WELCOME

RITA Intelligent Transportation Systems Joint Program Office

Welcome

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WWW.PCB.ITS.DOT.GOV

I101: Using ITS Standards
An Overview

Course Information

- Prerequisites: None
- Target Audience:
  - Public sector managers
  - Decision makers

Instructor

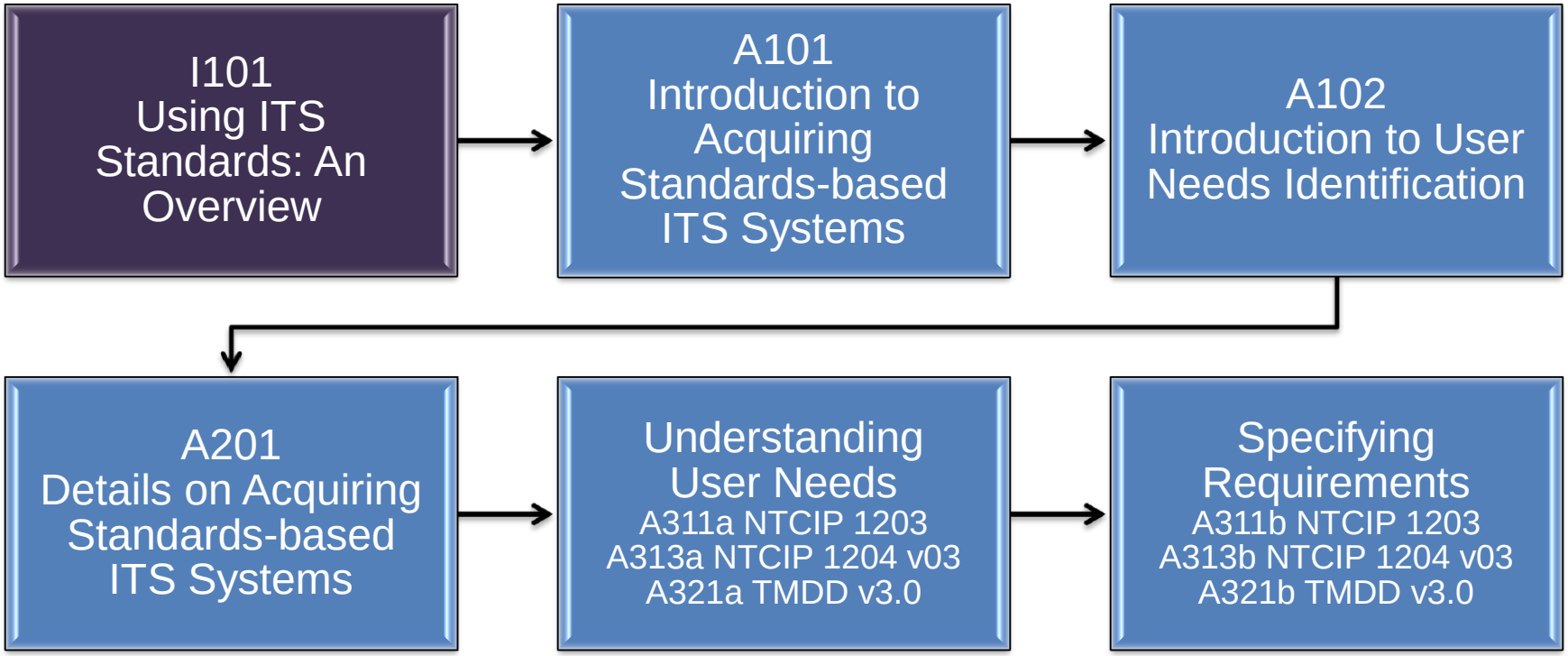
Gary B. Thomas, P.E., Ph.D.

