UNITED STATES
DEPARTMENT OF TRANSPORTATION

ITS ePrimer
Introduction and Overview

ITS Professional Capacity Building Program
ITS Joint Program Office
U.S. Department of Transportation

United States Department of Transportation
Office of the Assistant Secretary for Research and Technology
Intelligent Transportation Systems Joint Program Office

ite Learning HUB

INTELLIGENT TRANSPORTATION SYSTEMS
PROFESSIONAL CAPACITY BUILDING

Instructor

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Principal

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Learning Objectives

- Understand the history and current status of ITS
- Be familiar with the 16 subject modules
- Know how to access and use the ITS ePrimer

What is ITS?

- ITS applies information, technology, and systems engineering to the management and operation of surface transportation facilities
- It is an engineering discipline that encompasses
  - Research
  - Planning
  - Design
  - Integration
  - Deployment

Introduction to ITS

- ITS brings diverse disciplines together to deliver
  - Safe
  - Efficient
  - Sustainable transportation
- ITS enhances transportation infrastructure investments
- ITS supports system management and operation
  - Multimodal
  - Local, regional, state

Examples of How ITS Enhances Our Lives

Adaptive signal control technology uses real-time traffic information to

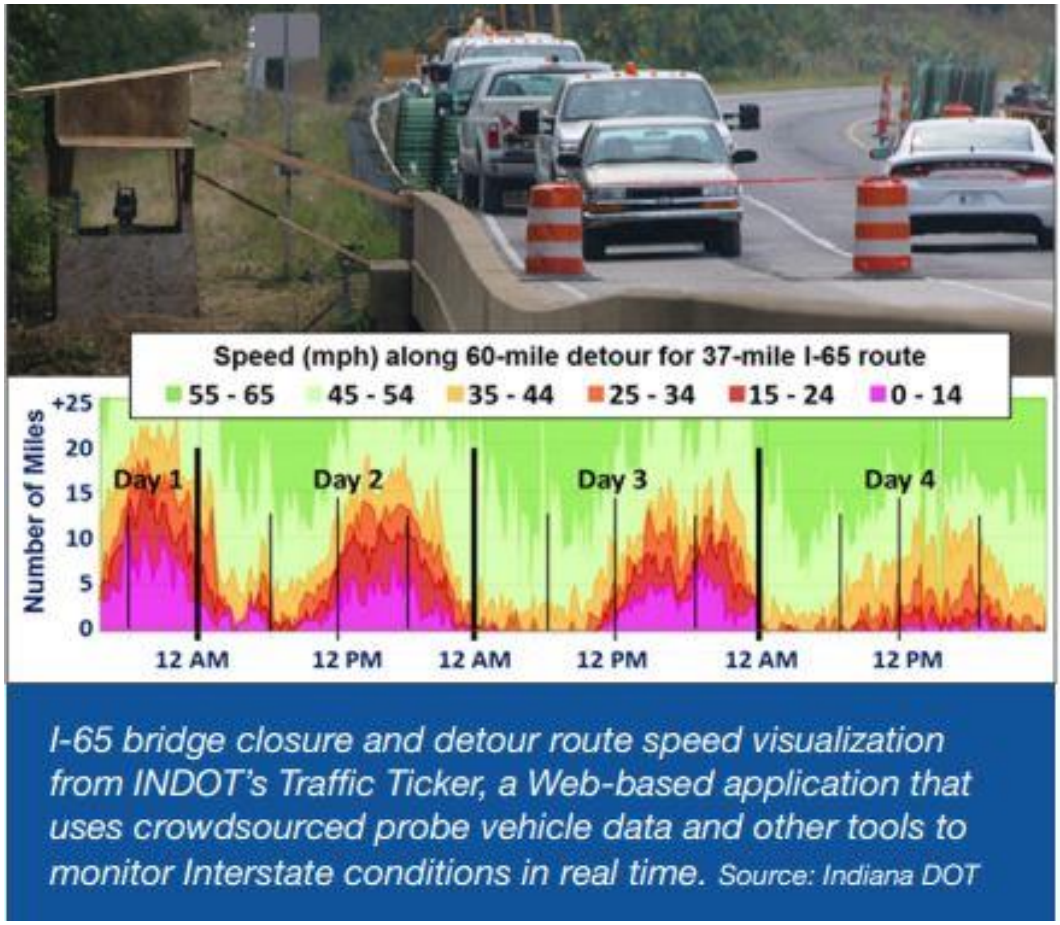
- Cut costs
- Reduce congestion
- Improve traffic flow
- Reduce emissions
- Respond to incidents, special events, and recurring congestion

Source: http://www.fhwa.dot.gov/everydaycounts/technology/adsc/intro.cfm.

