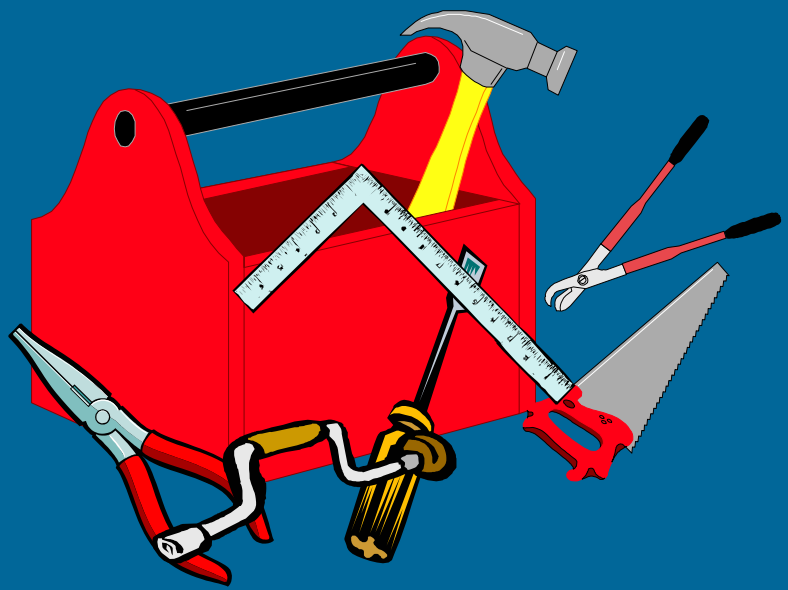
Rural Intelligent Transportation Systems Toolbox



A National Highway Institute Training Program

Course Goals

- Introduce the Rural ITS (Intelligent Transportation Systems) Toolbox
- Increase familiarity with ITS strategic planning

By the end of the day you will be able to:

- Identify rural transportation needs and challenges
- Define transportation technology
- State the value of Rural ITS Toolbox
- Describe key factors in ITS strategic planning
- Explain the benefits of rural transportation technology
- Relate lessons learned in rural transportation technology
- Identify additional information resources

Course Agenda/ Sessions

1. Introduction (30 min)
2. Rural Challenges and Transportation Technology (60 min)
3. Planning for Success (60 min)
4. Rural ITS Tools (150 min)
5. Information Resources & Course Summary (60 min)

Learning Exercise Methodology

General Challenges

Prioritized List

Stakeholder Groups

Rural ITS Development Tracks, Tools, and Implementation Considerations & Solutions

NHI Course Evaluation

- Course Content
- Instructional Material and Facilities
- Course Instructor(s)
- General Observations

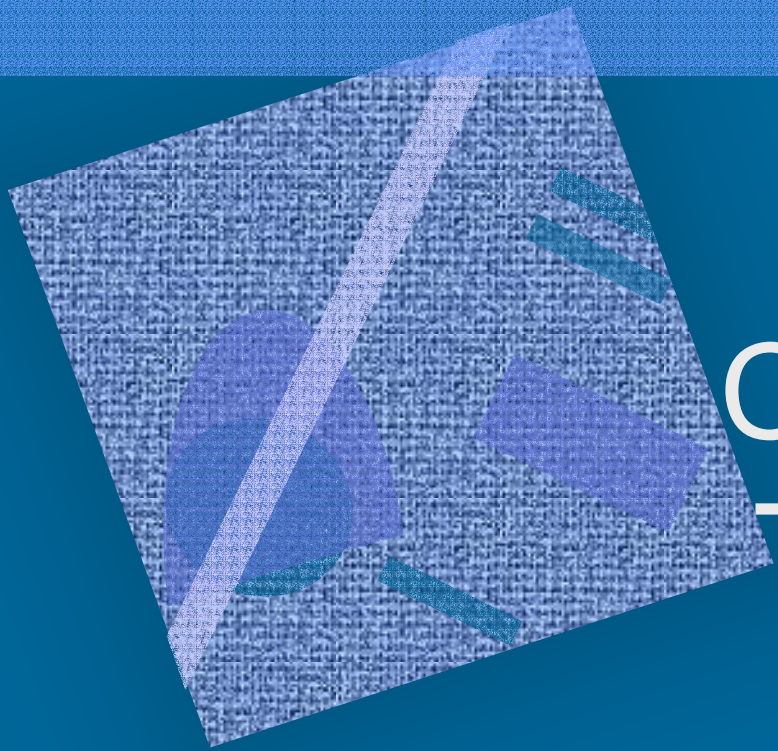
Training Site Logistics

- Location of facilities/smoking area
- Snacks/soda machines
- Turn off pagers and cell phones
- Message board

Self-Introductions

- Name
- Agency
- What are your training objectives?

Session 2



Rural Challenges and Transportation Technology

Learning Objectives

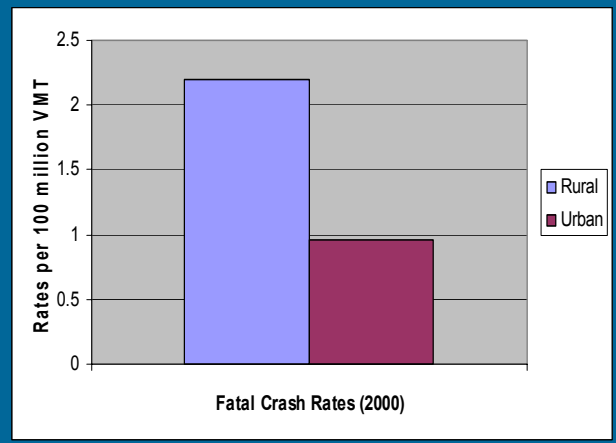
- Recognize transportation needs, challenges, and opportunities in rural environments
- Identify the seven rural ITS development tracks

Exercise # 1

What are your rural transportation needs and challenges?

