

Appendix R

Concept of Operations Template

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1. Overview

The first section of the Concept of Operations (ConOps) document provides four elements: system identification, an overview of the document, a high-level overview of the proposed system, and a brief description of the scope of effort required to take the system from the current state to the final future state of deployment that will be achieved at the conclusion of the proposed deployment. These elements are described in the following sections.

1.1 Identification

This section contains the proper title, identification number, and abbreviation, if applicable, of the system or subsystem that the ConOps applies to. If a system's related ConOps documentation has been developed in a hierarchical manner, the position of this document relative to other ConOps documentation should be described.

1.2 Document Overview

This section summarizes and expands on the purpose for the ConOps document. The intended audience for the document should also be described. The audience can be a variety of people from multiple parties with various levels of technical knowledge. Therefore, it is important that the document be clearly written to clearly define technical terms, and utilize layman English for the majority of the text. This section of the ConOps also outlines the remaining parts of the document. The purposes of a ConOps document will, in most cases, be:

- To communicate user needs and the proposed system expectations
- To communicate the system developer's understanding of the user needs and how the system will meet those needs

The ConOps document might also serve other purposes, such as building consensus among several user groups or developers, or the document may be summarized for a press release or information brochure.

1.3 System Overview

This section briefly states the purpose of the proposed system or subsystem to which the ConOps applies. It describes the general nature of the system, and identifies the project sponsors, user agencies or departments; system developers; maintenance and support entities; evaluation and certification entities; and the operating centers or sites that will run the system. It also identifies other documentation that is relevant to the present or proposed system.

A high-level graphical overview of the system is strongly recommended. This can be in the form of a physical layout diagram, a top-level functional block diagram, or some other type of diagram that depicts the system and its environment. Documentation that might be cited includes, but is not limited to, project authorizations, relevant technical documentation, significant correspondence, documentation concerning related projects, risk analysis reports, and feasibility studies.

2. Referenced Documentation

This section lists the publisher, document identification number, title, revision, and date of all documentation referenced in the ConOps document. This section should also identify a contact for all documents not available through normal channels.

3. Current System Situation

This section of the ConOps describes the problem to be solved, and the system or situation as it currently exists. This section basically answers the following questions.

- What is the system?
- What is the system supposed to do?
- Who owns, operates, and maintains the system?
- How well does the system perform?
- What is the system's geographic coverage?
- When is the system used?
- How does the system operate?
- What other systems does it talk to?

The current system could be an older technology-based system or one where manual processes are in place. If there is no current system, this section will describe the reasons and motivations for developing the system. In addition, this section will introduce the problems, needs, issues, and objectives that need to be addressed by the proposed system. This enables the reader to better understand the reasons for the desired changes and improvements. Specific elements that may be documented in this section are outlined in the sections below.

3.1 Background, Objectives, and Scope

This section should provide an overview of the current system or situation, including the background, mission, objectives, and scope of the current system, as applicable.

3.2 Operational Constraints

This section should include a description of limitations on the operational characteristics of the system. This could include limits on hours of operation, hardware limitations, or resource limitations.

3.3 Description of the Current System or Situation

This section should provide a thorough description of the current system, including operational characteristics; major system components; component interconnections; external system interfaces; current system functions; diagrams illustrating inputs, outputs, and data flows, such as ITS architecture market package diagrams; system costs; and performance statistics. Include a brief description of user classes and other people who interact with the system. A user class is distinguished by the way users interact with the system, and is classified according to common responsibilities, skill levels, work activities, and the ways they interact with the system.

3.4 User Profiles

This section should include a description of how the users interact with the system and the scenarios that occur when they interact with the system. The section should also discuss how the users interact with each other. For example, a supervisor user class may have certain capabilities that an operator class may not have with the system, and the ConOps should describe when, why, and how such an interaction takes place to achieve a system objective or function.

3.5 Support Environment

This section should describe how the system is supported and maintained, including the maintaining department or agency; facilities; equipment; support software or hardware; and repair or replacement criteria. The section should also identify whether the District will maintain the system or a vendor will be contracted to maintain the system according to a level of service (LOS) agreement.

4. Justification and Nature of the Changes

This section describes the shortcomings of the current system or situation that motivate development of a new system or modification of an existing system, and also describes the nature of the desired changes assumptions for the proposed system. This section provides a transition from the third section of a ConOps, which describes the current system or situation, to the fifth section, which describes the proposed system. If there is no current system on which to base changes, this section should so indicate and provide justification for the features of the new system. Specifically, this section should include the information detailed in the following sections.