Examples of How ITS Enhances Our Lives (cont'd)

Crowdsourcing for Advanced Operations

- Provides real-time information on travel speed and time, traffic incidents, travel behavior, and vehicle operation
- Data can be used by TMCs to manage the system and provide traveler information



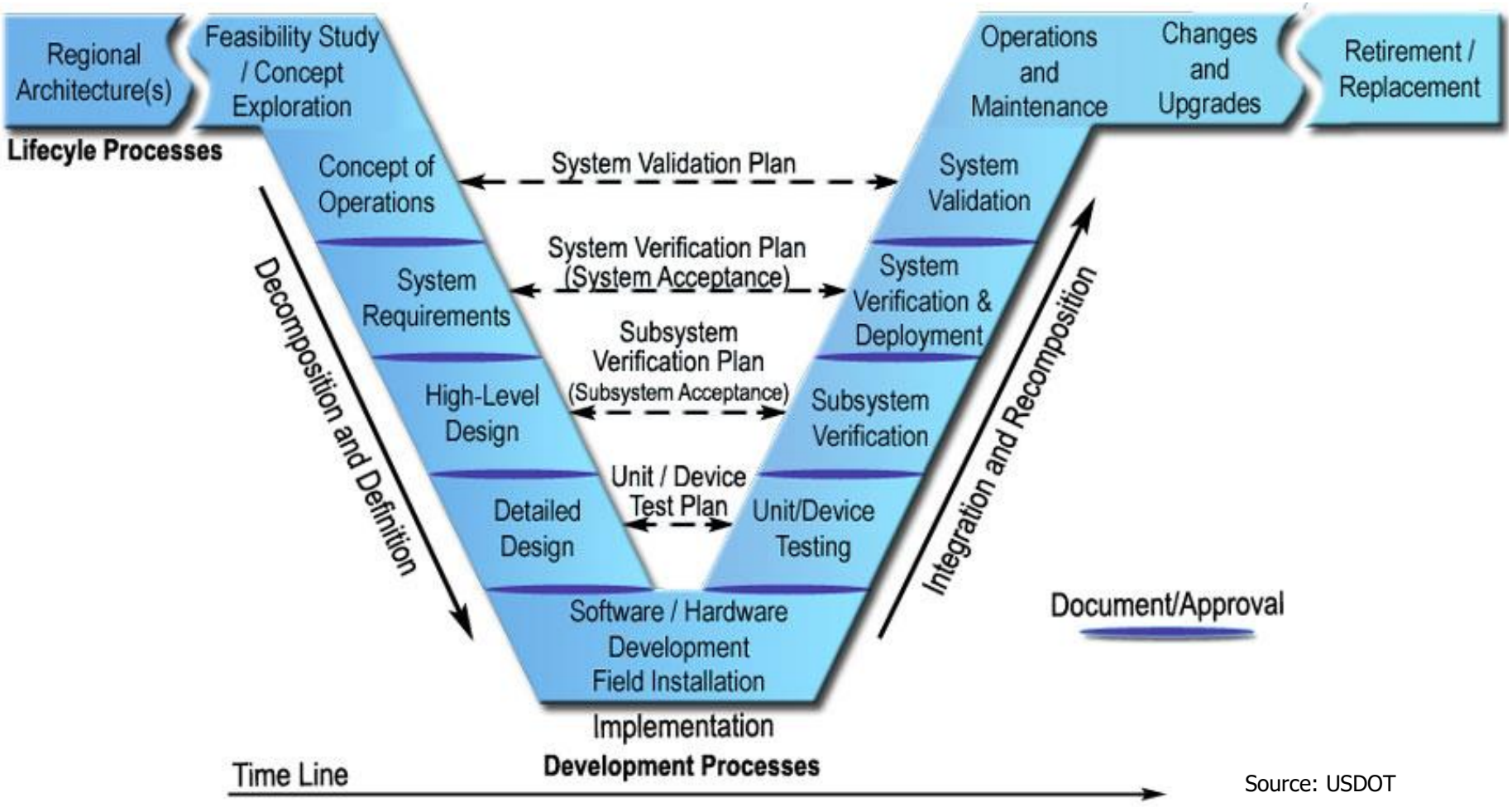
I-65 bridge closure and detour route speed visualization from INDOT's Traffic Ticker, a Web-based application that uses crowdsourced probe vehicle data and other tools to monitor Interstate conditions in real time. Source: Indiana DOT

Source: Crowdsourcing for Advancing Operations EDC-6 Factsheet /.