Center Director

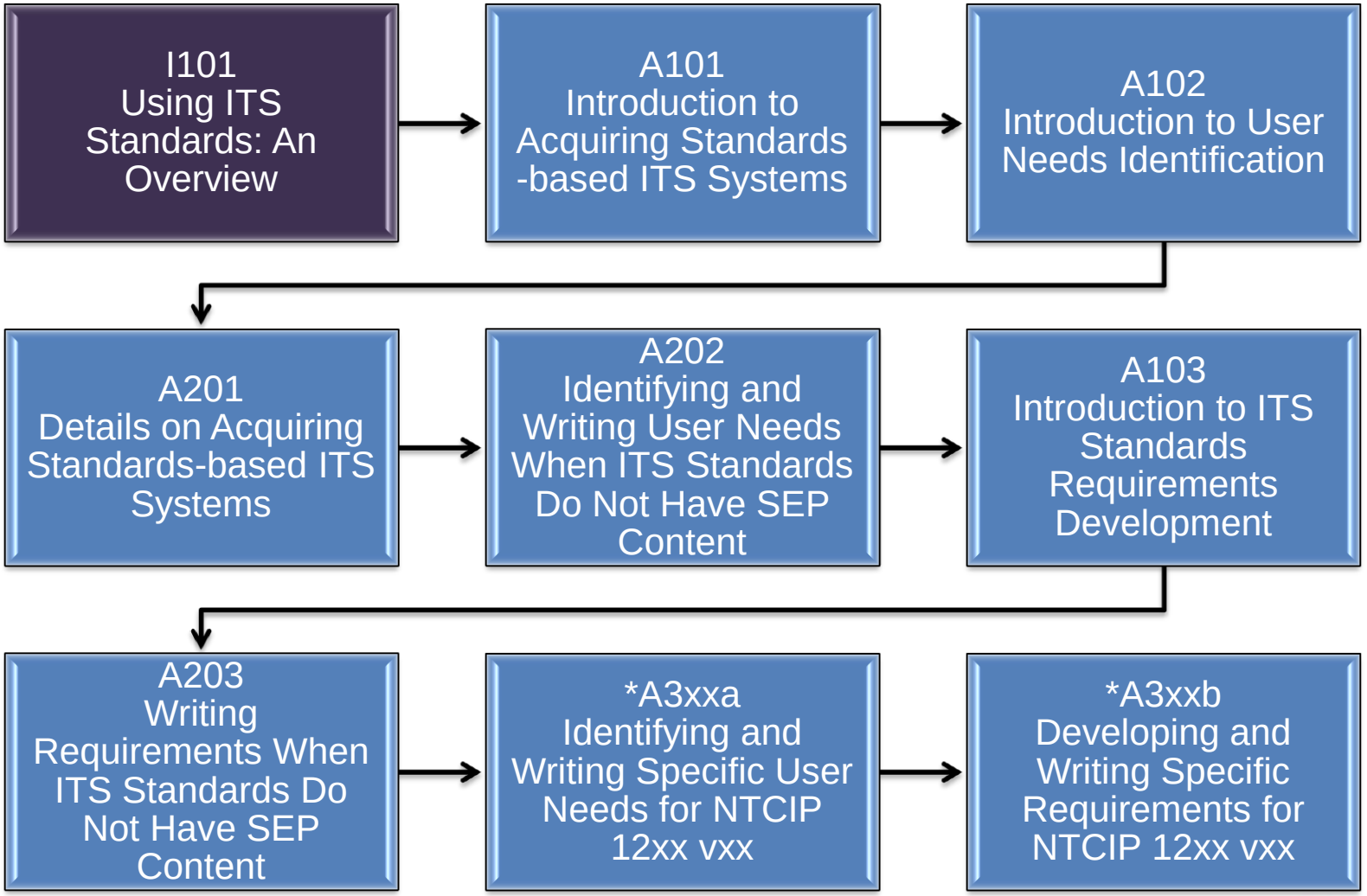
Texas Transportation Institute

College Station, TX, USA

Curriculum Path (SEP)



Curriculum Path (Non-SEP)



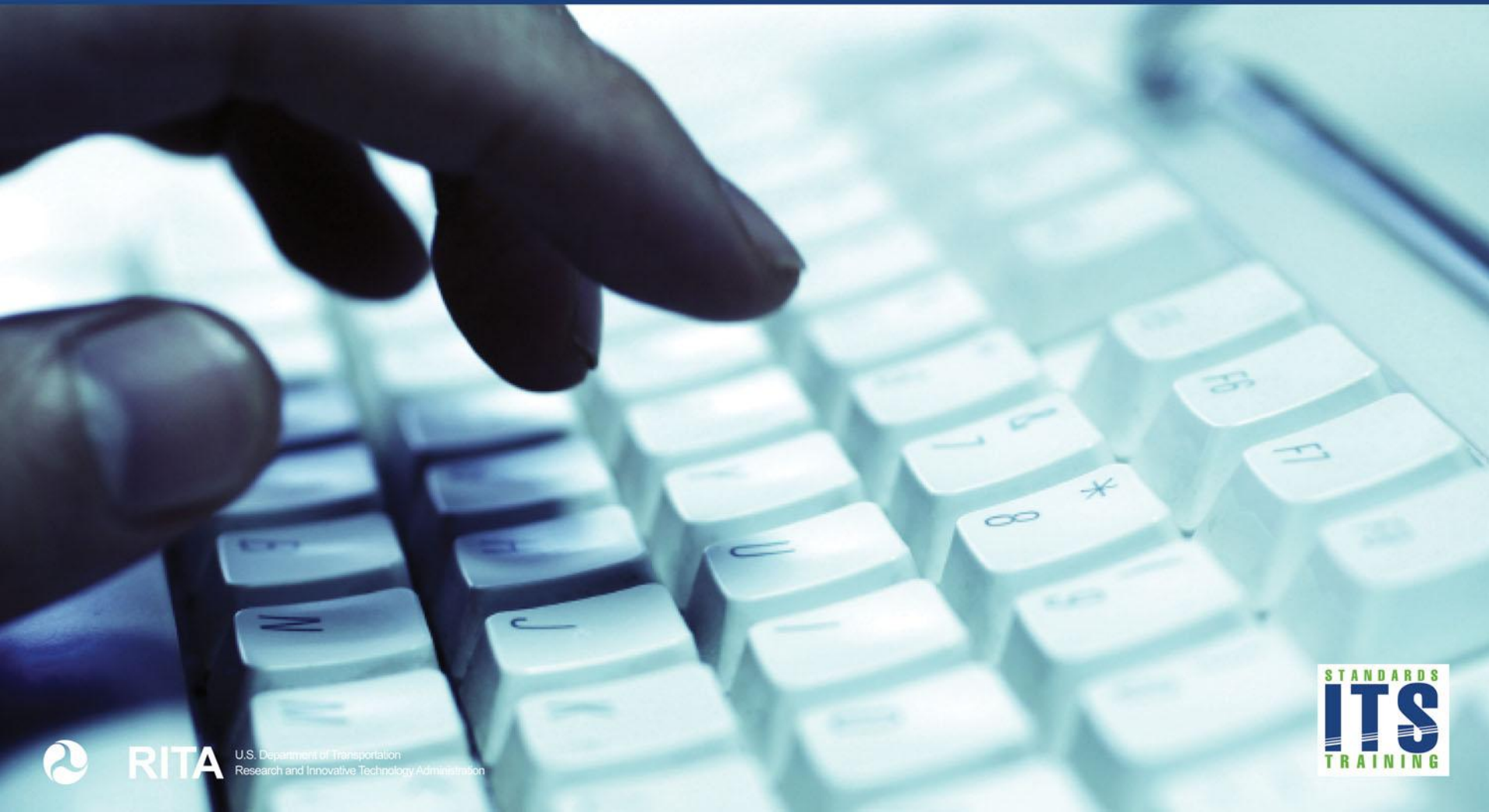
Learning Objectives

1. Identify the benefits and costs of using standards in ITS projects
2. Describe the benefits of using the systems engineering process in ITS projects
3. Identify and address high-level technical and institutional challenges to using standards
4. Describe the role of ITS standards in ITS applications

What Are Standards?

- Established norm or requirement about technical systems that establishes:
  - Uniform engineering or
  - Technical criteria, methods, processes, and practices
- Most standards are:
  - Voluntary
  - Consensus based
  - Open

ACTIVITY



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STANDARDS ITS TRAINING

Benefits of Using Standards

- What do you see as possible benefits of using standards?
- Use the chat pod to answer

What Are ITS Standards?

