

# Vital Overlay System Acquisition Challenges

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# Vital Overlay System

- *'Sits Atop'* Another System
- System Safety
  - Vital, Safety-Critical
- Integrated Operation
  - Preserve Underlying System



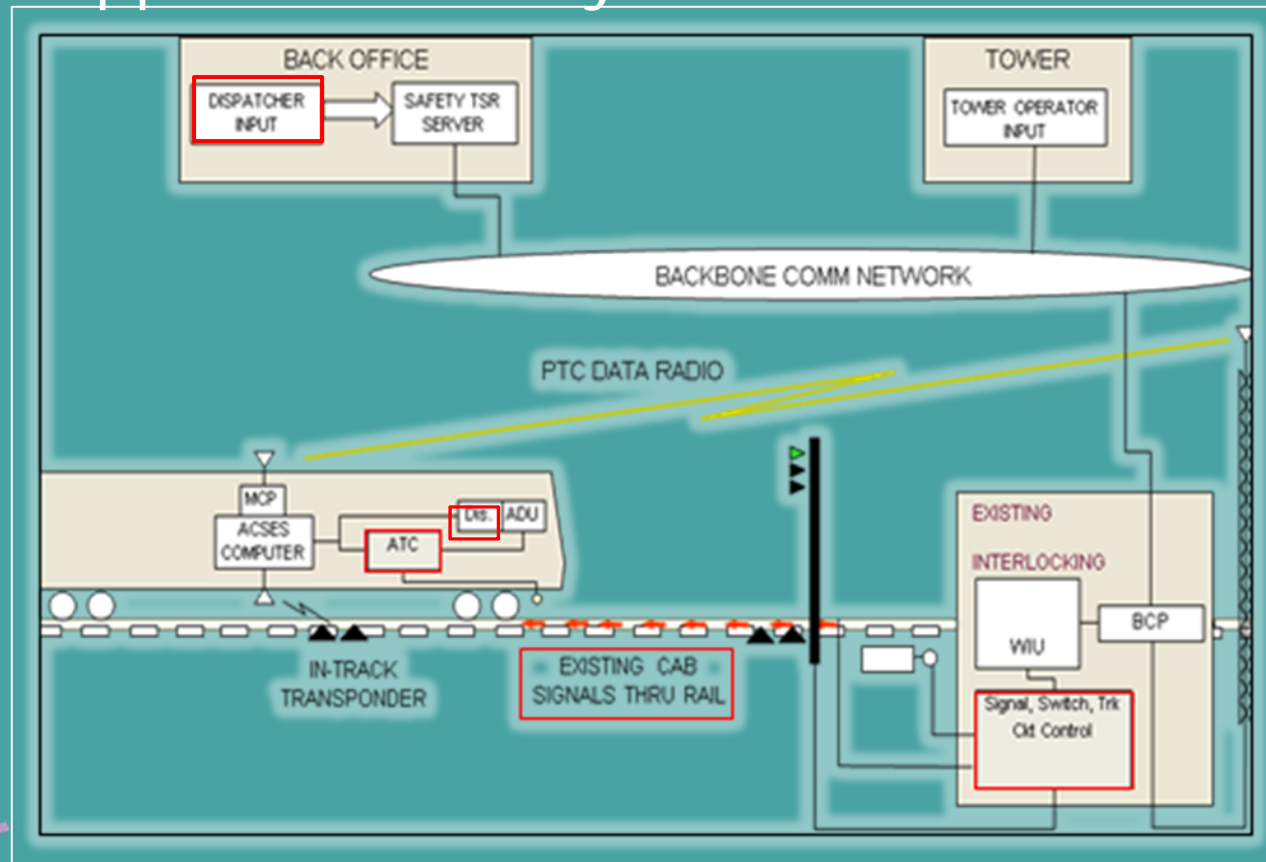
# Positive Train Control

- Need
  - Improved System Safety
  - Collision Avoidance
- FRA 49 CFR 236 Subpart I
  - Major Accidents
  - Implement 12/2015