Where ITS Can Be Applied

- Multimodal
  - Auto
  - Transit
  - Freight
  - Bicycles
  - Pedestrians
- Facility Types
  - Highways
  - Arterials
  - Fixed guideways
  - Bikeways
  - Sidewalks
  - Multimodal facilities
  - Ports and terminals

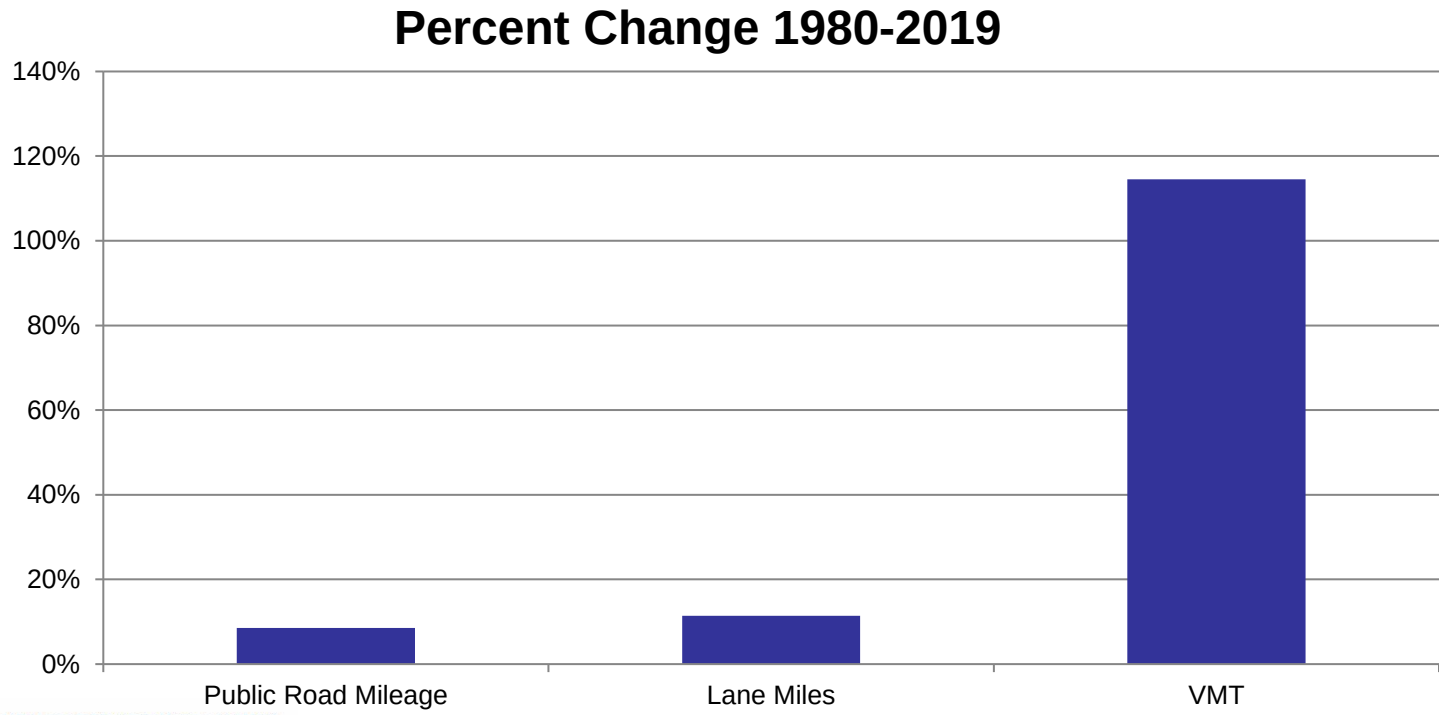
Systems Engineering



Source: USDOT

Transportation Challenges

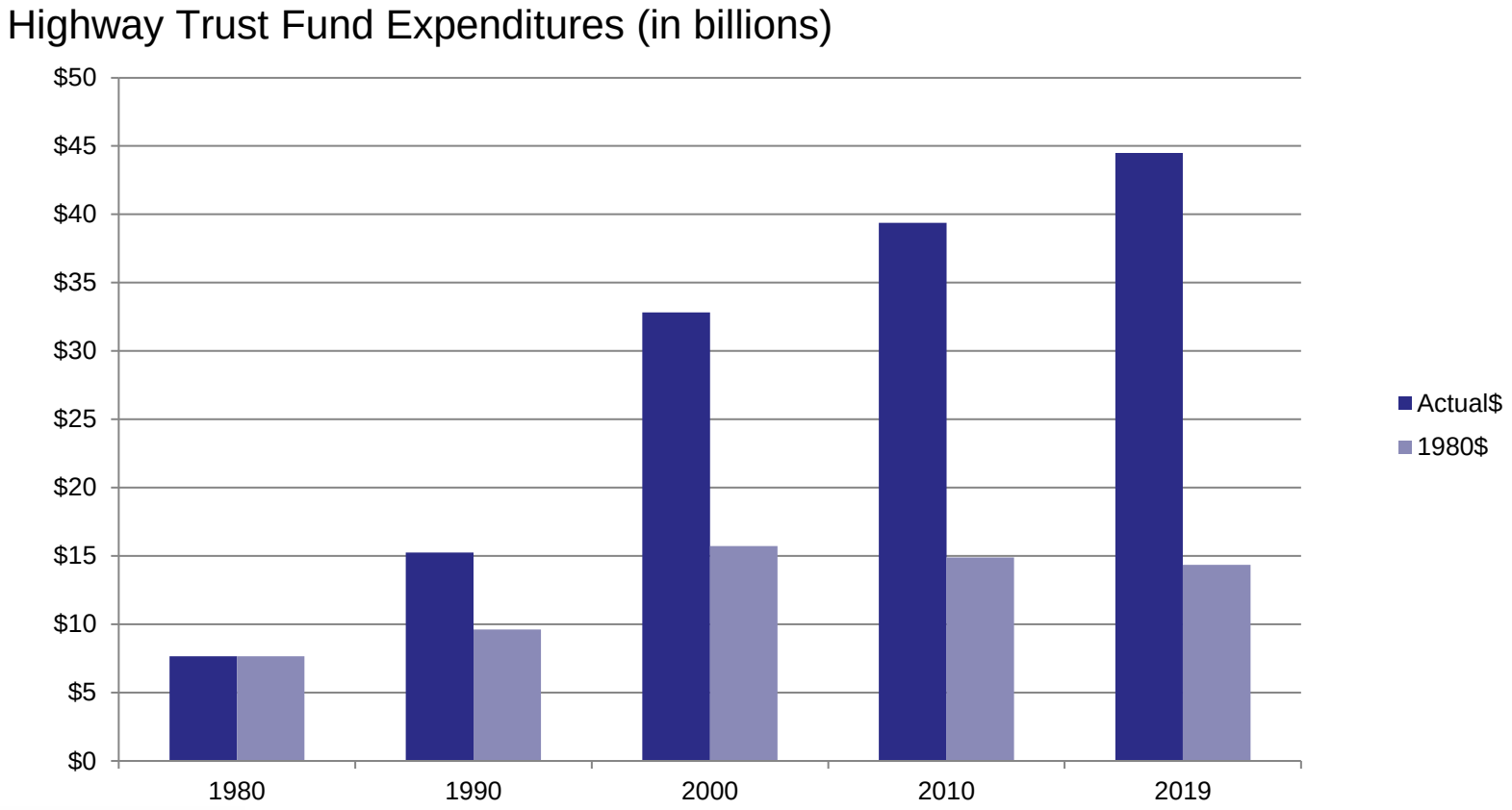
- Increasing demand: 115 percent increase in VMT over 39 years
- Minimal increase in capacity: Less than 11 percent increase in number of lane miles in same period



Source: FHWA Highway Statistics, 2019.

Transportation Challenges (cont'd)

- Funding levels have not kept pace with needs, increasing pressure to do more with less



