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Developing and Using a Concept of Operations In Transportation Management Systems

*The Foundation for Effective System
Development and Operations*



Purpose and Project Sponsor

- Introduce the Concept of Operations and its role in transportation management systems
- Provide an overview of guidance document
- This project was sponsored by the Transportation Management Center Pooled-Fund Committee



Presentation Outline

- What is a Concept of Operations?
- Lessons Learned in Developing and Using a Concept of Operations In Transportation Management Systems
- Available Resources to Support Concept of Operations Development and Use



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What is a Concept of Operations?

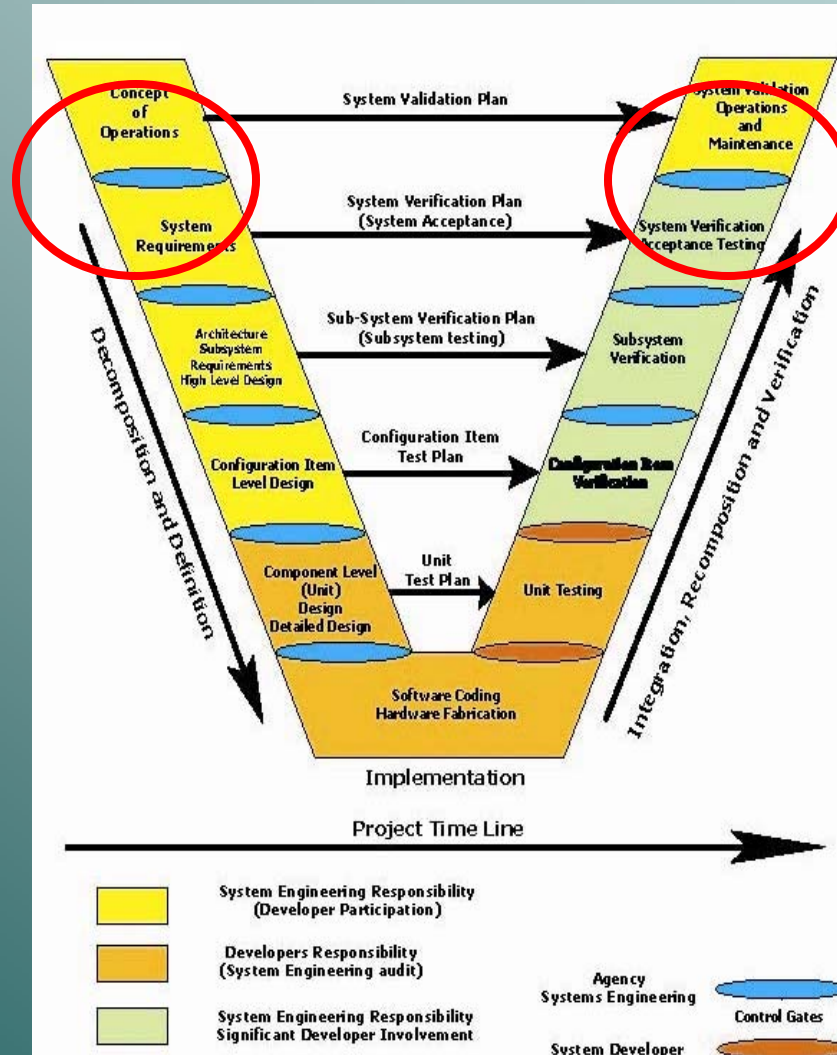


Concept of Operations

- *The Concept of Operations should be a document available, and relevant, to all stakeholders in the system, no matter what their background or role within the system. In the context of a TMS, it should be as readable and relevant to high-level decision makers as it is to the TMS manager as it is to the TMS operator. The Concept of Operations answers the who, what, when, where, why, and how for the new or existing system.*



Role Within Systems Engineering





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What Questions Will the Concept of Operations Answer?

- What – What are the known elements and the high-level capabilities of the system?
- Where – What are the geographical and physical extents of the system?
- When – What is the time-sequence of activities that will be performed?
- How – What resources do we need to design, build, or retrofit the system?
- Who – Who are the stakeholders involved with the system?
- Why – What does your organization lack that the system will provide?