- Define how ITS systems, products, and components:
  - Interconnect…
  - Exchange information…
  - Interact…
  - Within a transportation network
- They are not design standards

Benefits

- Supports interoperability
- Supports 940 compliance
- Minimizes future integration costs
- Facilitates regional integration
- Supports incremental measurable development
- Prevents technological obstacles
- Minimizes operations and maintenance costs
- Prepares for emerging technologies
- Makes procurements easier
- Makes testing easier

Benefits

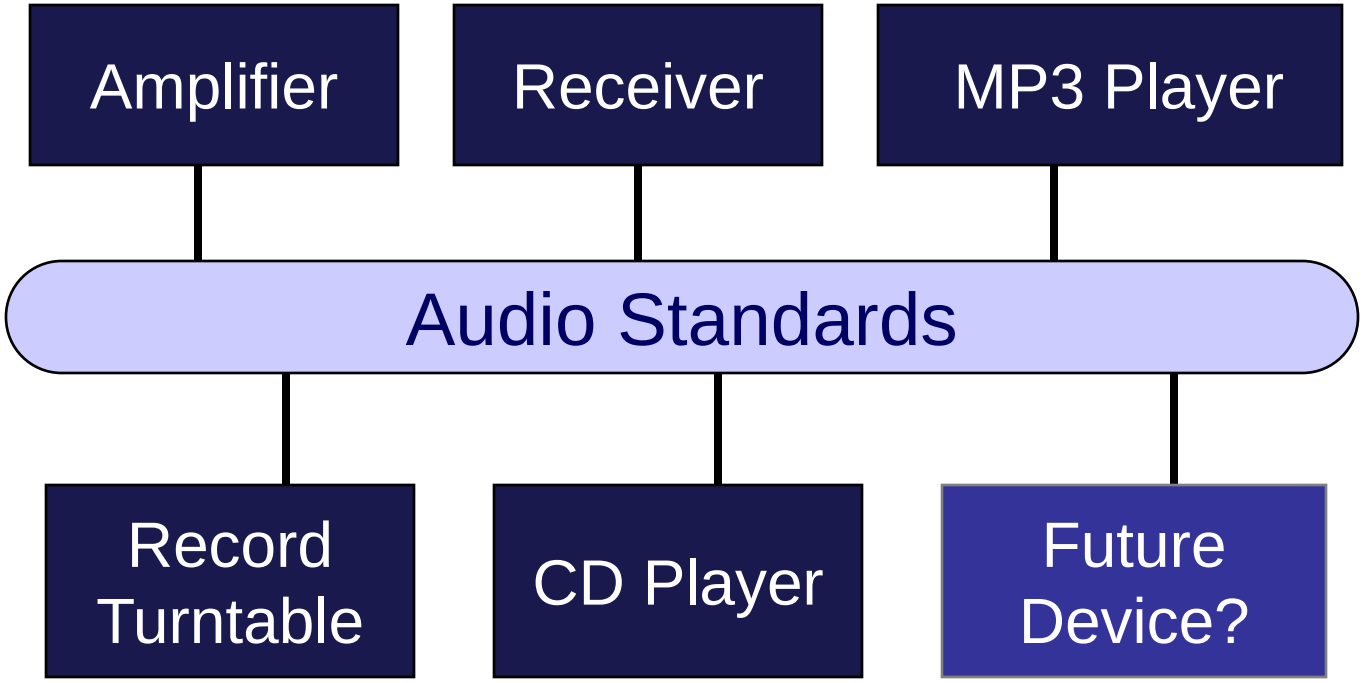
Supports interoperability

- The ability of an ITS system to:
  - Provide information and services to other systems
  - Use exchanged information and services to operate together effectively
- Analogy: home theater system

Source: Gary B. Thomas

Benefits

Supports interoperability



Benefits

Supports Rule 940 Compliance

- FHWA rule enacted on January 8, 2001
- Requires a systems engineering analysis for ITS projects using highway trust funds
- Seven requirements included in the SE analysis (see supplemental materials)
  - #6 states: Identification of applicable ITS standards and testing procedures

Benefits

Minimizes Future Integration Costs

- Not locked into proprietary systems
- Expansion is easier
- Still allows for innovation

Benefits

Facilitates Regional Integration

- Makes it easier to communicate with other jurisdictions
- Reduces miscommunication
- Improves coordination of field devices

Benefits

Others

- Supports incremental measurable development
- Prevents technological obstacles
- Minimizes operations and maintenance costs
- Prepares for emerging technologies
- Makes procurements easier
- Makes testing easier
- Minimizes risk