Source: FHWA Highway Statistics, 2010 and ENO Center for Transportation

Workforce Needs

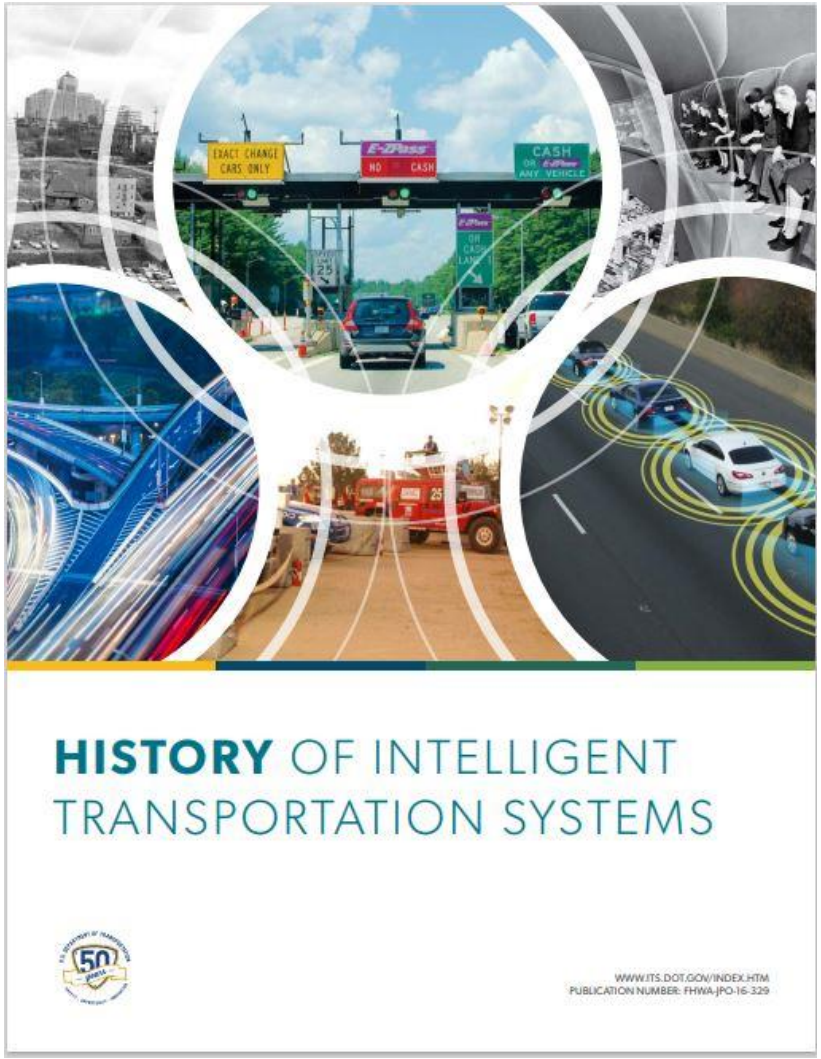
- Traffic Data Scientist/Statistician
- TSMO Manager/Chief/Bureau Director
- TSMO Program Manager
- Computer Engineer
- Artificial Intelligence Scientist
- Telecommunications Engineer
- Data Management Specialist
- Visualization Specialist
- Connected and Automated Vehicles (CAV) Program Manager
- Traffic Incident Management (TIM) Program Manager
- Cyber Security Engineer
- Transportation Data Ethicist
- Surface Weather Specialist
- Systems Engineer
- TSMO Modeling Specialist
- Emerging Technologies Industry Liaison
- Transportation Systems Performance Manager
- Integrated Corridor Management Manager
- Transportation Management Center Manager

