

NOAA/NESDIS



NESDIS-TPL-1306.1 CONCEPT OF OPERATIONS TEMPLATE

September 2019



Prepared by:
U.S. Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite, Data, and Information Service (NESDIS)



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Approval Page

Document Number: NESDIS-TPL-1306.1	
Document Title Block: NESDIS CONCEPT OF OPERATIONS TEMPLATE	
Document Owner: David Spencer	Document Release Date: September 30, 2019

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29 Sept. 19

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9/30/2019

Date:



Document Change Record

VERSION	Description	CCR #	Revised Sections	Date
1.0	Initial version		All	Sep 26, 2019



1 PURPOSE

The purpose of this template is to provide guidance to develop a Concept of Operations (CONOPS) document for projects.

2 APPLICABILITY

This document is applicable to all projects that follow the NESDIS project initiation and approval process

3 AUTHORITY

NESDIS-PD-1110.1, NESDIS Systems Engineering and Program Management Policy.

4 APPLICABLE DOCUMENTS

- a) NESDIS-PD-1100.1, NESDIS Enterprise Directives Publication Policy.
- b) NESDIS-PR-1220.1, NESDIS Project Approval Procedural Requirements.
- c) NESDIS-PR-1300.1, NESDIS Systems Engineering Procedural Requirements.

5 REFERENCE DOCUMENTS

IEEE Concept of Operations (CONOPS) Document Template, IEEE Standard 1362-1998.

6 GUIDANCE

- a) A CONOPS document is developed for all projects that go through the project initiation and approval process.
- b) A preliminary CONOPS is developed during the initial concept study, as described in the Project Approval Procedural Requirements.
- c) The CONOPS is updated during the detailed concept design phase.

7 APPROVALS

- a) The CONOPS must be approved by the project manager, the Director of OSAAP, and the Milestone Decision Authority (MDA).
- b) Other signatories are determined by the Integration Council (IC) prior to the Initial Concept Study.

8 ATTACHMENT

NESDIS Concept of Operations (CONOPS) Template.

ATTACHMENT: NESDIS Concept of Operations (CONOPS) Template

NOAA/NESDIS



NESDIS-CONOPS-Doc#

PROJECT NAME

CONCEPT OF OPERATIONS (CONOPS)

Month yyyy



Prepared by:

U.S. Department of Commerce

National Oceanic and Atmospheric Administration (NOAA)

National Environmental Satellite, Data, and Information Service (NESDIS)



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Approval Page

Document Number: NESDIS-CONOPS-Doc #	
Document Title Block: NESDIS {PROJECT NAME} CONCEPT OF OPERATIONS	
Document Owner: Name	Document Release Date: Month dd, yyyy

Prepared by:

Name
Office

Date:

Approved by:

Name
Project Manager

Date:

Name
Director, OSAAP

Date:

Name
Office

Date:



Document Change Record

VERSION	Description	CCR #	Revised Sections	Date



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PREFACE

P.1 PURPOSE

Describe the purpose of this CONOPS.

The CONOPS is a key architectural document describing the concept of operations from the perspectives of stakeholders. It helps build consensus among the stakeholders about the scope of the project and the target operation envisioned.

P.2 APPLICABILITY

This document is applicable to all projects that follow the NESDIS project initiation and approval process described in the NESDIS Project Approval Procedural Requirements document (NESDIS-PR-1220.1). A preliminary CONOPS is developed during the initial concept study. It is updated during the detailed concept design phase.

P.3 AUTHORITY

NESDIS-PD-1110.1, NESDIS Systems Engineering and Program Management Policy.

P.4 APPLICABLE DOCUMENTS

1. NESDIS-PD-1100.1, NESDIS Enterprise Directives Publication Policy
2. NESDIS-PR-1220.1, NESDIS Project Approval procedural requirements
3. NESDIS-PR-1300.1, NESDIS Systems Engineering Procedural Requirements

Include other applicable documents.



1. Introduction

This section introduces the program with its scope, operations of capability and/or system changes in the context of the NESDIS enterprise transformation. It contains an overview of the CONOPS Document, the intent for its use in conjunction with Program/Project documentation, and other NESDIS CONOPS documents.

The audience of this document can be a variety of stakeholders from multiple parties with various levels of technical knowledge. Therefore, it is imperative that the document utilize layman's terms to the greatest extent possible and clearly define any important technical terms for the content of this entire document.