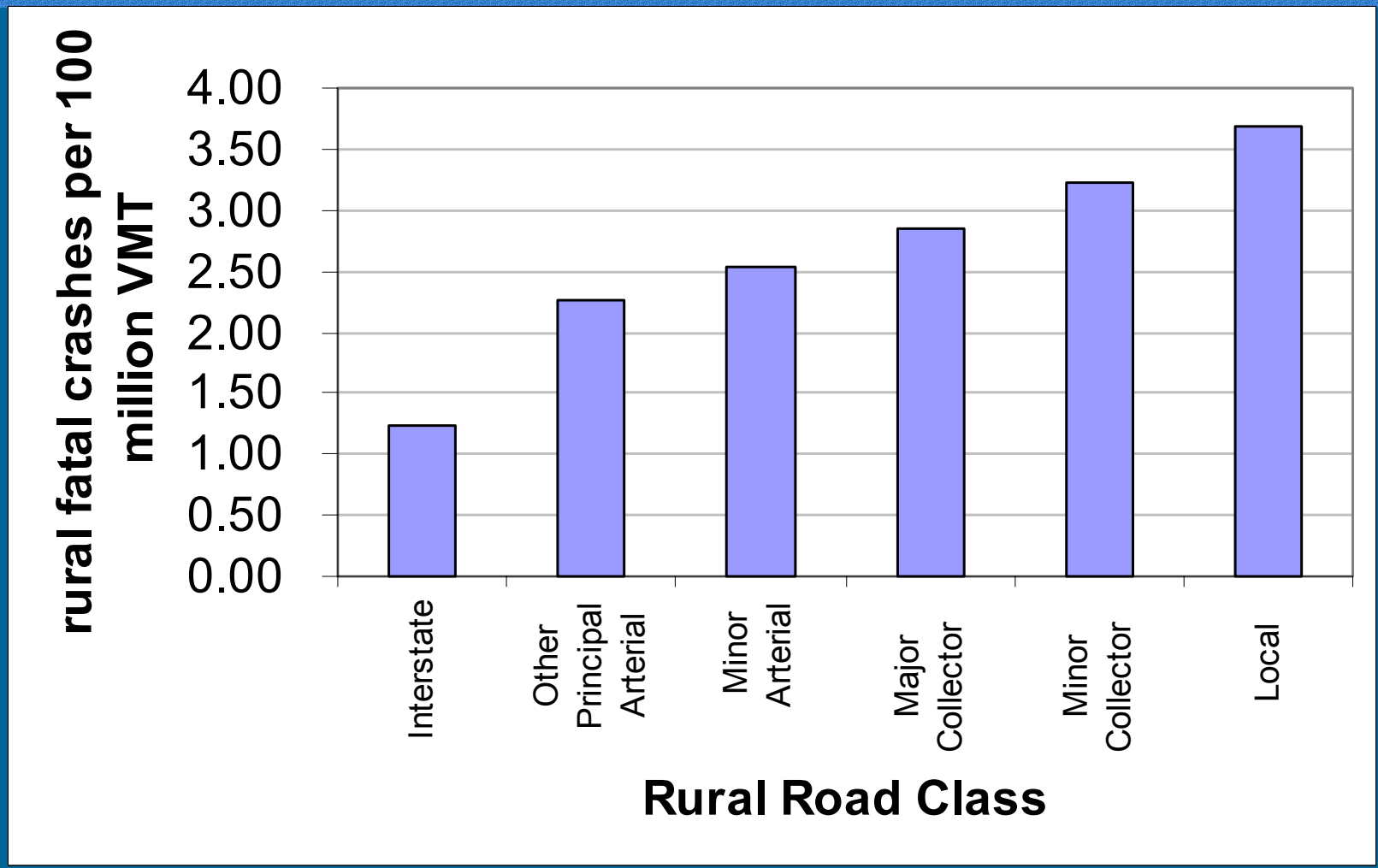
Rural Transportation in Context

- _____% of total roadway miles are rural (3,084,000 miles)
- _____% of vehicle miles traveled is in rural areas
- _____% of crash fatalities occur on rural highways (23,876 fatalities in 2000)



Source: FHWA Highway Statistics 2000, Table HM-10, VM-2

Fatal Crash Rates by Rural Road Class



Understanding Rural Transportation

- Challenging topography, weather events, and road conditions
- Limited alternative routes
- High percentage of recreational travelers and commercial vehicle operators

A Concentration of Recreational Traffic

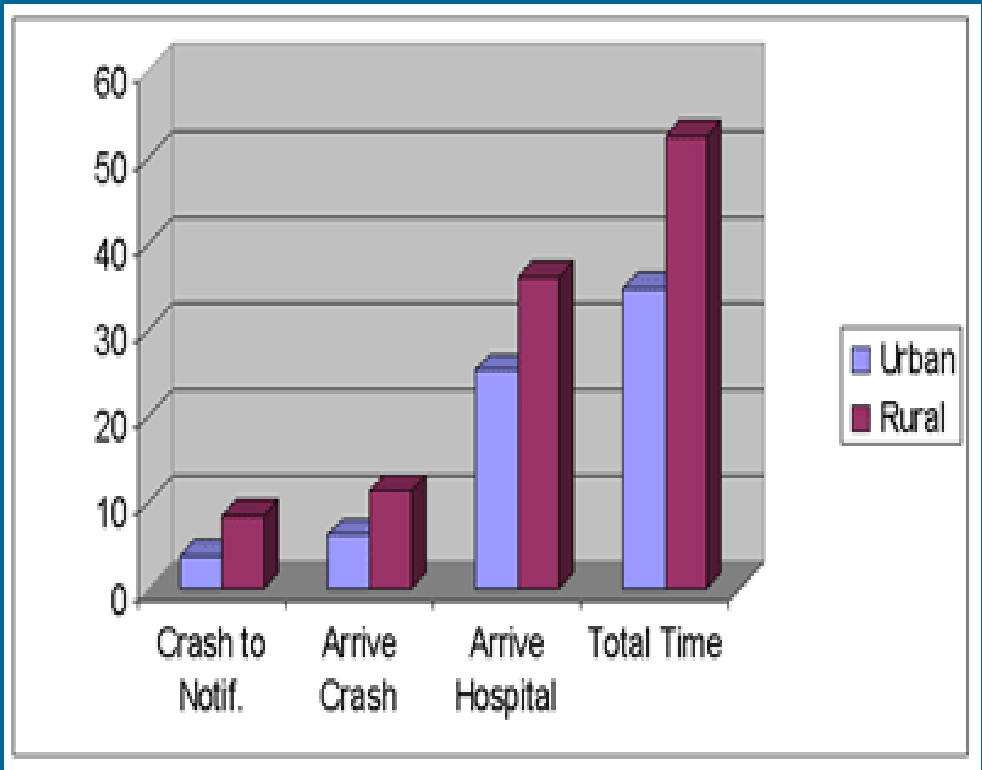
- Seasonal demand
- Route congestion
- High-frequency crash locations
- High parking demand and turn-over
- Limited transit options
- Limited infrastructure and funding

Transit and Mobility

- Rural residents need to get to jobs, shops and medical facilities
- 45% of rural elderly and 57% of rural poor without a vehicle
- 38% have no access to public transportation; a further 28% have little access

Source: TCRP A - 21, 1999

Emergency Response

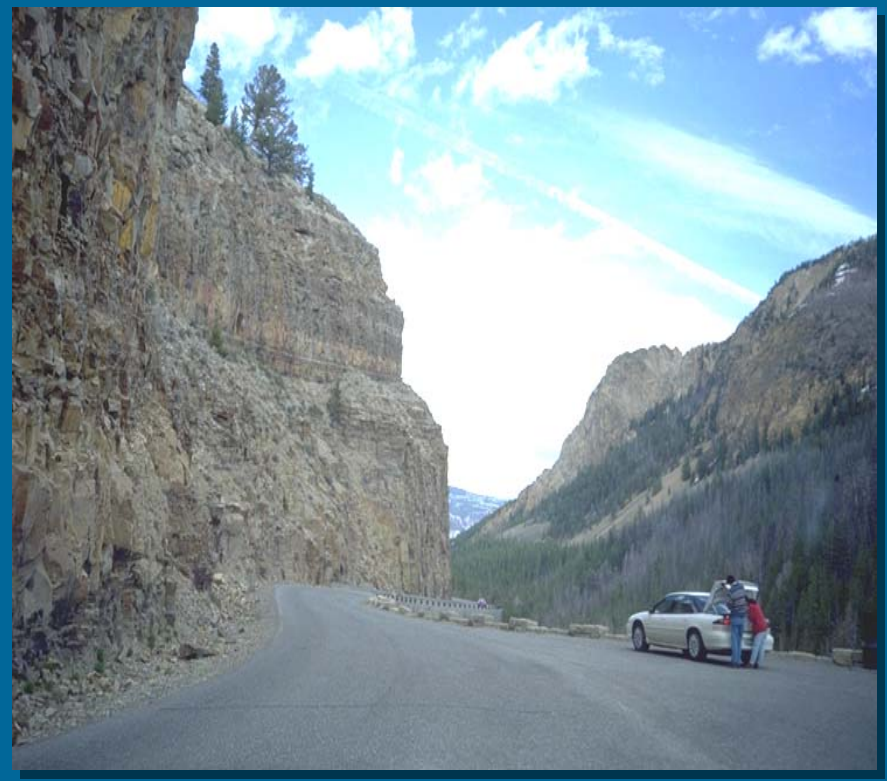


- Emergency response is a series of phases
- Rural response is 30% longer
- Volunteer efforts can add to response times

Source: http://www.arl.psu.edu

Availability of Power and Communications

- Limited cellular communication coverage
- Limited power availability
- Limited wireless E-911 service



Weather and the Environment

- Impacts include:

  _____, _____, _____,

  _____, _____, _____
- _____ total fatalities, (881 in snow/sleet)
- _____ total injuries, (63,000 in snow/sleet)
- $2 billion spent on snow and ice control each year

Source: USDOT, National Highway Safety Administration, Traffic Safety Facts 2000

Maintenance and Operations

- Primarily a city and county responsibility
- Local agencies maintain 95% of rural unpaved roadways (3.1M miles) and 55% of rural paved roadways (926,000 miles)
- Limited budgets & resources
- Work zone safety

Source:FHWA Highway Statistics 2000, Table HM-15

Animal Conflicts

- Around 726,000 animal/vehicle crashes each year
- Property damage costs of around $1 billion per year

Source:
Conover, M.R. Wildlife Society Bulletin, 1997

Let's Review the Challenges!

- Recreational traffic
- Rural transit
- Emergency response
- Communications & power infrastructure
- Weather and environment
- Maintenance responsibilities
- Animal – vehicle conflicts

Intelligent Transportation Systems

ITS can be one solution to the variety of rural transportation problems we have discussed

How is Transportation Technology Being Used?