4.1 Justification for Changes

This section should include the reasons for developing the proposed system, including:

- New or modified user needs, missions, or objectives
- Dependencies or limitations of the current system

4.2 Description of the Desired Changes

This section should include a summary of the new or modified capabilities, functions, processes, interfaces, and other changes needed to respond to the justifications previously identified. This shall include:

- Capability changes (i.e., functions and features to be added, deleted, or modified);
- System processing changes (i.e., changes in the process or processes of transforming data that will result in new output with the same data, the same output with new data, or both)

- Interface changes (i.e., changes in the system that will cause changes in the interfaces and changes in the interfaces that will cause changes in the system)
- Personnel changes (i.e., changes in personnel caused by new requirements)
- Environmental changes (i.e., changes in the operational environment)
- Operational changes (i.e., changes to the user's operational policies, procedures, or methods)
- Support changes (i.e., changes in the support or maintenance requirements)
- Other changes (i.e., a description of other changes that will impact the users)

4.3 Change Priorities

This section should include any prioritization or ranking regarding the proposed changes. The section should define what features are essential, what features are desirable, and what features are optional.

4.4 Changes Considered but Not Included

This section should include significant changes or features that were assessed but not included in the proposed system description. This information is included to assist others in knowing what other options were considered and why they were not included.

4.5 Assumptions and Constraints

This section describes assumptions or constraints applicable to the changes and new features identified in this section. This should include all assumptions and constraints that will affect users during development and operation of the new or modified system.

5. Concepts for the Proposed System

This section describes the proposed system that results from the desired changes specified in the fourth section of the ConOps document. The format follows the format of the third section to make it easy to understand the role of the proposed system in solving the problem stated in the beginning of the document. This includes a high-level description of the proposed system that indicates the operational features to be provided without specifying design details. Methods of description to be used and the level of detail in the description will depend on the situation. The level of detail should be sufficient to fully explain how the proposed system is envisioned to operate in fulfilling user needs and requirements.

In some cases, it may be necessary to provide some level of design detail in the ConOps. The ConOps should not contain design specifications, but it may contain some examples of typical design strategies for the purpose of clarifying the proposed system's operational details. In the event that actual design constraints need to be included in the description of the proposed system, they shall be explicitly identified as requirements to avoid possible misunderstandings.¹

Specifically, the fifth section should include information on the:

- Proposed system's background, objectives, and scope
- Operational policies or constraints imposed on the proposed system
- Description of the proposed system
- Modes of operation
- User involvement and interaction
- Support environment

5.1 Background, Objectives, and Scope

An overview of the new or modified system, including the background, mission, objectives, and scope, should be provided, as applicable. In addition to providing the proposed system's background, a brief summary of the system's motivation should be provided. The goals for the new or modified system should also be defined, as well as the strategies, solutions, tactics, methods, and techniques proposed to achieve those goals.

⁸¹ If some of the proposed system's features are the same as the original system's features, then a comment indicating that there is no change should be included for that element.

5.2 Operational Policies and Constraints

The operational policies and constraints that apply to the proposed system should be described. This includes, but is not limited to, such elements as hours of operation, staffing constraints, space constraints, and hardware constraints.

5.3 Description of the Proposed System

A thorough description of the proposed system should be provided that includes:

- Operational environment and its characteristics
- Major system components and the interconnections among these components
- Interfaces to external systems or procedures
- Capabilities or functions of the proposed system
- Relationship to other systems
- Conformity and compatibility to the *SITSA* and *RITSA*s
- Charts and accompanying descriptions that depict inputs; outputs; data flows; and manual and automated processes so the proposed system or situation is sufficiently understood from the user's point of view
- Cost of system operations
- Deployment and operational risk factors
- Performance characteristics
- Quality attributes, such as reliability, accuracy, availability, expandability, flexibility, interoperability, maintainability, portability, reusability, supportability, survivability, and usability
- Provisions for safety, security, privacy, integrity, and continuity of operations in emergencies

Since the purpose of this section is to describe the proposed system and how it should operate, it is important that the description of the system be simple and clear enough that all intended readers can fully understand it. It is important to keep in mind that the ConOps should be written in the user's language. Graphics and pictorial tools should be used wherever possible. Useful graphical tools include, but are not limited to, the contract work breakdown structure (CWBS); sequence or activity charts; functional block diagrams; and relationship diagrams.

The description of the operational environment should identify the facilities, equipment, computing hardware, software, personnel, and operational procedures needed to operate the proposed system. This description should be as detailed as necessary to give the readers an understanding of the numbers, versions, capacity, etc., of the operational equipment to be used.

The author(s) of a ConOps should organize the information in this section as appropriate to the proposed system, as long as a clear description of the proposed system is achieved. If parts of the description are voluminous, they can be included in an appendix or incorporated by reference. An example of material that might be included in an appendix would be a data dictionary. An example of material to be included by reference might be a detailed operations or policy manual.