Benefits of ITS

- Improved safety
- Reduced congestion
- Reduced emissions
- Reduced travel times
- Enhanced access and quality of life
- Crash prevention
- Cost savings for commercial vehicle operations
- Enhanced travel options

History of ITS

- USDOT ITS JPO published a History of ITS on their website
- History of Intelligent Transportation Systems (dot.gov)



History of ITS

- 1988: Mobility 2000 – working group focused on national program of automated technology
- 1991: ISTEA – encouraged new technologies to improve safety, information exchange, system capacity, and travel times
- 1990s: National Architecture and Standards Program initiated
- Late 1990s: Term "ITS" emerged to include more multimodal focus

History of ITS (continued)

- 2012: Moving Ahead for Progress in the 21st Century (MAP-21) – created a streamlined, performance-based surface transportation program with an increased focus on system management
- 2014: NHTSA proposed rulemaking supporting V2V communication technology research
- 2015: Fixing America's Surface Transportation (FAST) – largely continued previous program structures with an 11 percent increase in funding over 5 years

USDOT CARMA Program

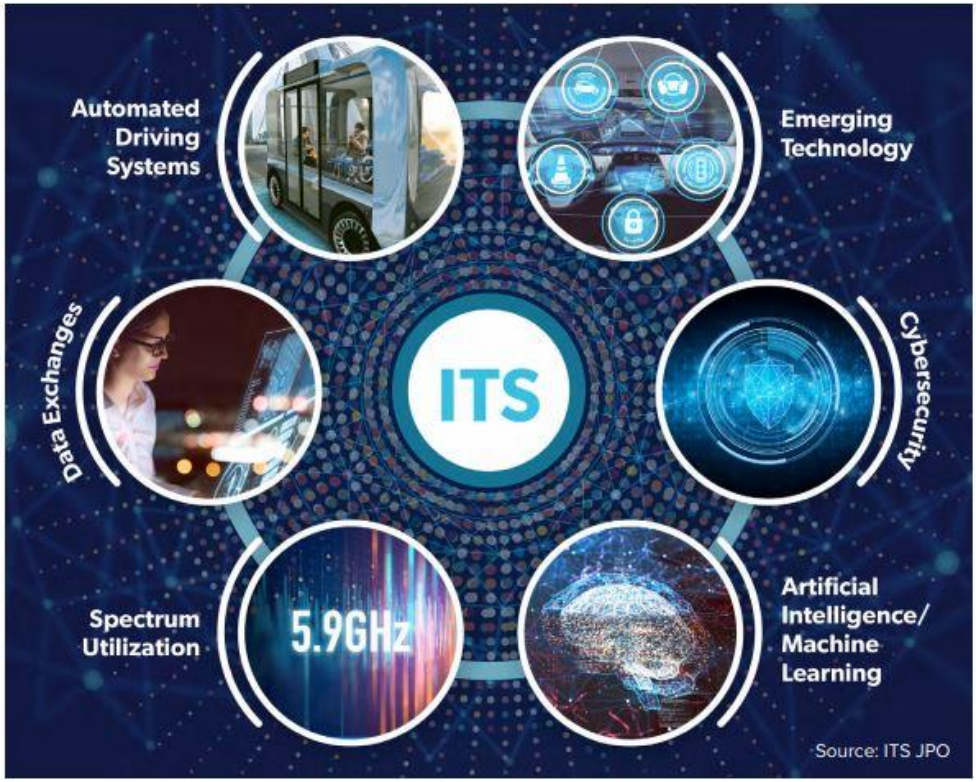
ITS JPO Strategic Plan 2020-2025

- Vision

  To accelerate the use of ITS to transform the way society moves

- Mission

  To lead collaborative and innovative research, development, and implementation of IT to improve the safety and mobility of people and goods