# ASCES II

- Advanced Civil Speed Enforcement System II
  - Type Approved 27-May-10



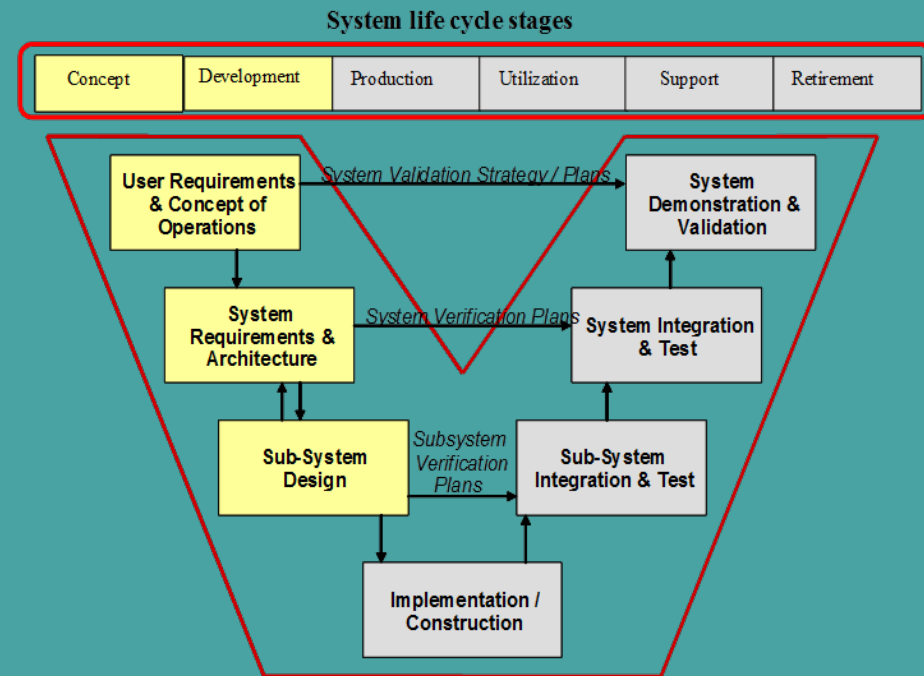
# Type Approved ACSES II

- Solution *NOT* Answer
- Railroad
  - Vehicle Types
  - Track Configurations
  - Operating Rules
- Interoperability
  - Tenants
  - Rail Corridor



# Applying Systems Engineering

- Disciplined, Mature Model
- Whole Systems Thinking
- Existing System
- Final Operation
  - Performance
  - Functionality
  - Sustainability



# PTC PUZZLE

## FRA Regulation

- Implementation Plan
- Complete To Schedule
- Safety Certification

## Operation & Maint

- PTC Functionality
- Tenant Integration
- Training

## Implementation

- Operating Railroad
- Railroad Commissioning
- System Maintainability



# Reliable PTC Functionality

- Functional Needs
  - Gap Analysis
  - Mitigate Functional Hazards
  - Operational Analysis
  - Segmentation
  - Interfaces / Interoperability
- Success
  - ✓ Commissioning
  - ✓ Performance Demonstration





# Reliable Tenant Integration

- Interoperability
  - Passenger / Freight
  - Interoperable Systems
  - Message Protocol
  - Temporal Separation
- Success
  - ✓ Host / Tenant Agreements
  - ✓ Inter/Intra Railroad Operation



# Commissioning

- Segment Implementation
  - Fully Operational Pilot
  - Segment Deployment
  - Vital Database
  - Test & Commissioning Tools
  - Change & Variance Management
- Success
  - ✓ Full Operation Acceptance



# Staffing & Training

- Operators and Maintainers
  - Staffing Plan
  - Training Program
  - Curriculum
  - Trainers
  - Tools
- Success
  - ✓ Proficient Staff
  - ✓ Proficient Instructors



# Acquisition Plan

- Complexity
- FRA & Railroad Needs
- Safe Service Delivery



## Systems Engineering

- ✓ Stakeholder Needs
- ✓ Requirements Early
- ✓ Existing Operation
- ✓ Performance
- ✓ Life-Cycle Processes

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