5.4 Modes of Operation

This section should describe the proposed system's various modes of operation. Examples of modes of operation include standard, after-hours, maintenance, emergency, training, or backup.

5.5 User Involvement and Interaction

The users and the way they interact with the system should be described. This section should include the identification of the users, organizational structure, skill levels, roles, work activities, methods of interacting with the system, and system interaction scenarios. In addition, the interactions among users should be identified and defined.

5.6 Support Environment

The support and maintenance concepts and environment for the proposed system should be documented. This section should include the support agency or agencies; facilities; equipment; support software; repair or replacement criteria; maintenance levels and cycles; and storage, distribution, and supply methods.

6. Operational Scenarios

A scenario is a step-by-step description of how the proposed system should operate and interact with its users and its external interfaces under a given set of circumstances. Scenarios are written in layman's language and should be nontechnical as much as possible. Scenarios should be described in a manner that will allow readers to walk through them and gain an understanding of how all the various parts of the proposed system function and interact. The scenarios tie together all parts of the system, users, and other entities by describing how they interact. Scenarios may also be used to describe what the system should not do.

Scenarios should be structured so that each describes a specific operational sequence that illustrates the role of the system, and its interactions with users and other systems. Operational scenarios should be described for all operational modes of the proposed system. Each scenario should include events, actions, inputs, information, and interactions as appropriate to provide a comprehensive understanding of the operational aspects of the proposed system.

It may be necessary to develop several variations of each scenario, including one for normal operation, one for exception handling, one for degraded mode operation, etc.

Scenarios play several important roles. The first is to bind together all of the individual parts of a system into a comprehensible whole. Scenarios help the readers of a ConOps document understand how all the pieces interact to provide operational capabilities. The second role of scenarios is to provide readers with operational details for the proposed system; this enables them to understand user roles, how the system should operate, and the various operational features to be provided.

In addition, scenarios can serve as the basis for the first draft of a users' manual and as the basis for developing acceptance test plans. The scenarios are also useful for the FDOT and the developer to use when verifying that the system design will satisfy user needs and expectations.

Creative writing and graphics should be employed to make the scenarios interesting and easy to read. A good ConOps will have a story line that features different characters that relate to the situation and environment where the proposed system is being contemplated. The story line will have a common thread that weaves through all the characters as they interact with the system. Story lines should be selected that highlight key system features based on the initial understanding of the problem to be solved and the user needs so that readers can understand the consequences of their needs when they are translated to a system that meets those needs.

Scenarios are an important component of a ConOps and, therefore, should receive substantial emphasis. The number of scenarios and level of detail specified will be proportional to the complexity and criticality of the project.

7. Summary of Impacts

This section describes and summarizes the operational impacts of the proposed system from the users' perspective. This section can also include a description of the temporary impacts that can be realized during the development, installation, or training periods. This information is provided to allow all affected departments to prepare for the changes that will be brought about by the new system, and to allow the FDOT divisions/departments or other agencies to plan for the impacts. Impacts can be characterized into several areas, including operational impacts, organizational impacts, and developmental impacts

8. Analysis of the Proposed System

This section provides a summary of the benefits, limitations, advantages, disadvantages, alternatives, and trade-offs considered for the proposed system. Improvements to the system should be documented. This includes a qualitative and quantitative summary of the benefits to be provided by the proposed system, and can include new capabilities, enhanced capabilities, deleted capabilities, and improved performance. In addition, any disadvantages or limitations should also be provided.

The major alternatives considered, the trade-offs among them, and the rationale for the decisions reached should be summarized in this section. In the context of a ConOps document, alternatives are operational alternatives and not design alternatives, except to the extent that design alternatives may be limited by the operational capabilities desired in the new system. This information can be useful in determining, now and later, whether a given approach was analyzed and evaluated, or why a particular approach or solution was rejected.

This section should describe the proposed system's rough order of magnitude (ROM) cost based on assumptions that are clearly listed. An approximate schedule for the development based on months after contract award (MACA) should also be included.

9. Notes

This section should contain any additional information that will aid in understanding the ConOps document. If there are no notes, this section should still be included with the notation that there are no notes at this time. Subsequent revisions of the ConOps usually require that notes be added.

10. Appendices

To facilitate the ConOps' ease of use and maintenance, some information may be placed in appendices to the document. Each appendix should be referenced in the main body of the document where that information would normally have been provided. Appendices may be bound as separate documents for easier handling.

11. Glossary

The inclusion of a clear and concise compilation of the definitions and terms used in the ConOps document that may be unfamiliar to readers is important. A glossary should be maintained and updated during the ConOps' concept analysis and development processes. To avoid unnecessary work due to misinterpretations, all definitions should be reviewed and agreed upon by all involved parties.

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