- Extensive use in the nation's principal urban areas.
- Promising in rural areas to improve safety, security, mobility, and economic viability

Rural Transportation Technology Application Example

Rural Transportation Technology Application Example

Using Transportation Technology in Rural Areas

- Transportation technology is not the solution for every challenge we have discussed, but it has shown particular promise in solving some of the problems

The Rural ITS Toolbox

- Rural ITS user needs were developed on a national basis
- Seven Development Tracks have been created to address user needs
- The Rural ITS Toolbox is structured around these development tracks

The Development Tracks

- Emergency Services
- Travel and Tourism Information
- Traffic Management
- Rural Transit and Mobility
- Crash Prevention and Security
- Operations and Maintenance
- Surface Transportation and Weather

Matching Development Tracks with Challenges

Emergency Services	30% longer response
Travel and Tourism	Seasonal congestion
Traffic Management	Work zone safety
Rural Transit and Mobility	38% without service
Crash Prevention & Security	60% of fatalities
Operations and Maintenance	Local agency responsibility
Surface Transportation and Weather	Changing conditions

Learning Objectives

- Recognize transportation needs, challenges, and opportunities in rural environments
- Identify the seven rural ITS development tracks

Session 3

Planning for Success

Learning Objectives

- Describe the strategic planning process
- Identify key institutional stakeholders
- Describe options to maintain stakeholder involvement
- Identify alternatives for assessing needs
- Identify major activities within each process step

Describe Strategic Planning Process

The strategic planning process is a method by which all the stakeholders, user needs, and technology assets are integrated to realize an overall deployment goal.

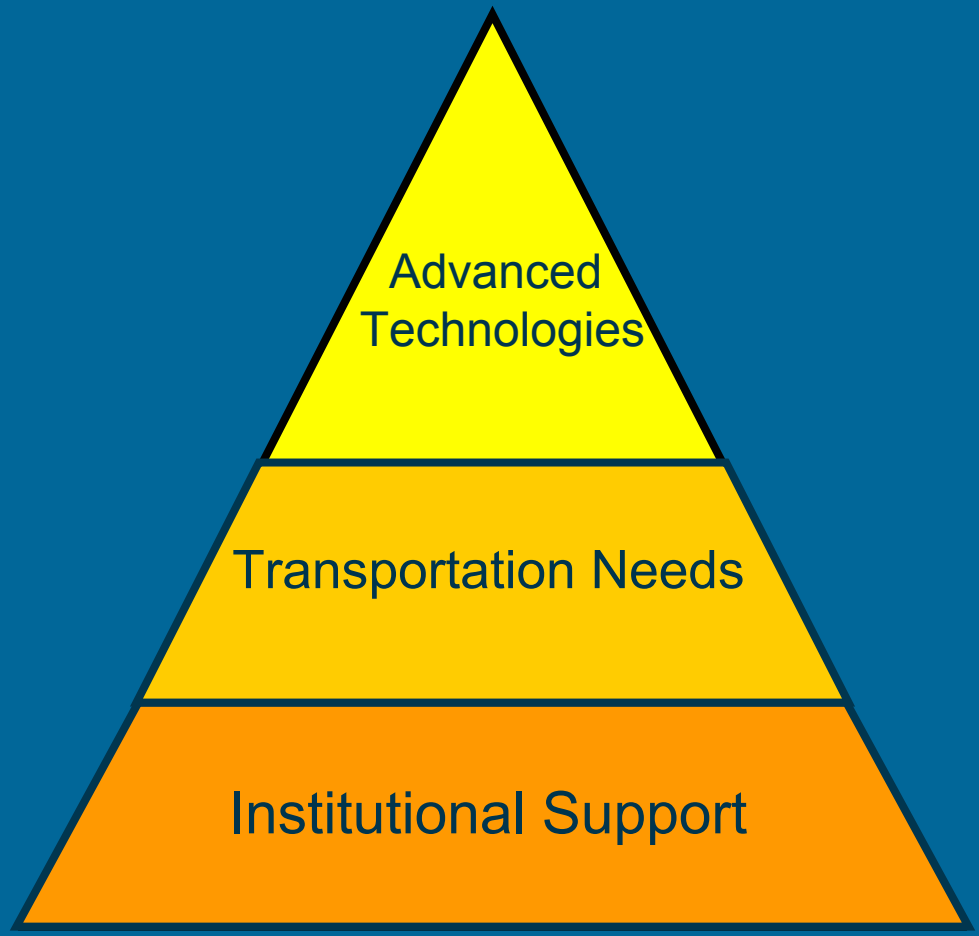
Key Strategic Planning Process Steps

1. Gather and Expand Stakeholders
2. Assess Transportation Needs
3. Inventory Related Improvements
4. Define Regional ITS Architecture
5. Develop Strategic Deployment Plan

Step 1: Gather & Expand Regional Partners

- Strategic planning requires input and broad involvement by different groups
- Stakeholders need to be actively involved in the process through a structured process
- Process
  - Identify champion (lead organization)
  - Form Steering Committee and develop business, management and outreach plan
  - Document input and keep stakeholders involved and informed

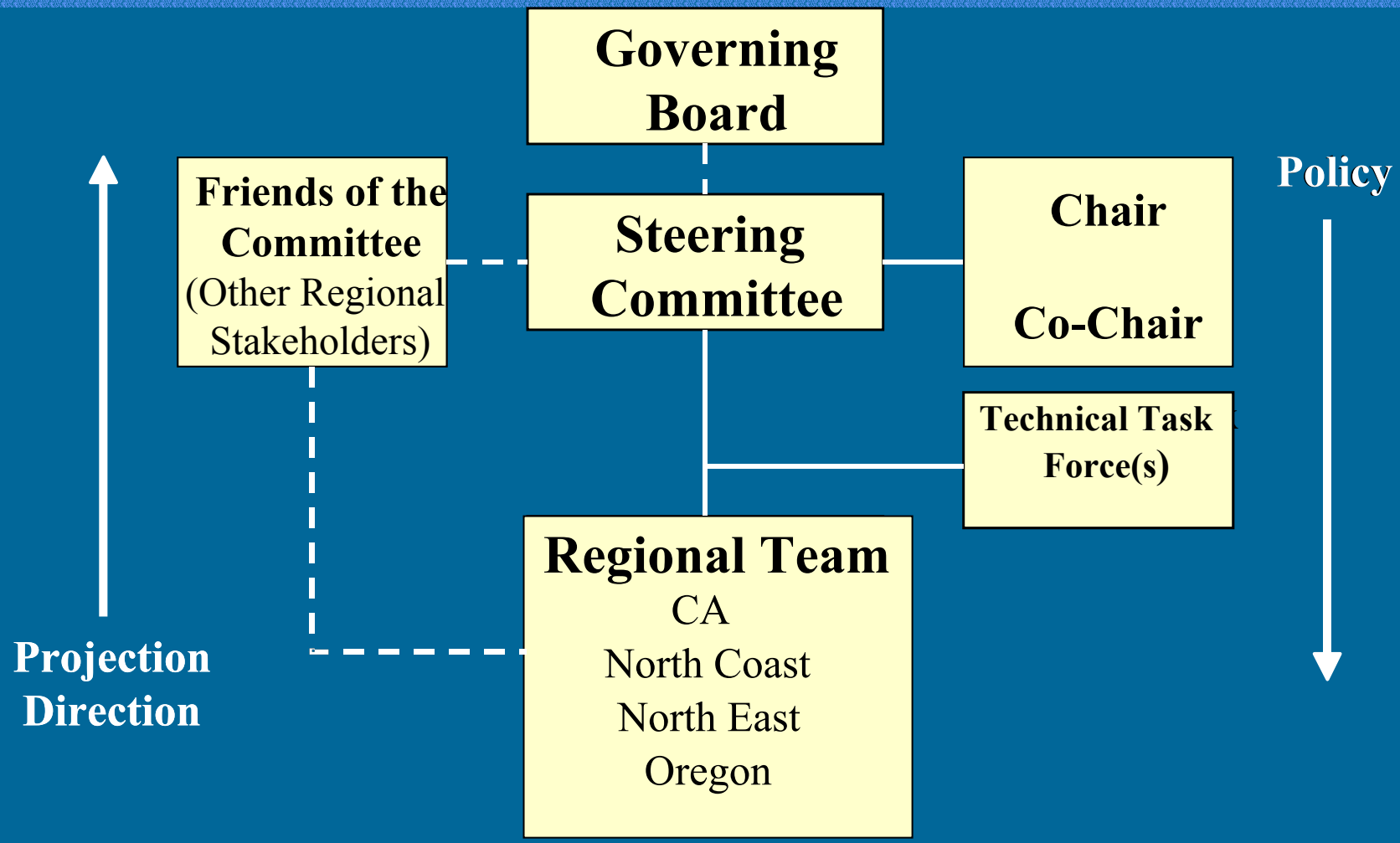
Institutional Foundation



Potential Partners

- **Local**
  - Gateway Community
  - Chambers of Commerce
  - Transit Operators/ Fleet Operators (trucking, delivery service)
  - Emergency Management/ Response Providers
  - Native American Organizations
- **Private**
  - Telecommunication companies
  - Concessionaire's
- **State**
  - Department of Tourism
  - Department of Commerce or Economic Development
  - Police/ Highway Patrol
  - Department of Transportation;
- **Federal/U.S.**
  - Department of Transportation (FHWA, FTA)
  - Forest Service
  - National Weather Service
  - National Park Service