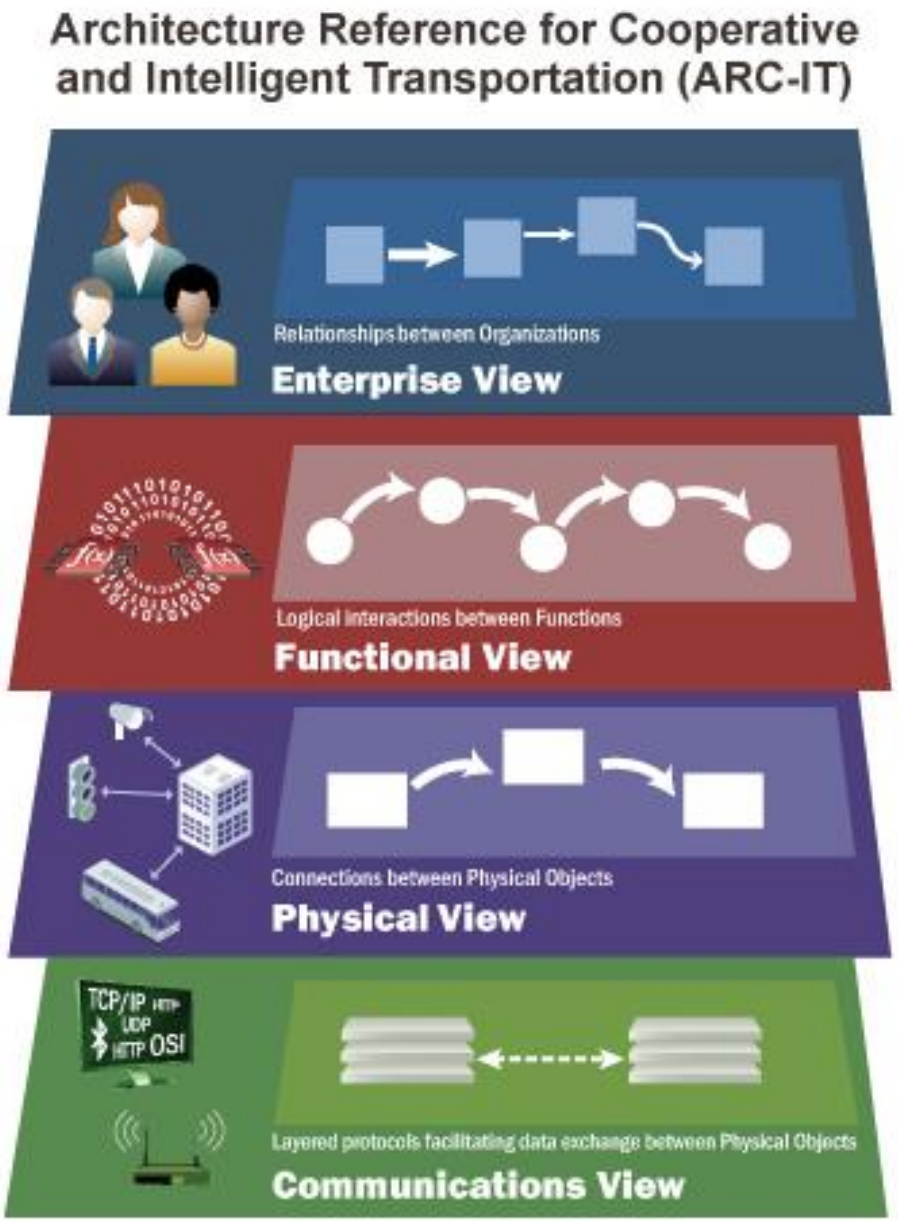
ITS JPO Research Priorities

ITS Architecture and Standards

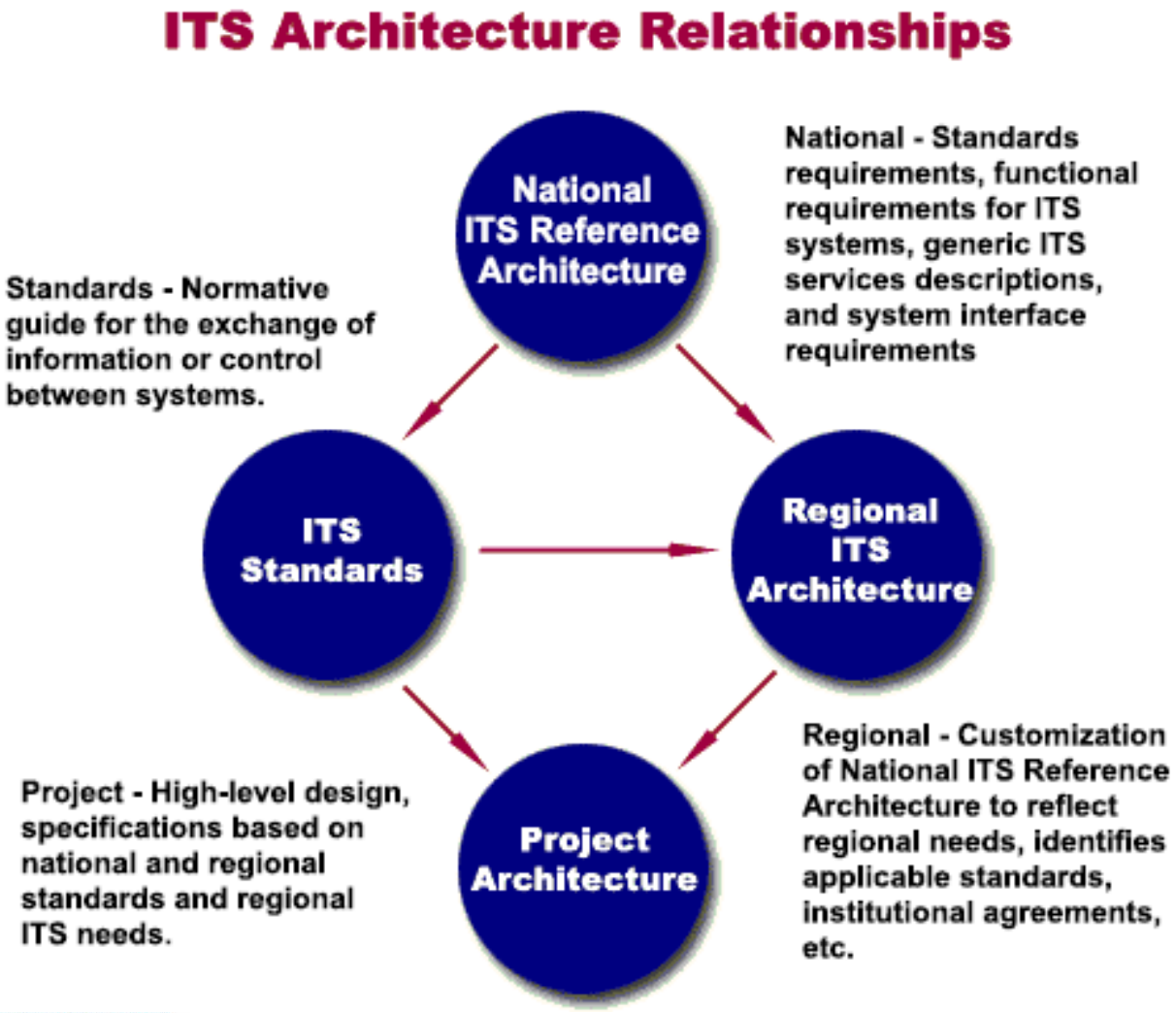
- National ITS Reference Architecture (ARC-IT)
  - Guides ITS programs at the national level
- Regional Architecture Development for Intelligent Transportation (RAD-IT)
  - Supports regional and project ITS architectures
- Systems Engineering Tool for IT (SET-IT)
  - Tool to integrate drawing and database tools with ARC-IT

ARC-IT

- Reference architecture that provides common basis for planners and engineers
- Does not mandate any particular implementation
- Provides tools to develop regional architecture



ITS Standards and Architecture



Growth of ITS Deployment

- ITS deployment is growing rapidly, nationally, and globally
- The global value of the ITS market was estimated over $26 million in 2021
- Projected growth at 7 percent over the next 7 years expected - $42 million by 2028

Areas of Growth in ITS

- Freeway management
- Arterial management
- Incident management
- Transit management
- Future deployment plans
- Connected vehicles and automated vehicles

How to Use the *ITS ePrimer*

- Modules are structured around specific topic areas and intended to stand on their own
- 16 different authors – level of detail varies across modules, and some topics are cross-cutting/overlapping

Content Outline

1. Introduction to ITS

   Provides an overview of ITS including history, benefits, and future vision

2. Systems Engineering

   Presents an overview of systems engineering and its relation to ITS architecture, planning, and deployment

3. Application of ITS to TSMO

   Provides an overview of ITS technology and tools used to manage transportation strategies, systems, and networks

Content Outline (cont'd)

4. ITS Data in Decision Making

   Introduces fundamentals related to collecting, storing, analyzing, and sharing ITS data to manage performance and improve decision-making

5. ITS to Support Travelers

   Focuses on ITS applications to support multimodal transportation: information, safety, convenience

6. Freight and Commercial Vehicle ITS

   Illustrates and explains major ITS applications related to freight management and commercial vehicle operations

Content Outline (cont'd)

7. Public Transportation

   Identifies a broad range of ITS applications in public transportation and describes how they enhance efficiency, convenience, safety, and security

8. Electronic Tolling and Pricing

   Provides an introduction to electronic payment systems applications and pricing strategies

9. Supporting ITS Technologies

   Describes various supporting ITS technologies and considers opportunities for deployment and integration

Content Outline (cont'd)

10. Rural and Regional ITS Applications

    Identifies unique transportation needs in rural areas and applies lessons from successful ITS deployments in rural and regional settings

