



U.S. Department of Transportation

ITS 4 US

IT'S TRANSPORTATION FOR ALL OF US

Task 2-I:

Comprehensive Maintenance and Operations Plan



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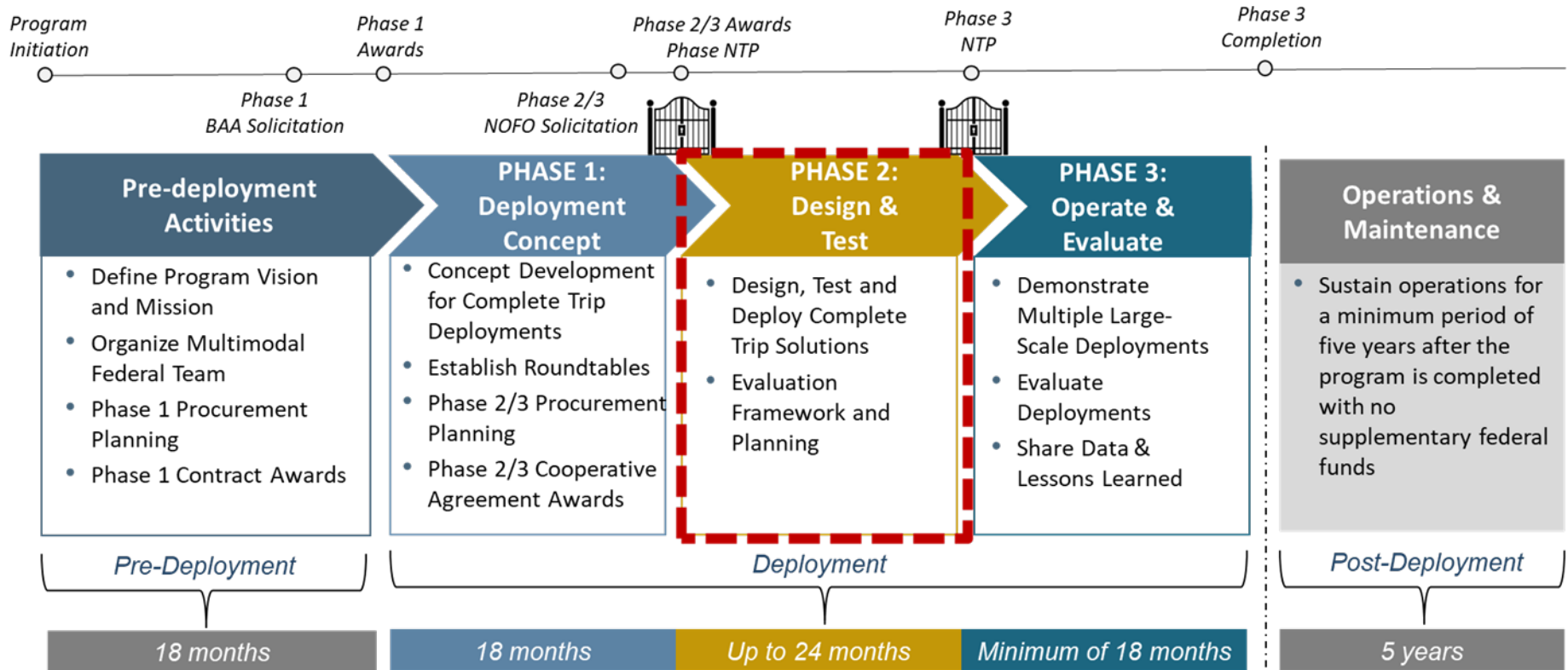
ITS4US Program Overview

- A USDOT Multimodal Deployment effort, led by ITS JPO and supported by OST, FHWA and FTA
- Supports multiple large-scale replicable deployments to address the challenges of planning and executing all segments of a complete trip