Management Relationships



Outreach Workshops

- Workshops used to identify transportation challenges and technology opportunities
- Benefits
  - Introduce project
  - Solicit viewpoints and awareness
  - Maintain interest and achieve long-term consensus
  - Develop public and private partners

Lessons Learned

- Institutional buy-in key to success!
- Early winner is essential
- Need continuous stakeholder engagement and re-education
- Diverse stakeholders who may have limited multi-agency experience
- Limited funding with extreme competition
- Most familiar with traditional or low-tech approaches
- Transportation not the “hook”

Step 2: Assess Transportation Needs

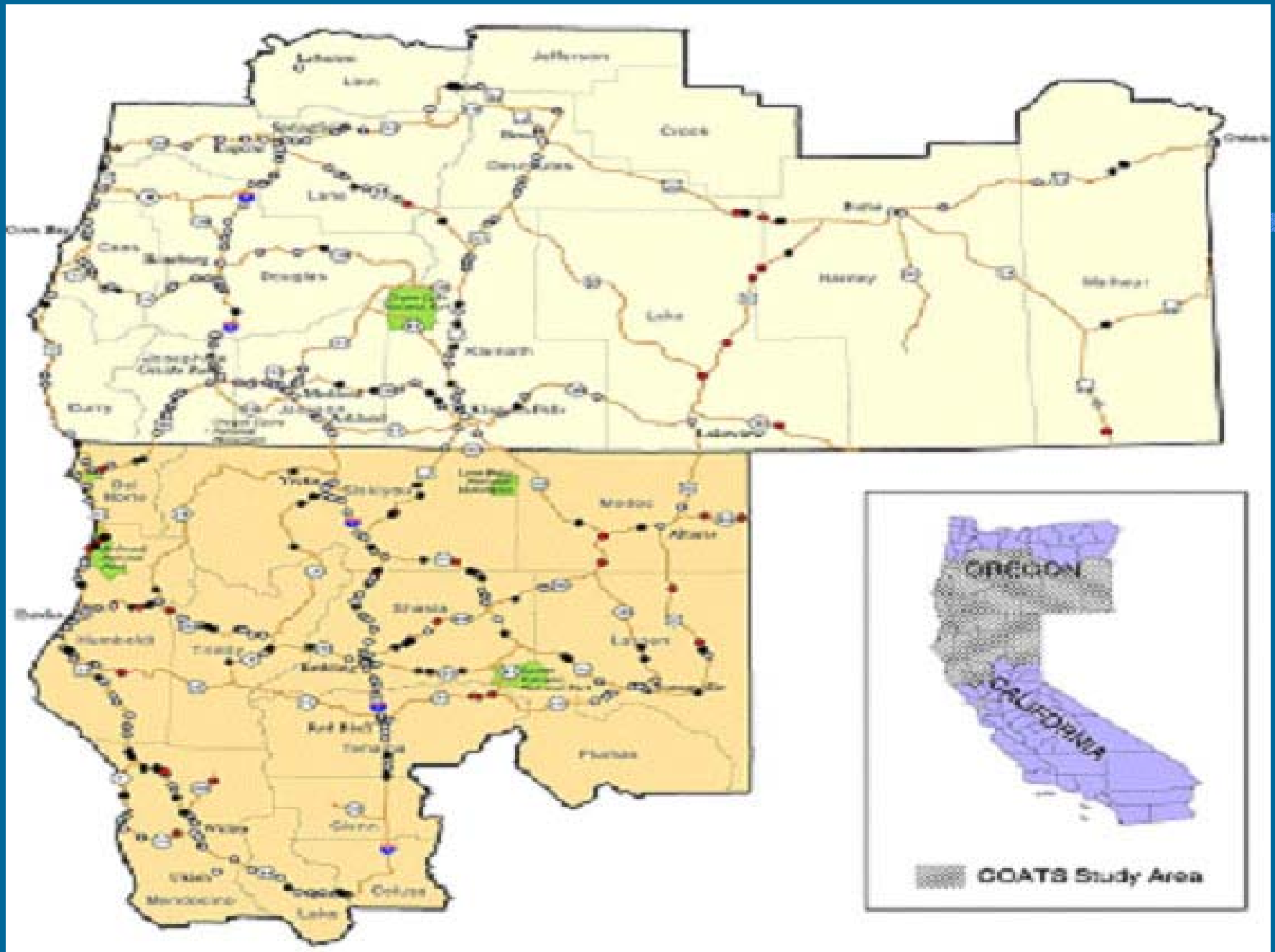
- Problem definition
- Problem prioritization
- Geographic area of focus

Problem Definition & Prioritization

- Methods:
  - Interviews (stakeholders)
    - Effective for buy-in and data collection
  - Surveys (stakeholders, travelers)
    - Intercept, mail-in
    - Quantitative data, cost effective and objective
  - Workshops
    - Addresses perceived needs and consensus
  - Quantitative data collection and analysis

Screening Criteria

Goal	Performance Measure	Criteria
Safety	Road Closure	Type and Duration and Frequency
Safety	Emergency Response Time	Fatal crashes over 40 minutes
Mobility	Transit Dependent	Population (age, physical, income) over 40%
Economic Viability	Recreation Traffic/Expenditures	Annual visitors over 200K