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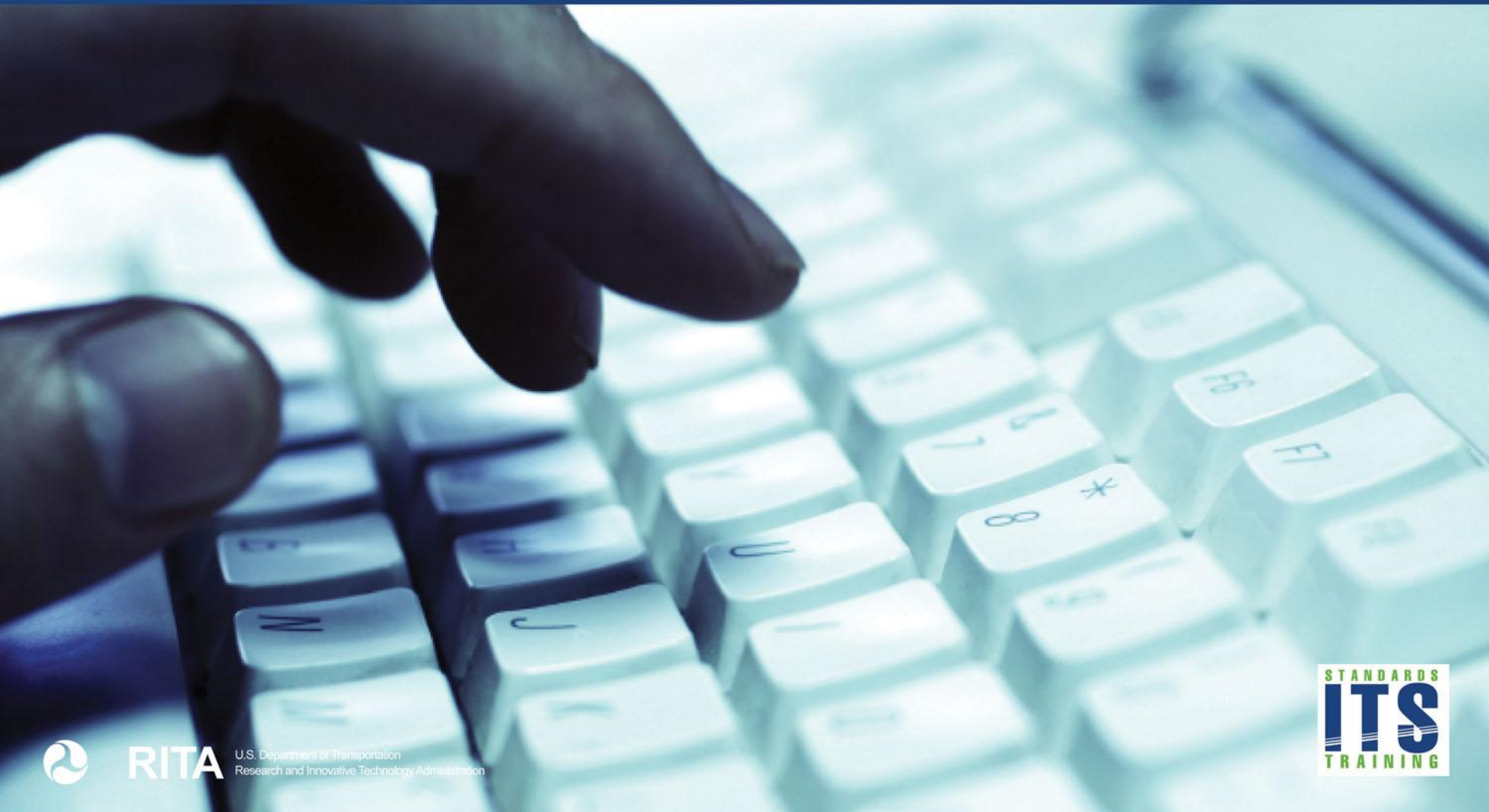

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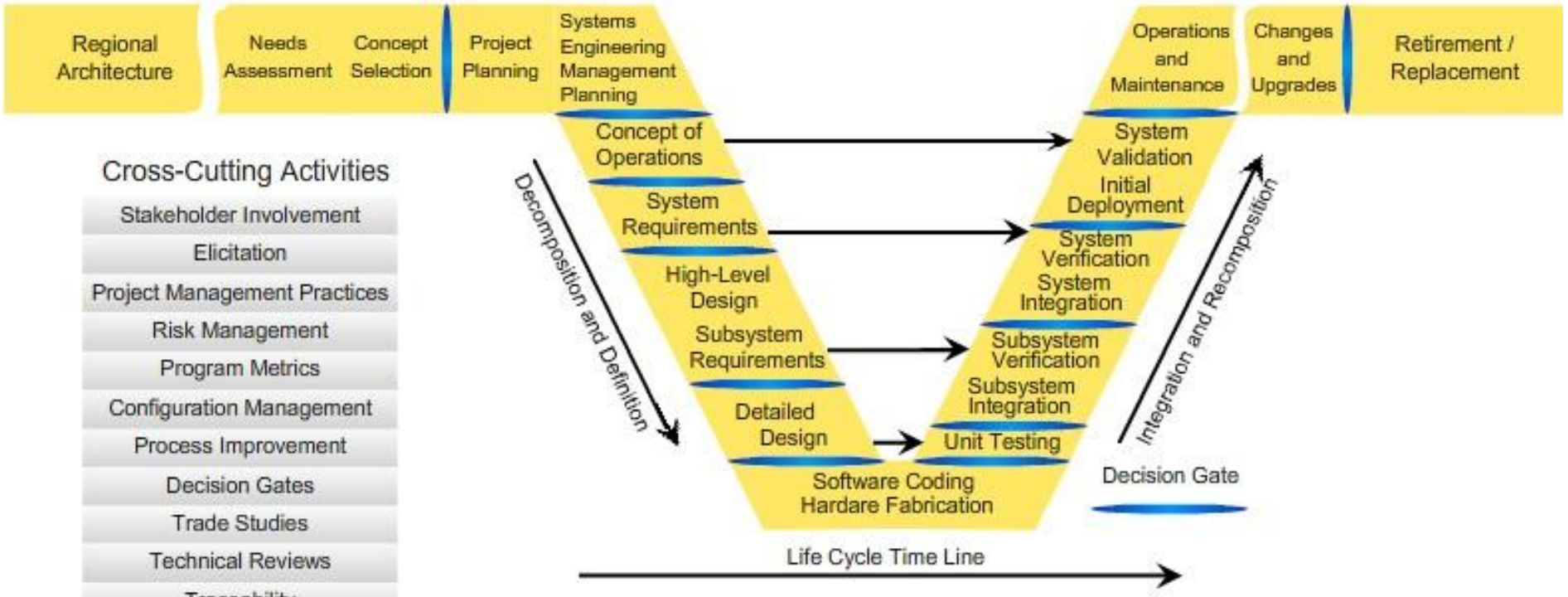
Costs of Using ITS Standards

- What do you think are potential COSTS of implementing a standards-based system?
- Use the chat pod to answer

