Workload Issues and Resolution

Stakeholder Roles

Public Sector’s responsibilities
- manage public infrastructure,
- ensure transportation system serves widest possible constituency effectively, securely and safely,
- minimize impact on environment,
- foster a robust and productive private industry.

Private Sector’s responsibility:
- innovators in providing goods and services to business, government, and consumers

University’s responsibility
- carrying out a significant portion of ITS research
- developing a new curriculum which focuses on operations management, systems, software, communications, and new relationships