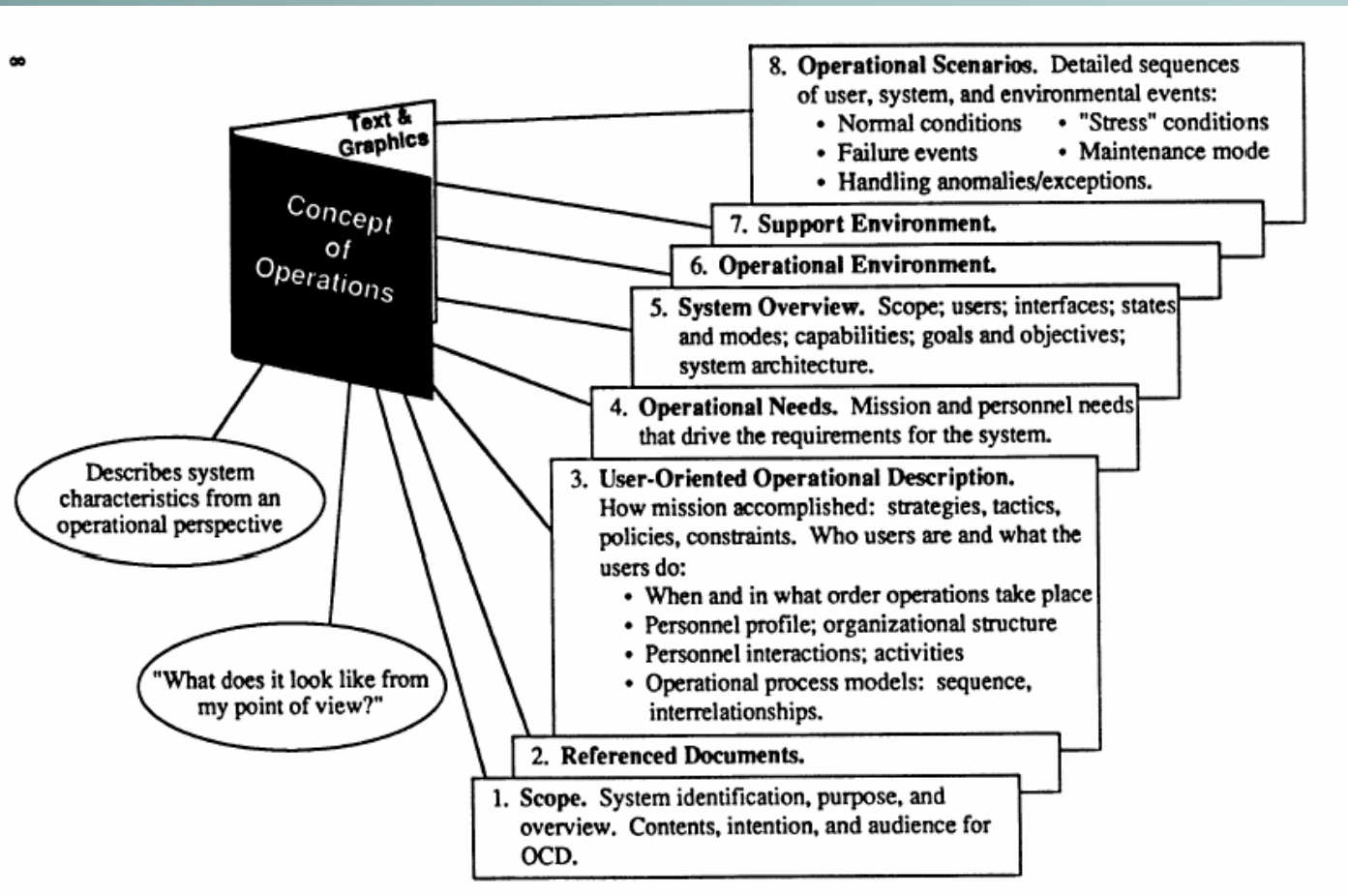


Goals of a Concept of Operations

- Stakeholder Identification and Communication
- High-level System Definition
- Foundation for Lower-level System Description
- Definition of Major User Classes and User Activities