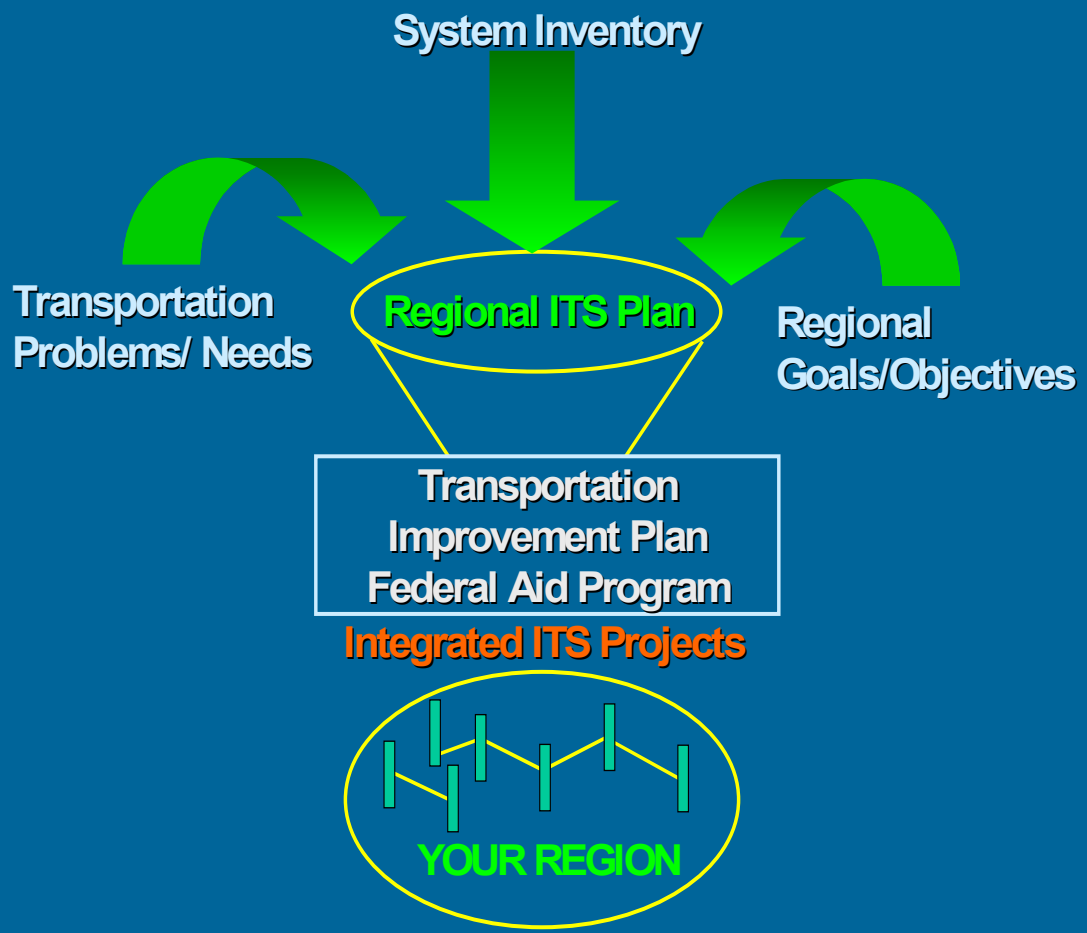

OREGON
CALIFORNIA
COATS Study Area

Lessons Learned

- Quantitative data is beneficial but costly.
- Qualitative data can be perception based.
- Screening criteria should be used to determine priorities
- Graphical representations help achieve consensus

Step 3: Inventory Technology Related Improvements

- Identify the stakeholders' systems
- Understand current connectivity and planned upgrades



Step 4: Define Regional ITS Architecture

"A regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects in a particular region."

- Identify integration opportunities
- Ensure efficient implementations
- Federally required for funding

Step 5: Develop Strategic Deployment Plan

- Describes what, where, when, how, and why
- Regional framework and roadmap for identifying challenges and deploying technologies
- Provides information that stakeholders need
- A marketing and education tool (future)

Overall Lessons Learned

- Planning and coordination is time intensive
- Involve multiple stakeholders – go beyond DOT
- Recognize institutional issues early
- Develop effective management structure
- Adopt regional philosophy through coordination/ integration

Learning Exercise

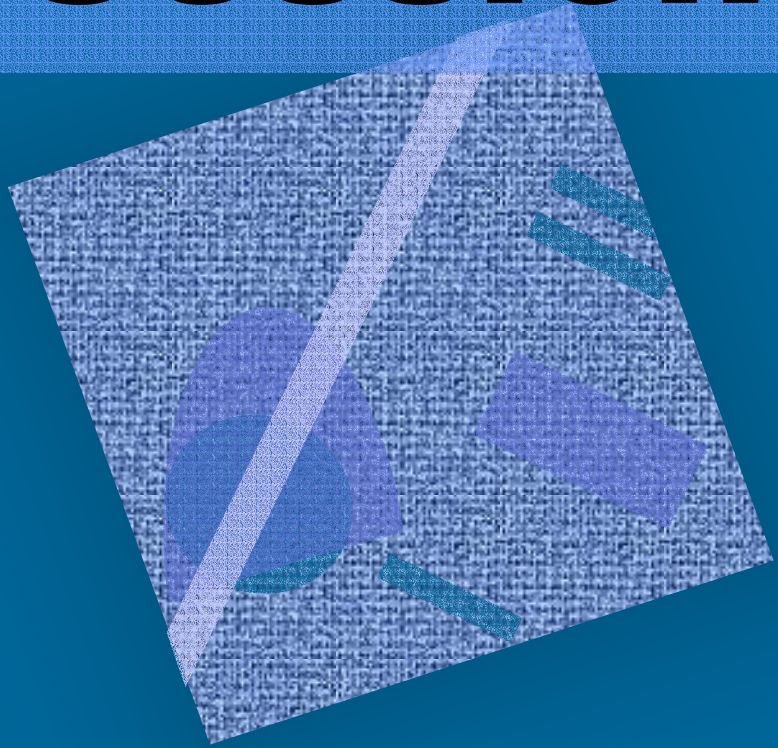
- Prioritize Session 2 challenges (max. 4)
- Identify key stakeholders
- Identify methods to maintain stakeholder involvement

  – Time: 20 minutes

Session 3
Learning Objectives

- Describe strategic planning process
- Identify key institutional stakeholders
- Describe options to maintain stakeholder involvement
- Identify alternatives for assessing needs
- Identify major activities within each process step

Session 4



Rural ITS Tools

Learning Objectives

- Demonstrate familiarity with the mapping of needs to the seven rural ITS development tracks
- Use the Toolbox to:
  - Identify technologies that are being used to address user needs
  - Recognize key stakeholders
  - Describe lessons learned by others
  - Describe typical qualitative benefits

Rural ITS Toolbox Purpose

- Serve as a resource document on successful rural ITS projects
- Share the developing body of information
- Avoid redundant efforts in developing your own solutions

Rural ITS Toolbox Organization

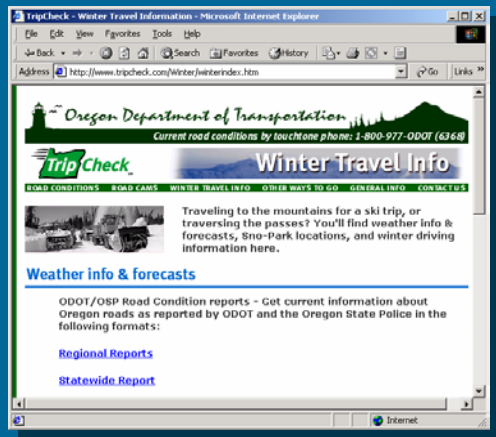
- By the 7 development tracks – main body of report
- By user need – appendix
- By geographic location - appendix

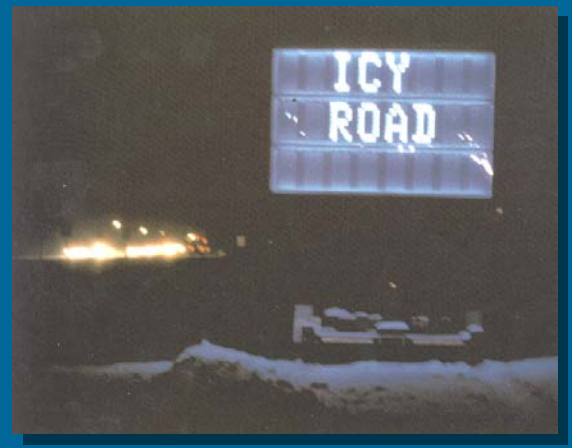
Rural Development Tracks

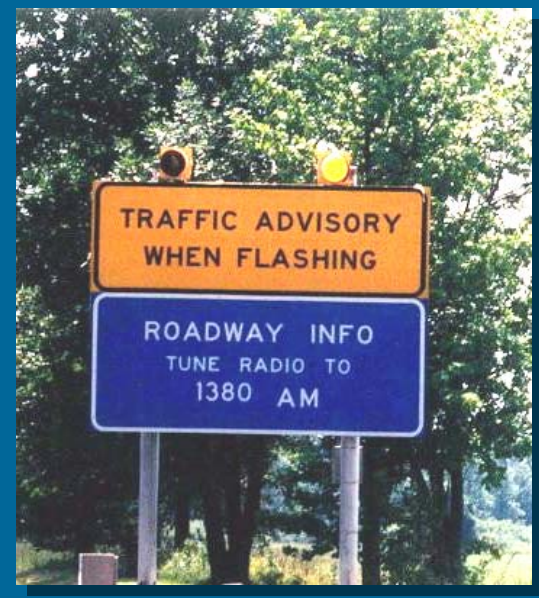
- Emergency Services
- Travel and Tourism Information
- Traffic Management
- Rural Transit and Mobility
- Crash Prevention and Security
- Operations and Maintenance
- Surface Transportation and Weather