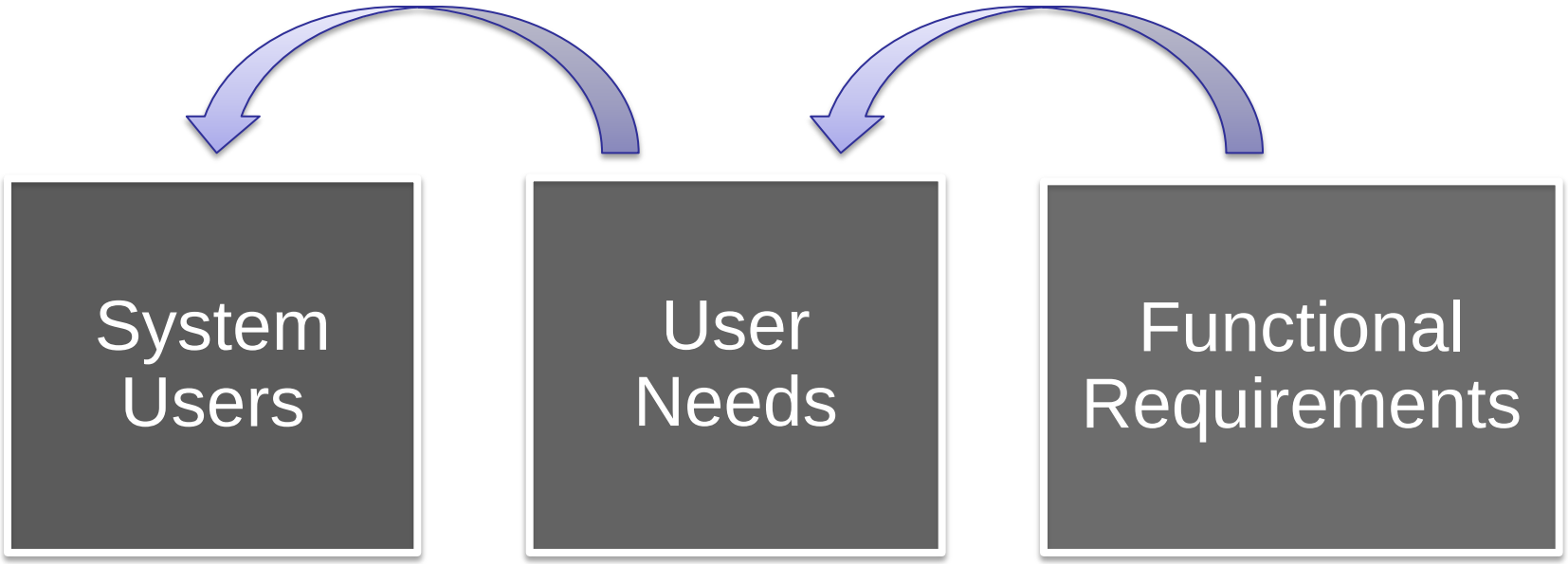
Systems Engineering Process (SEP)

Phase -1	Phase 0	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Interfacing with Planning and the Regional Architecture	Concept Exploration and Benefits Analysis	Project Planning and Concept of Operations Development	System Definition and Design	System Development and Implementation	Validation, Operations and Maintenance, Changes & Upgrades	System Retirement / Replacement



Needs, Requirements, and Traceability

- Focus on the WHAT – not the HOW
- Every need has at least one requirement
- Every requirement should trace to at least one need

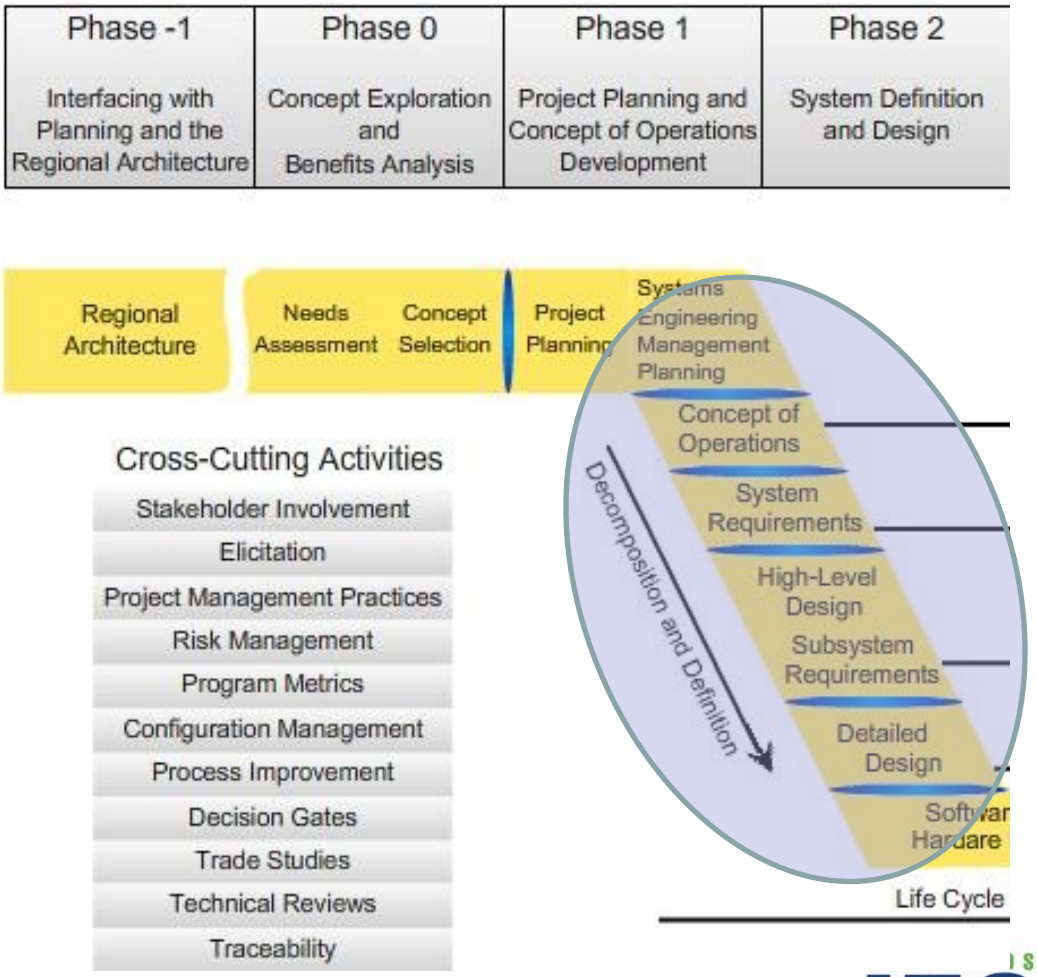


Benefits of Using SEP

- Provides framework and process to verify that the system meets user needs
- Improved stakeholder participation
- More adaptable, resilient systems
- Verified functionality and fewer defects
- Higher level of reuse from one project to the next
- Better documentation

How Do Standards Relate to SEP?