Elements of a Concept of Operations





Scope

- The Scope section will provide an overview of the entire Concept of Operations, including the following elements
 - Outline the Contents of the Document
 - Purpose for Implementing the System
 - Highlight Major Objectives and Goals
 - Identify the Intended Audience
 - Set Boundaries on the Scope of the System
 - Describe an Overarching Vision for the System



Referenced Documents

- Referenced Documents – this section identifies resources used when developing the document. Types of reference documents that are typically listed include:
 - Business Planning Documents
 - Concept of Operations for Related Systems
 - Requirements for Related Systems
 - Studies to Identify Operational Needs
 - System Development Meeting Minutes



User-Oriented Operational Description

- This section describes the system from a user vantage point. Typical information in this section includes:
 - User Activities
 - Order of User Operations
 - Operational Process Procedures
 - Organizational/Personnel Structures



Operational Needs

- This section details agency- and region-specific goals and objectives that will drive the requirements for the system.
- The element is attempting to answer the question of what is necessary for the agency or region that would complement and improve the existing system.



System Overview

- This section provides a high-level description of the interrelationships of key system components, focusing on the interrelationships among the elements. The areas this section should address include:
 - Scope
 - Interfaces
 - System Capabilities (Functions)
 - Goals and Objectives



Operational and Supporting Environments

- This section describes the environment or “world” in which the system will operate, including information about the system’s environment in terms of the following categories:
 - Facilities
 - Equipment
 - Hardware
 - Software
 - Personnel
 - Operational Procedures
 - Support Necessary to Operate the Deployed System



Operational Scenarios

- In this element, the authors place themselves in the users' position, and detail how the new system would impact their activities under differing conditions including:
 - Stress/Failure Scenarios
 - Multiple Circumstances
- Effective scenarios include a variety of user classes