11. Sustainable Transportation

    Explores opportunities to integrate ITS technologies in support of sustainable transportation

12. Institutional Issues

    Defines institutional challenges encountered in planning, deploying, and maintaining ITS and provides guidance on addressing institutional concerns

Content Outline (cont'd)

13. Connected Vehicles

    Examines current and emerging CV technologies and discusses institutional, policy, legal, and funding challenges associated with CV applications

14. ITS in Emergencies and Disasters

    Provides information on how ITS can support transportation operations during emergencies and disasters

Content Outline (cont'd)

15. Port Operations

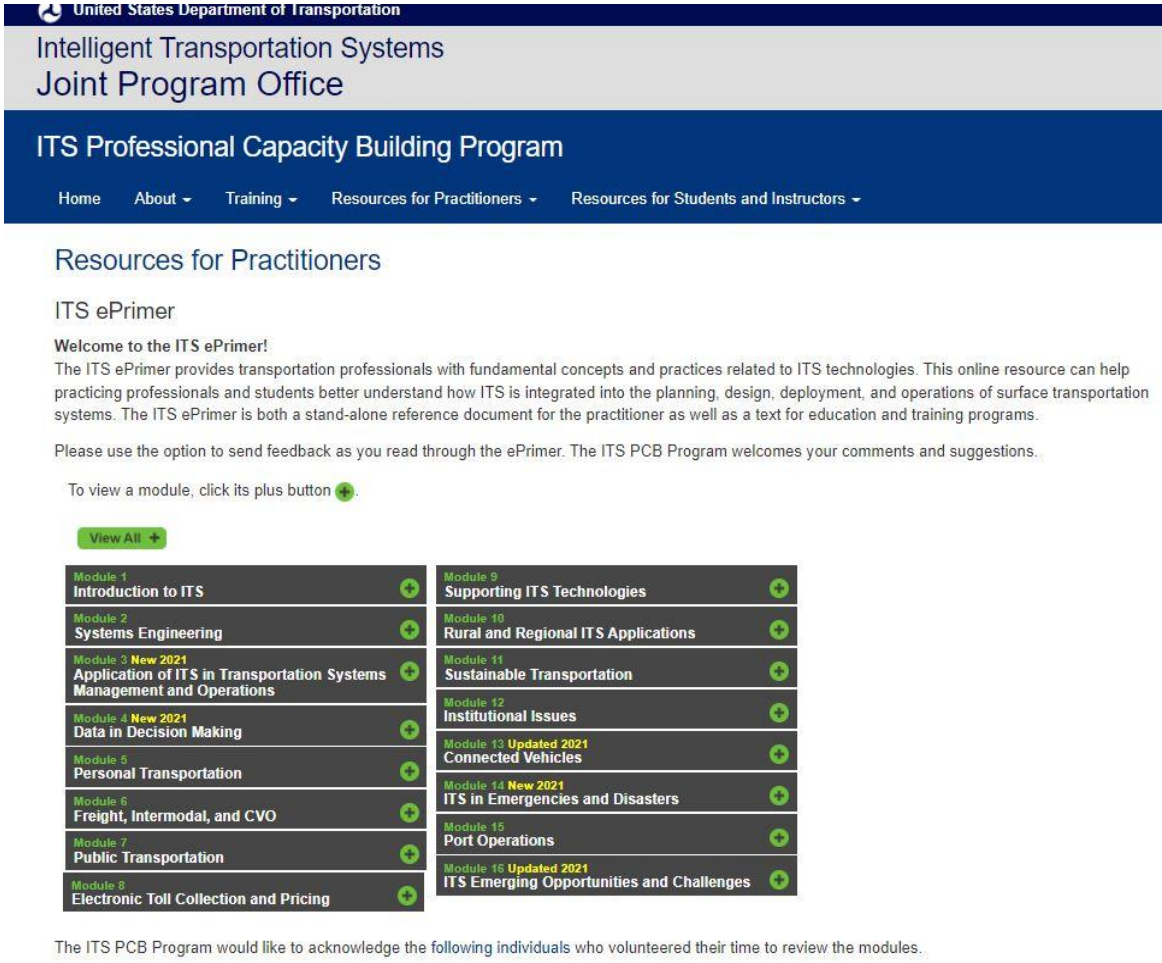
    Provides an overview of ITS related to port operations and supports expanded port participation in ITS applications

16. ITS Emerging Opportunities and Challenges

    Explores 4IR technologies and how developments in data, computing, and telecommunications are impacting ITS and transportation profession

ITS ePrimer Online Products

- Available online
  - 16 modules
  - PowerPoint slides with speaker notes and suggested audience interaction for each module



Resources

- ITS ePrimer: www.pcb.its.dot.gov/eprimer
- ITS Professional Capacity Building (PCB): www.pcb.its.dot.gov
- National Highway Institute (NHI): https://www.nhi.fhwa.dot.gov
- ITE Webinars: www.ite.org
- ITS JPO PCB Program: ITShelp@dot.gov