- Primarily used in the design stage of SEP
- After the concept of operations and initial project planning has been developed



SEP-based Standards

- Early ITS standards were not developed using SEP
- Some have been redeveloped using SEP
- SEP-based standards include user needs, requirements, needs to requirements and requirements to design matrices and design solutions
- SEP-based standards better ensure that systems will be conformant to ITS standards

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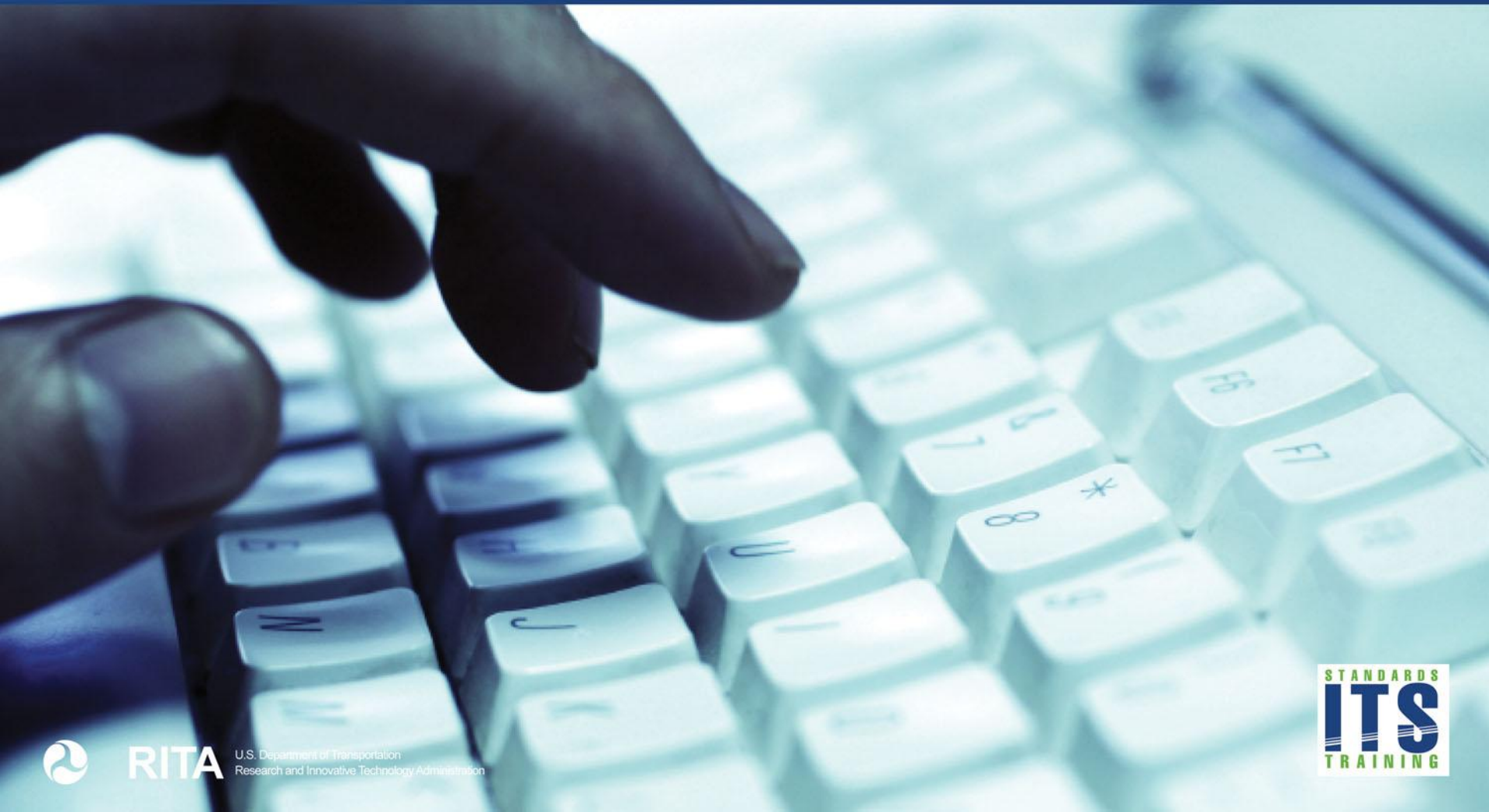

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STANDARDS ITS TRAINING

Technical and Institutional Challenges

- What do you think some of the most common **technical** challenges are?
- Use chat pod to answer

- What do you think some of the most common **institutional** challenges are?
- Use chat pod to answer

Technical and Institutional Challenges

Technical
Gaps in existing skills
Inconsistent industry support for standards
Conformance to standards
Paradigm shift from non-standards based to standards based
Paradigm shift from non-SE based to SE-based

Institutional
Not everyone in an agency is willing to articulate their needs
Resistance to change
Not all agencies have bought into regional integration
Paradigm shift from non-standards based to standards based
Paradigm shift from non-SE based to SE-based

CASE STUDY

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STANDARDS ITS TRAINING

Lessons From the Field

Functional Integration

- Develop usable systems that meet user needs, assess user needs, and follow accepted usability engineering practices when developing interactive systems
- Use ITS standards when developing systems to maximize vendor flexibility and data exchange compatibility and ensure comprehension by agencies

Lessons From the Field

Jurisdictional Integration

- Create systems and plans that allow information sharing and coordination among regional agencies and states
- Consider developing an emergency response plan that coordinates command, control, and communications among regional agencies

Lessons From the Field

Legacy Systems

- Comply with standards and select proven commercial off-the-shelf technology (hardware and software) when possible to save money and facilitate integration with existing legacy systems
- To identify and resolve system integration issues with existing legacy equipment, plan on adequate development time and thorough system testing to ensure systems are working properly after system integration