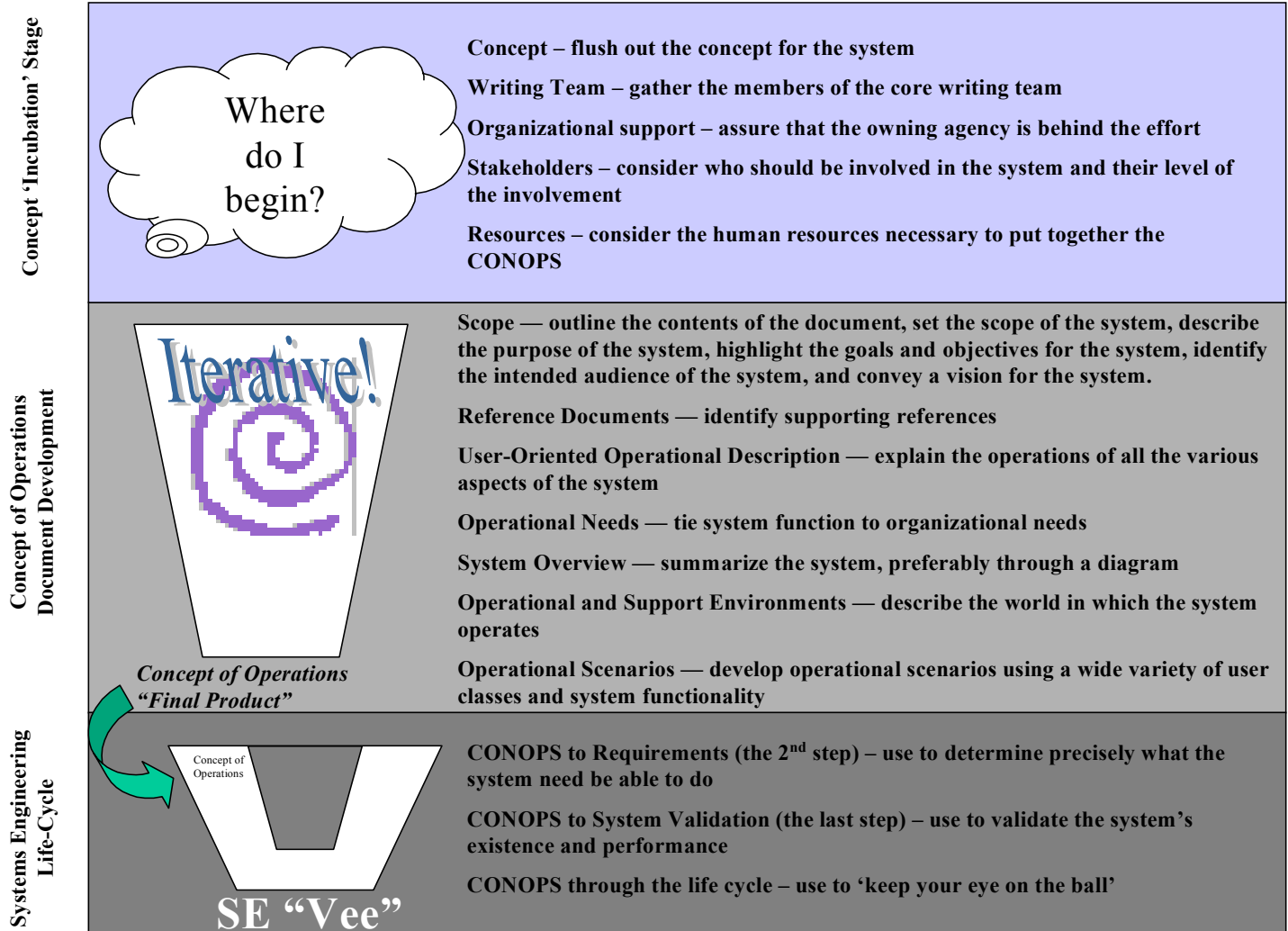


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Lessons Learned in Developing and Using a Concept of Operations In Transportation Management Systems



How to Develop a Concept of Operations





Benefits of Developing and Using a Concept of Operations

- Stakeholder Consensus
 - Create consensus on the priority of needs for an organization
 - Bridge the gap between the technical and operational sides of an organization
 - Provide continuity over the ebbs and flows of the economy and politics
- Reduction of Risk for the System
 - Reduce the risk of schedule and cost overruns
- Improvement in the quality of operations
 - Matching the agreed upon vision with the implemented, operational system



Best Practices Identified

- Active Use of Concept of Operations
 - A living document for the life-cycle of the system
 - The document should be used and updated
- Use of Graphics
 - Complex systems need diagrams to convey multiple types of information at once
 - Graphics can communicate the vision, goals, and functionality of the system in a clear, non-technical manner



Best Practices Identified

- Scenario Development
 - A broad range of user classes and operational settings will enhance the reader's understanding of the operations of the system
- Technical Writing
 - Keep the level of technical jargon as low as possible
- Stakeholder Identification
 - It is important to identify all those groups and individuals with a stake in the system, both within the scope and those that interact externally with the system



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TMC PFS Developing and Using Concept of Operations in Transportation Management Systems Document



Document Philosophy

- Relate Concept of Operations standards and guidance to transportation management systems
- Extensive use of examples of Concept of Operations documents developed for transportation management systems
- Convey guidance given by transportation professionals concerning Concept of Operations development and use



Document Foundation

- Analysis of standards
 - Guide for the Preparation of Operational Concept Documents. (ANSI/AIAA G-043-1992).
- Internet survey
- Analysis of TMS Concept of Operations documents
- Interviews with transportation professionals



Document Chapters

1. Introduction
2. Role of a Concept of Operations in Systems Engineering
3. What is a Concept of Operations
4. How to Develop a Concept of Operations
5. Using the Concept of Operations to Support Planning
6. The Next Step – Using the Concept of Operations to Drive Requirements



Other Project Resources

- Outreach Materials:
 - Concept of Operations Primer
 - Fact sheet
 - Tri-fold brochure
- Available from TMC Pooled Fund Study
Web Site @
<http://tmcdfs.ops.fhwa.dot.gov/projects.htm>



Other Concept of Operations Resources

- Guide for the Preparation of Operational Concept Documents (ANSI/AIAA G-043-1992)
- Transportation Management Center: Concepts of Operation. Intelligent Transportation Systems. Report No FHWA-OP-99-029
 - http://www.itsdocs.fhwa.dot.gov/jpodocs/rept_mis/8v@01!.pdf
- National ITS Architecture
 - <http://www.its.dot.gov/arch/arch.htm>