Emergency Services Track

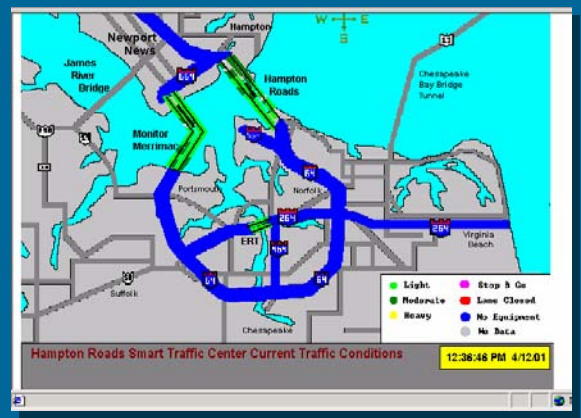
Tourism and Travel Information Track



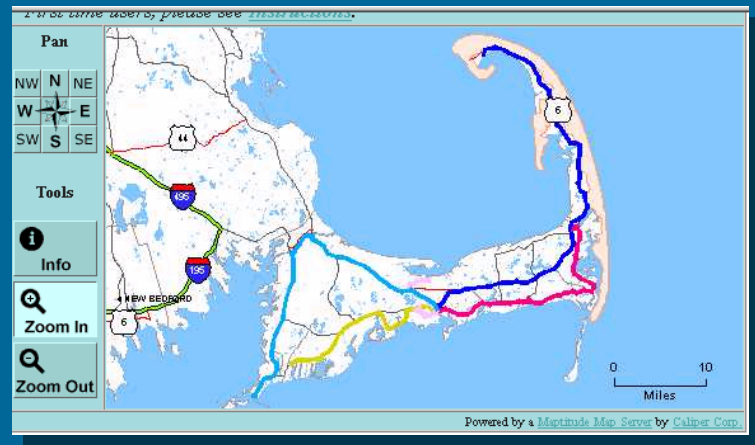




Traffic Management Track

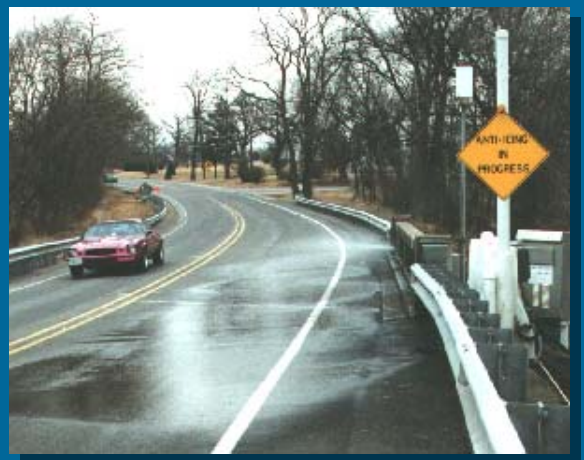


Rural Transit and Mobility Track

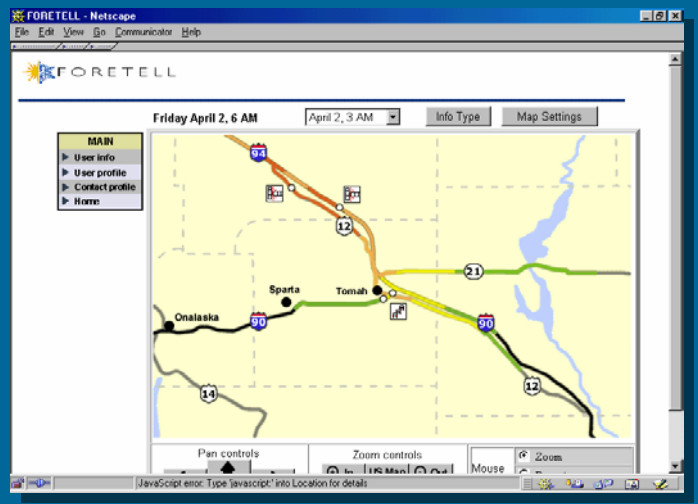


Crash Prevention and Security Track

Operation and Maintenance Track



Surface Transportation and Weather Track



Using the Rural ITS Toolbox

- For each Tool:
  - User needs addressed
  - Description
  - Real-world examples
  - Lessons learned
  - Benefits
  - Opportunities
  - Implementation
  - Institutional issues
  - References

Real-World Examples in the Toolbox

- For each example:
  - Goals
  - Approach
  - Location
  - Current status
  - Future activities
  - Cost information
  - Participants
  - Impacts
  - Key contacts

Speed Warning Systems – Page 76

- Needs – slow traffic near intersections, work zones; slow commercial vehicles on mountain passes and tight curves
- Description – Advise safe speed based on geometry, weather, current speed. Include weight and classification for trucks

Speed Warning Systems continued

- Benefits:
  - Fewer fatalities and injuries
  - Reduced property damage costs
  - Reduced incident management costs
- Lessons learned – favorable public perception
- Opportunities – Use signs for other warnings or advisories

Speed Warning Systems continued

- Institutional issues – Police involvement for speed enforcement
- Implementation issues – Calibration is critical; inaccurate speed readings lose credibility with public

Colorado Truck Speed Warning System

- Goals – Improve truck safety on steep grades
- Approach – Radar speed detection; dynamic message sign with “YOU ARE SPEEDING AT XX MPH. 45 MPH CURVE AHEAD”
- Location – I-70 at Glenwood Canyon
- Status – Operational since Sept 1996

Colorado Truck Speed Warning System

- Future – Leave permanently installed
- Impacts:
  - Before: 85th percentile speed = 66 mph
  - After: 85th percentile speed = 48 mph
- Cost – Initial deployment $25 - 30,000
- Participants – Colorado DOT
- Contact – Jim Nall, 970-248-7213

Weather Data Gathering/ Processing – Page 121

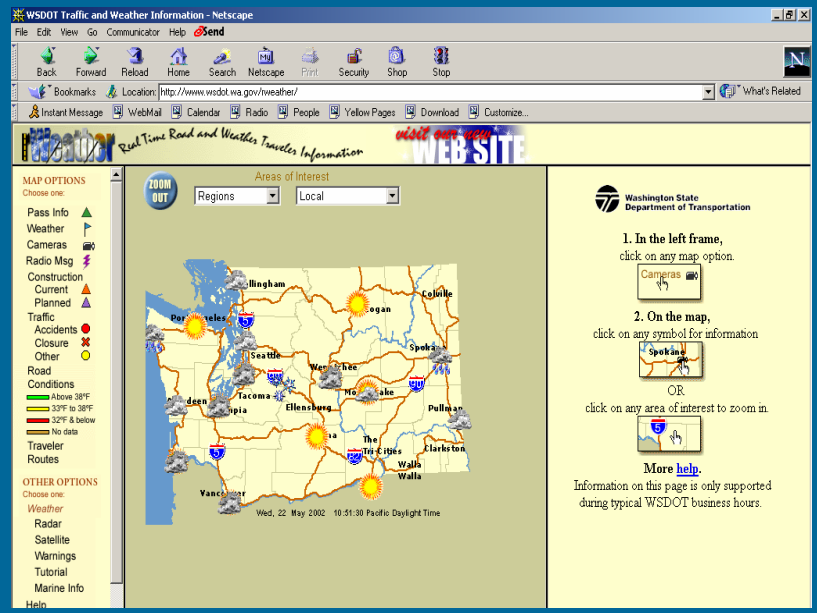
- Needs – provide weather/road condition info to travelers & maintenance operators
- Description – Gather weather data from multiple sources; use models for more accurate forecasts and to determine best maintenance response

Weather Data Gathering/ Processing continued

- Benefits:
  - Lower infrastructure costs by sharing data
  - Cost savings to agencies
  - Better informed travelers
- Lessons learned – combining devices achieves statewide coverage quickly
- Opportunities – Collaboration with private sector weather sites

Weather Data Gathering/ Processing continued

- Institutional issues – data ownership
- Implementation issues – Ensure consistent data quality through use of standards



Washington State rWeather Program

- Goals – Collect real-time/predictive statewide weather info
- Approach – Create dense monitoring network using DOT, airport, agricultural & environmental stations; use weather & road condition prediction models
- Location – 400 sites statewide
- Status – Project in development

Washington State rWeather Program

- Future – Continued testing
- Impacts – TBD
- Cost – $1.25M USDOT + $312k WSDOT
- Participants – WSDOT; Univ. of Washington; NW Regional Weather Consortium
- Contact – Bill Brown, 206-616-6183

Traveler Information by Phone – Page 17

- Needs – Provide drivers weather & road condition information to make better travel decisions
- Description – Use the easy-to-remember national travel information number, 511, to provide pre-trip and en-route information

Traveler Information by Phone continued

- Benefits:
  - Improved info for operations
  - Centralized repository for info
  - Better informed travelers
- Lessons learned – system may be overloaded during peaks (e.g., severe weather event)
- Opportunities – Consider private sector sponsorship of the traveler info service