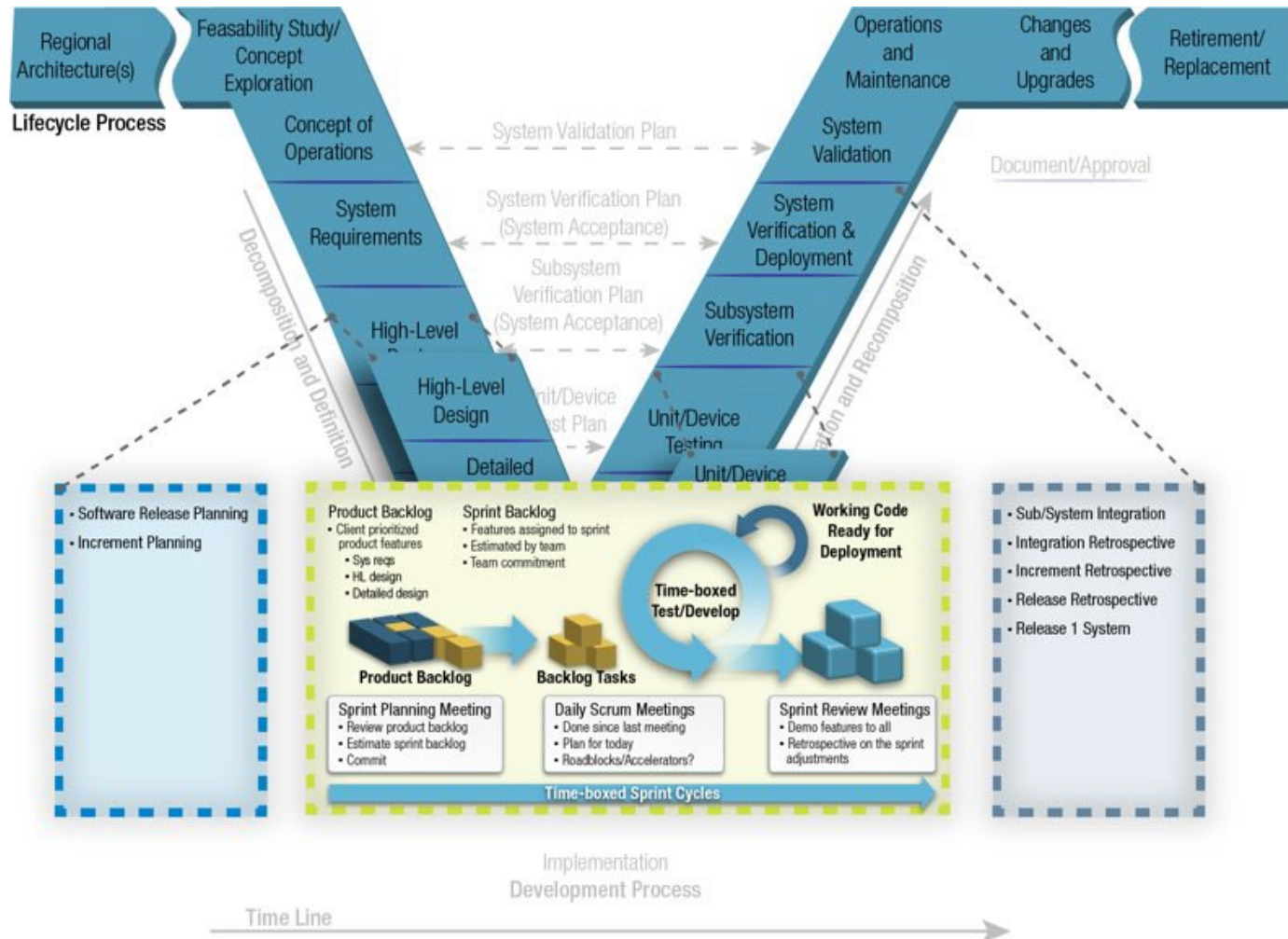


Vision: Innovative and integrated complete trip deployments to support seamless travel for all users across all modes, regardless of location, income, or disability

Deployment Phases



Systems Engineering “Vee” Diagram



(Source: FHWA 2007 and modified by Noblis 2017)

Task 2-I: Comprehensive Maintenance and Operations Plan



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2-I Maintenance and Operations Planning

Task 2-I extends from Month 12 to Month 18. This task includes planning for operations and maintenance of all components of the deployed system. The objective of this task is to develop a systematic and reliable process to ensure safe and efficient operations in Phase 3 and beyond.

Deliverables

1. Comprehensive Maintenance and Operations Plan (CMOP)

2-1 Deliverables

- Draft, Revised, and Final Comprehensive Maintenance and Operations Plan (CMOP)
 - Each site shall develop a plan that identifies the types, number, and extent of equipment and system components required for the system and associated operational and maintenance needs, processes, and supporting tools and resources.

2-1 Key Activities

- **Operations Planning**

- Identify equipment and components of the system requiring operational or maintenance activities, and methods and processes that will be used for the deployment.

- **Maintenance Planning**

- Define maintenance needs for system including inventory and configuration management processes, problem resolution methods, and supporting resources.

2-I Challenges and Possible Strategies

- **Unclear responsibilities for problem resolution**

- Issue: Lack of agreement on responsibility for troubleshooting and resolving problems during installation/deployment
- Possible Strategy: Work with vendors, suppliers, and other team members to formally establish responsibilities in Task 2-D and 2-E, including needs related to integration / cross-component issues.

- **Supply chain limitations**

- Issue: Replacement components may be unavailable on short notice
- Possible Strategy: Assess critical components needed for the deployment and component lead times during initial planning in Task 2-D and regularly assess for changes.

2-1 Lessons Learned

- Consider assessing the readiness of any system components before putting in the possession of end-users, where retrieving for troubleshooting / updates / repair can be logistically challenging.
- Capacity and standardized processes for remote / over-the-air updates can be vital for deployments with larger scale where field visits could be cost-prohibitive.
- https://www.its.dot.gov/pilots/thea_obu.htm
- https://www.its.dot.gov/press/2018/nycdot_airsupport.htm

Relationship between SE Tasks

- Phase 2 SE activities build on the SE activities in Phase 1, adding more technical detail and refining user needs and requirements as appropriate
 - Traceability between the User Needs, Requirements, System Design and Testing is very important in Phase 2
- Phase 2 activities, whether traditional waterfall processes or Agile, become more connected and interrelated
 - Acquisition plans may be heavily reliant on system requirements to drive procurement efforts
 - Installation plans will be driven by requirements and system design
 - A logical test program that builds from lower-level Unit/Component tests, to integration testing to full system testing will be verifying system requirements, validating user needs and demonstrating that the system is ready to enter operations
- Phase 2 activities can move very quickly and the USDOT SE Team is always available to help with any questions and concerns that arise during any of the Phase 2 SE activities

References for SE Session

- Phase 1 [Connected vehicle pilot deployment program phase 1 : lessons learned : final report. \(bts.gov\)](#)
- Phase 2 [Connected Vehicle Pilot Deployment Program: Driving Towards Deployment: Lessons Learned From the Design/Build/Test Phase \(bts.gov\)](#)
- [Architecture Reference for Cooperative and Intelligent Transportation](#)
- https://www.its.dot.gov/pilots/thea_obu.htm
- https://www.its.dot.gov/press/2018/nycdot_airsupport.htm
- https://www.its.dot.gov/pilots/disparate_systems.htm

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Visit the ITS4US Deployment Program Website:

<https://its.dot.gov/its4us/>

ITS4US Deployment Program Video

<https://youtu.be/pztl1lRyXAc>