Lessons From the Field

Functional integration

- TriMet (Oregon)
- Traffic Management Center (TMC) study

Jurisdictional integration

- Washington, DC metro area
- Iowa DOT

Legacy systems

- TriMet

Lessons From the Field

Functional Integration

TriMet's LED signs

- No TCP/IP standards existed for LED sign interface
- TriMet provided specs that required vendors to interface with protocols
- Such compliance ensured a modular and compatible infrastructure
- Benefits: Supports interoperability, facilitates regional integration, minimizes operations and maintenance costs

Lessons From the Field

Functional Integration

TMC Study

- 10 states
- Use of standards allows better coordination of TMC efforts
- Increased efficiency of traffic and emergency operations
- Incomplete/inaccessible information is an impediment
- Benefits: Facilitates regional integration

Lessons From the Field

Jurisdictional Integration

Washington. DC metro area

- September 11 revealed negative consequences of a lack of coordination
- No communication between different DOTs or between DOTs and transit agencies
- Emergency evacuation strategies hampered
- Benefits: Facilitates regional integration, supports interoperability

Lessons From the Field

Jurisdictional Integration

Iowa DOT

- Statewide ITS architecture emphasized interoperability between transit agencies
- Template developed for ITS contracts
- Transit agencies must agree to terms in contract template
- Benefits: Supports interoperability, makes procurements easier

Lessons From the Field

Legacy Systems

TriMet's TransitTracker

- Built upon an existing bus dispatch system and rail central control system
- Same platform for existing and proposed systems
- Saved software development time and costs
- Benefits: Minimizes future integration costs, makes procurements easier

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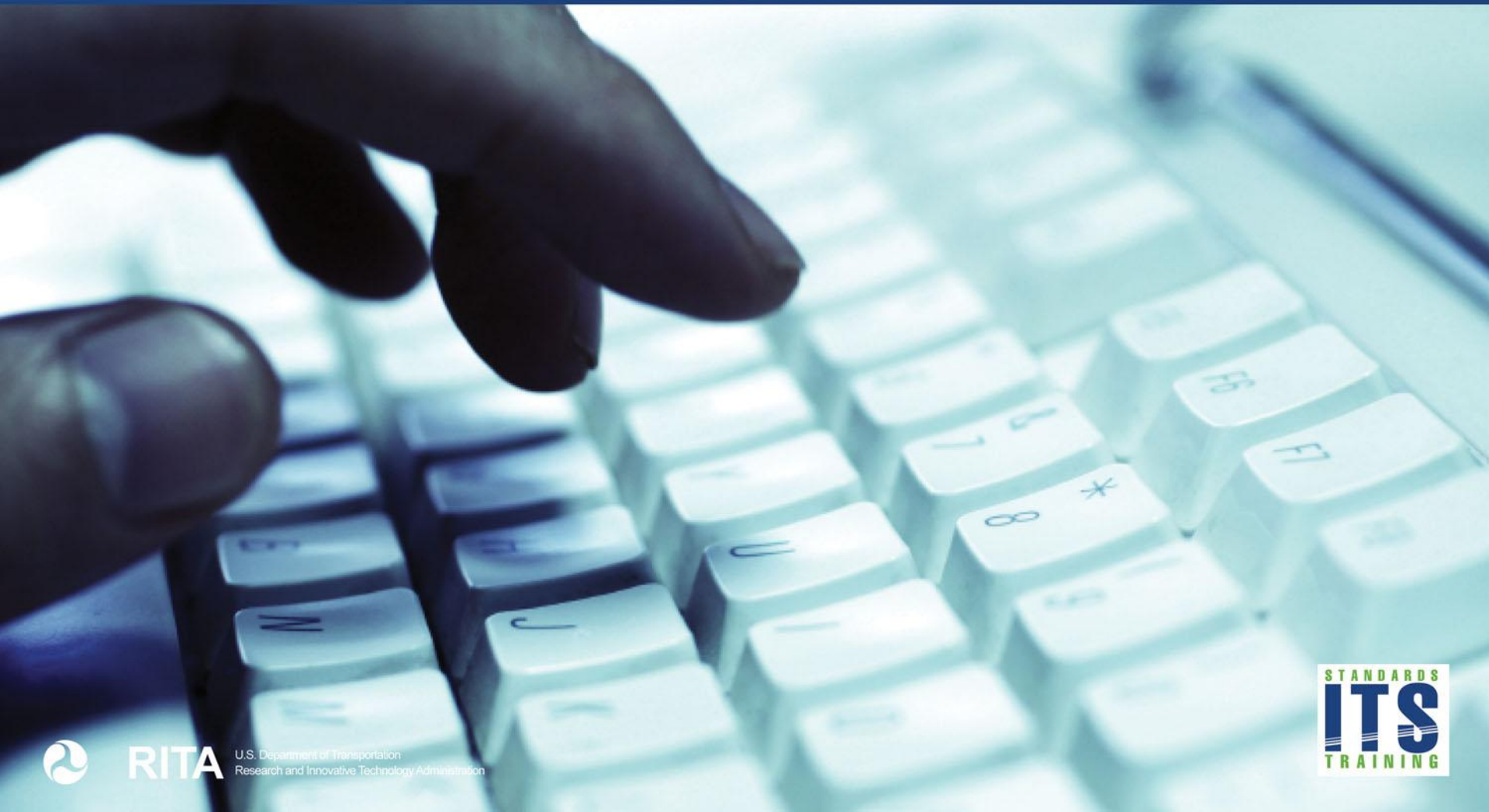