Traveler Information by Phone continued

- Institutional issues – participation of telecom carriers is very beneficial
- Implementation issues – Customer feedback is necessary to shape service

Travel Shenandoah 511 System on I-81 in Virginia

- Goals – Provide real-time weather, traffic and construction info for the I-81 corridor
- Approach – Implement a voice interactive 511 system in cooperation with landline & wireless telecom carriers
- Location – 325 miles of I-81 from WV to TN
- Status – Operational since Feb 2002

Travel Shenandoah 511 System on I-81 in Virginia

- Future – Continued operation and statewide expansion
- Impacts – Averages 7,000 calls per month
- Cost – $535,000 annually
- Participants – Virginia DOT; Shentel; Virginia Tech
- Contact – Todd Kell, 804-786-2451

Learning Exercise Part 1

- For 2 top priority challenges:
  - Identify applicable development tracks
  - Identify 1 or 2 applicable rural ITS tools
  - For each tool identify:
    - stakeholders you would engage
    - how you would address the lessons that others have learned
    - what benefits you would expect
- Time: 60 minutes

Learning Exercise Part 2

- Identify potential institutional and implementation issues for two of the selected rural ITS tools
- Develop these in the context of the needs you are using the tools to respond to
- Time: 30 minutes

Learning Objectives

- Demonstrate familiarity with the mapping of needs to the seven rural ITS development tracks
- Use the Toolbox to:
  - Identify technologies that are being used to address user needs
  - Recognize key stakeholders
  - Describe lessons learned by others
  - Describe typical qualitative benefits

Session 5

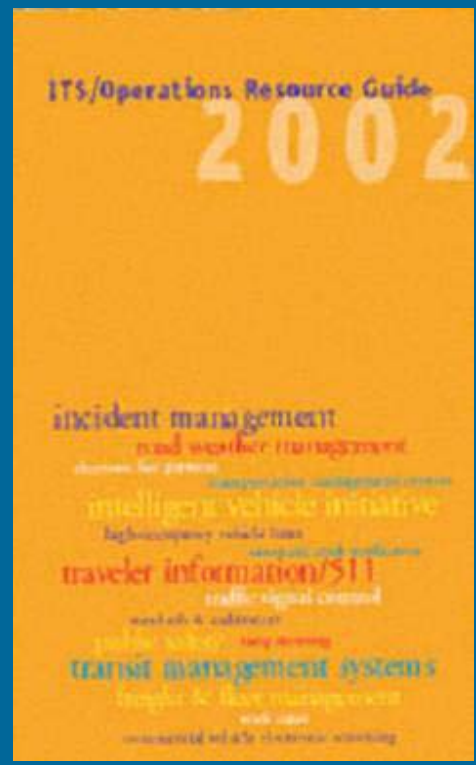
Information Resources and Course Summary

Learning Objectives

- Identify two additional resources
- Briefly summarize the course

Information Contacts

- Local ITS America Chapter
  (202) 484-4847
- Local FHWA representative
  Toll Free “Help Line”
  (866) 367-7487
- ITS Resource Guide 2002

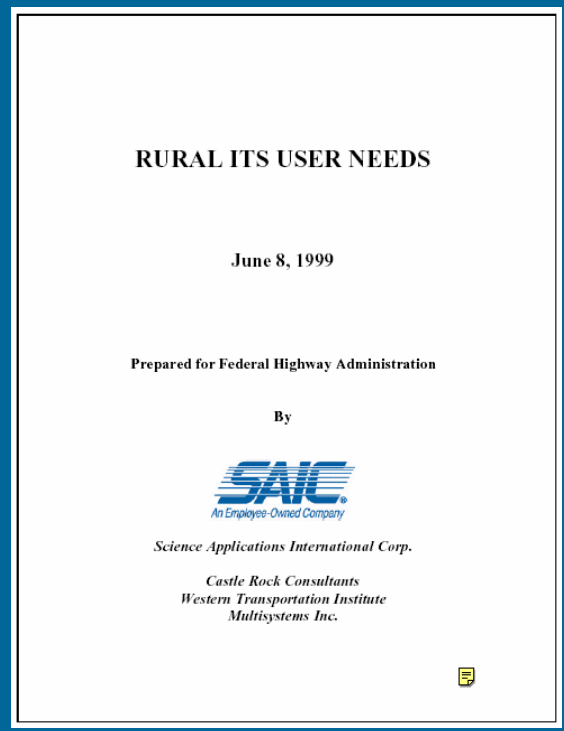


Information Contacts

- USDOT ITS Peer-to-Peer Program
  (888) 700-7337

Information Resources

- Rural ITS User Needs Document
- Rural ITS Toolbox



RURAL ITS USER NEEDS

June 8, 1999

Prepared for Federal Highway Administration

By

SAIC
An Employee-Owned Company

Science Applications International Corp.

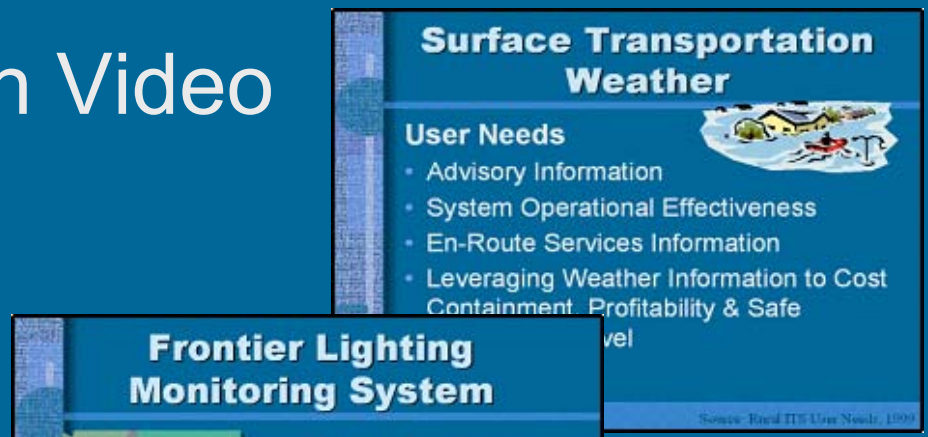
Castle Rock Consultants
Western Transportation Institute
Multisystems Inc.

Information Resources

- Best Practices in Rural and Statewide ITS Strategic Planning
- ITS Simple Solutions

Information Resources

- ARTS Outreach CD
- ARTS Outreach Video

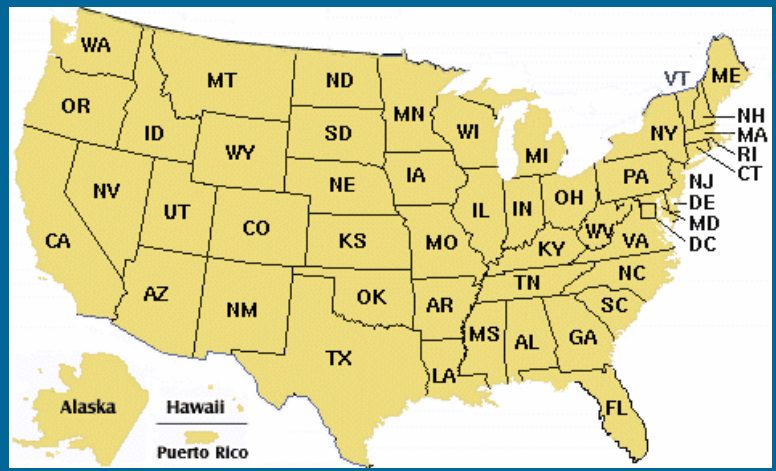


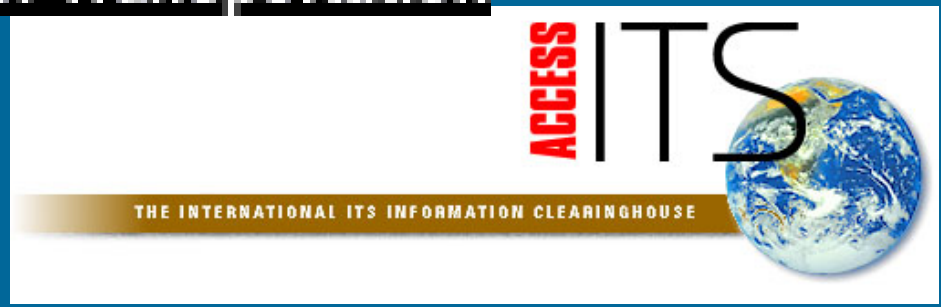
Internet Resources

http://www.itsa.org/

http://www.its.dot.gov

http://www.its.dot.gov/staterpt/state.htm





Internet Resources

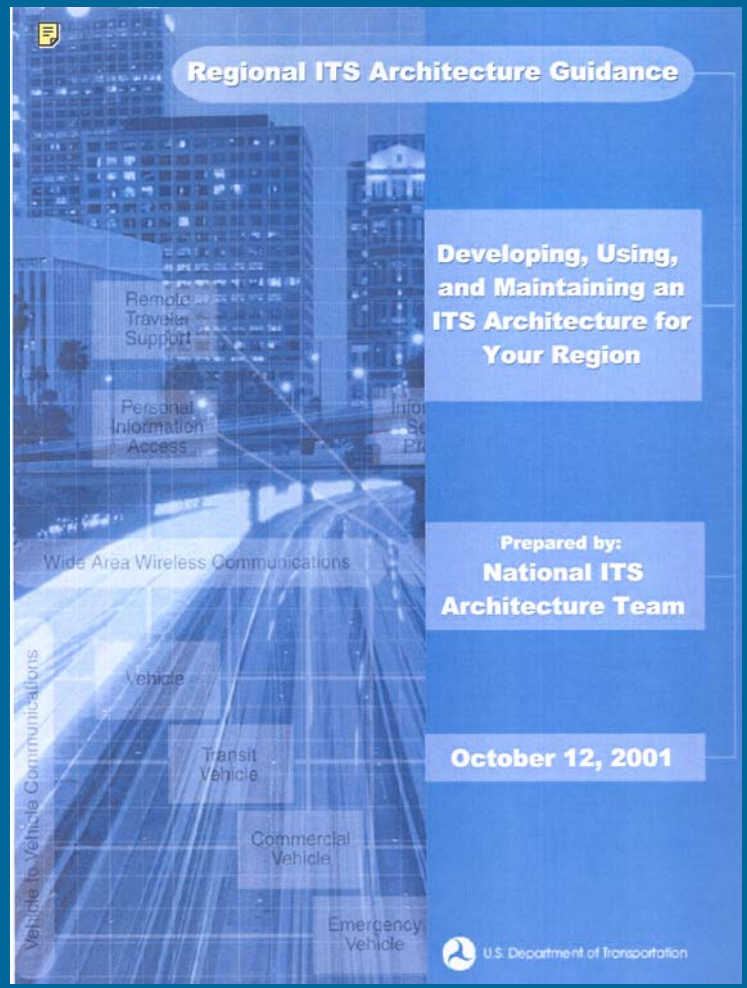
http://www.benefitcost.its.dot.gov/.

http://www.coe.montana.edu/wti/

Information Resources

Guidance Documents & Handbooks:

- Regional ITS Architecture Guidance Document



Related Courses

- National Highway Institute (NHI)
  www.nhi.fhwa.dot.gov/
- Professional Capacity Building Program (PCB)
  http://www.pcb.its.dot.gov/

Course Goals

- Introduce the Rural ITS (Intelligent Transportation Systems) Toolbox
- Increase familiarity with ITS strategic planning

Course Learning Objectives

- Identify rural transportation needs and challenges
- Define transportation technology
- State the value of Rural ITS Toolbox
- Describe key factors in ITS strategic planning
- Explain the benefits of rural transportation technology
- Relate lessons learned in rural transportation technology
- Identify additional information resources

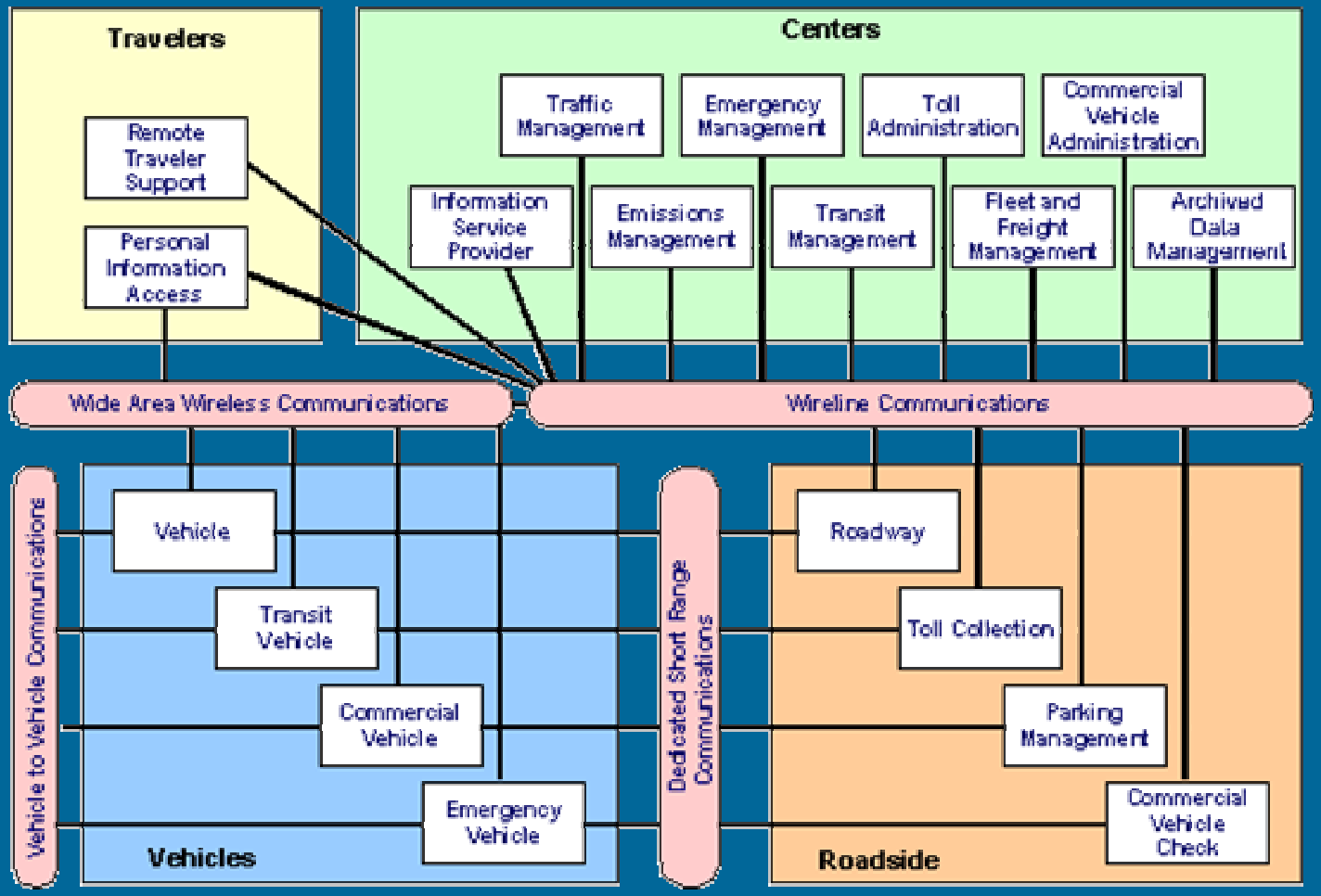
Needs and Challenges

Emergency Services	30% longer response
Travel and Tourism	Economic Viability, high visitation, limited services
Traffic Management	limited detection, need for coordination
Rural Transit and Mobility	38% without service
Crash Prevention & Security	60% fatalities
Operations and Maintenance	Local agency responsibility
Surface Transportation and Weather	dynamic conditions, life-threatening

Key Strategic Planning Process Steps

1. Gather and Expand Stakeholder Partners
2. Assess Transportation Needs
3. Inventory Related Technological Improvements
4. Define Regional Technological Architecture
5. Develop Strategic Deployment Plan

National ITS Architecture



Strategic Planning Lessons Learned

- Planning and coordination is time intensive
- Involve multiple stakeholders – go beyond DOT
- Recognize institutional issues early
- Develop effective management structure
- Adopt regional philosophy through coordination/ integration

Rural ITS Toolbox

- Serve as a resource document on successful rural ITS projects
- Share the developing body of information
- Avoid redundant efforts in developing your own solutions

Tools

Learning Objectives

- Identify two additional resources
- Briefly summarize the course

Thank You