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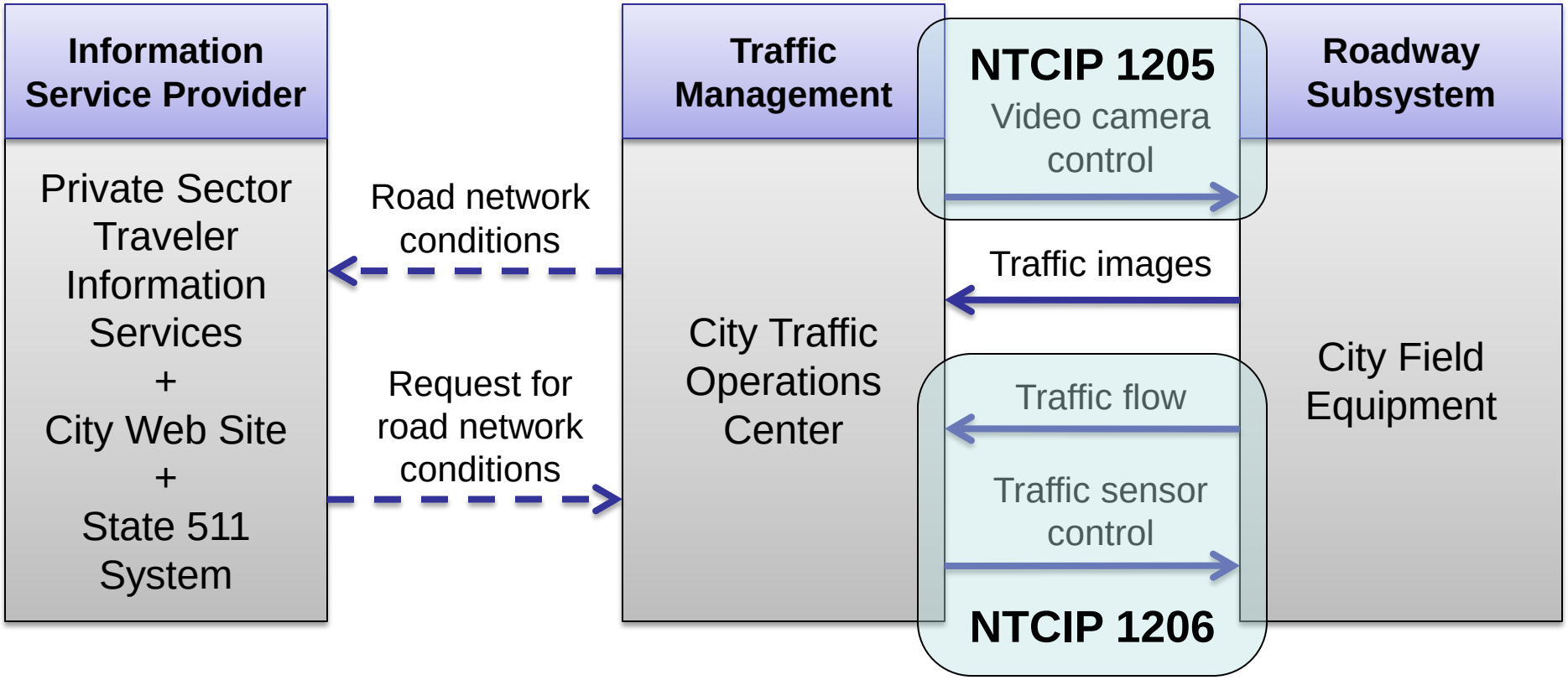
STANDARDS ITS TRAINING

Lessons From the Field

Participant Experiences

- What lessons have you learned from your own projects?
- Answer in chat pod

Role of ITS Standards in ITS Applications



Review of Learning Objectives

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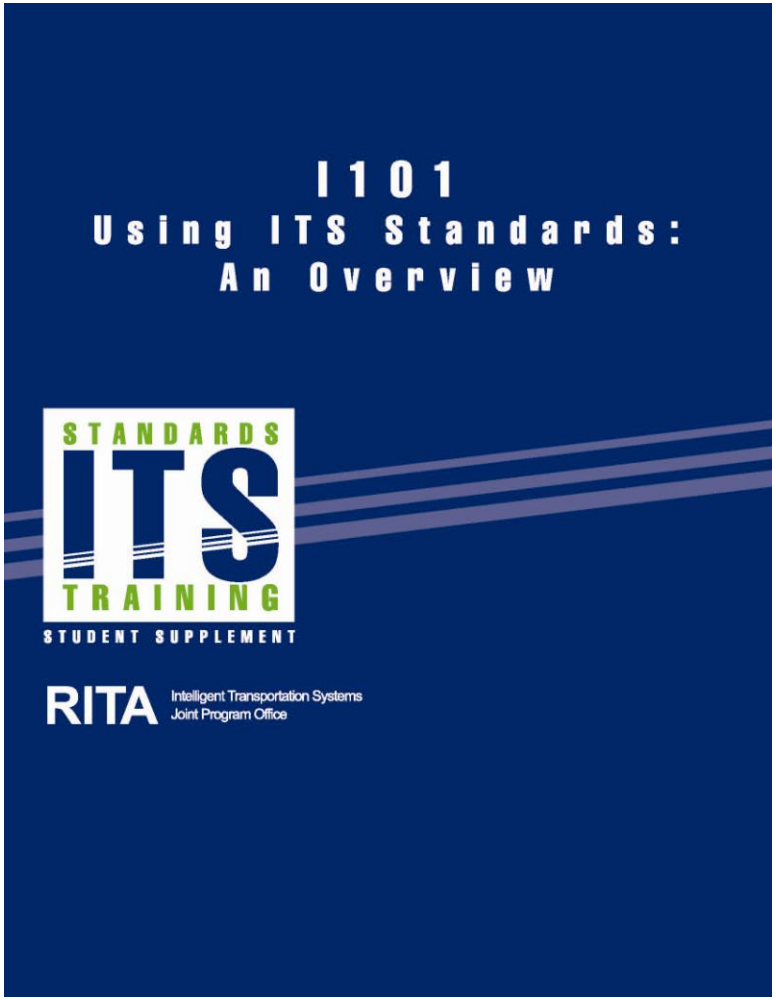
Student Supplement



- ITS Standards FAQ
- General ITS standards reference information
- ITS Architecture and Standards Final Rule (01/08/01)

QUESTIONS?

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STANDARDS ITS TRAINING

For More Information

RITA/ITS Web site

http://standards.its.dot.gov/

ITE Web site

http://www.ite.org/standards/

ITS Architecture Implementation Program

http://www.ops.fhwa.dot.gov/its_arch_imp/

NTCIP Web site

http://www.ntcip.org/

Systems Engineering Guide for ITS

http://www.fhwa.dot.gov/cadiv/segb

Next Course

A101: Introduction to Acquiring Standards-Based ITS Systems

The module provides key reference points and information for participants to be able to communicate procurement strategies for standards-compliant systems.