1.1. Document Overview

This CONOPS is a key architectural document describing the concept of operations from the perspectives of stakeholders such as owners, subject matter experts (SMEs), enterprise architects, system architects, business users, system engineering staff, and others in the program. The purposes of this document include:

- Building consensus of common understanding among the stakeholders about the scope of the program and the target operation envisioned.
- Laying out an architectural basis for the target operations design and requirements specification in support of capability development and meeting operational expectations.
- Communicating to system engineers a complete picture of mission needs so that capability development and the capability transition make the vision of improved NESDIS operations a reality.
- Add program specific purposes.

1.2. Program Overview

This section briefly describes the context of a program and operations transition of NESDIS capabilities or systems to which this CONOPS applies. It may include goals and objectives of the program that transfers the operation from the current state to the final future state of deployment, which may associate with a program implementation plan.

A graphical overview of the operations transition of capabilities or systems is strongly recommended. It may describe the general nature of the operation transition within NESDIS enterprise and the program sponsors.



2. Current Operation or Situation

This section describes the operation as it currently exists, and may introduce problem statements. This enables the audience to understand the reasons for the desired changes and improvements, especially in cases where the current operation is out of date with current circumstances.

If operation of a new capability is being introduced by this program, this section may be touched lightly, describing the needs, issues, and objectives to be addressed by the new system.

2.1. Background, Objectives, and Scope

This paragraph shall describe the background, mission or objectives, and scope of the current operation or situation.

2.2. Operational Policies and Constraints

This paragraph shall describe any operational policies and constraints that apply to the current operation or situation.

2.3. Description of Current Operation or Situation

This section provides a description of the current operation or situation enabled by a set of systems, identifying differences associated with different states or modes of operation (for example, regular, maintenance, training, degraded, emergency, alternative-site, wartime, peacetime). The distinction between states and modes is up to the CONOPS author. A system may be described in terms of states only, modes only, states within modes, modes within states, or any other scheme that is useful. If the system operates without states or modes, this paragraph shall so state, without the need to create artificial distinctions. The description may be extrapolated and/or referenced from the enterprise architectures. The description should include, as applicable:

- The operational environment and its characteristics
- Major operational components and the interconnections among these components, operational nodes, activities performed at each node, connectivity's & information flow between nodes, information exchanged between nodes and the relevant attributes of that exchange such as media, quality, quantity, and the level of interoperability required
- Interfaces to external systems or procedures
- Capabilities or functions of the current operation to include activities and relationships among activities, inputs and outputs, constraints (e.g. policy, guidance), and mechanisms that perform those activities. In addition to showing mechanisms, overlays can show other pertinent information.
- Charts and accompanying descriptions depicting inputs, outputs, data flows, control flows, and manual and automated processes sufficient to understand the current operation or situation. This section may include the data requirements and structural business process rules of the operational viewpoint
- Performance characteristics, such as speed, throughput, volume, frequency



- Quality attributes, such as reliability, maintainability, availability, flexibility, portability, usability, and efficiency
- Provisions for safety, security, privacy, and continuity of operations in emergencies

2.4. User and affected personnel

This section describes the types of users or operators, or personnel involved in the current situation, including, as applicable, organizational structures, training and skills, responsibilities, activities, and interactions with one another. This section may include organizational views detailing the users and roles/responsibilities, and organizational relationships.

2.5. Support Environment

This paragraph shall provide an overview of the support environment for the current system, including, as applicable to this document, support agencies, facilities, equipment, support software, repair or replacement criteria, maintenance levels and cycles, storage, distribution, and supply methods.



3. Concept of the Target Operation

A brief context and overview of the concepts of target operation.

This section describes the target operation with solution and the desired features of the operations. A high-level graphical overview of the future operation is strongly recommended. The level of detail should be sufficient for fully explaining what the target operation is envisioned and how the operation fulfills the needs of stakeholders. Approach of description to be used and the level of detail in the description could depend on the specificity of the target operation.

In some cases, it may be necessary to provide some level of design detail in the CONOPS. The CONOPS should not contain design specifications. However, it may contain some examples of typical design strategies, for the purpose of clarifying operational details of the target operation. In the event that actual design constraints need to be included in the description of the target operation, they shall be explicitly identified as required to avoid possible misunderstandings.

3.1. Background, Objectives and Scope

This section provides a brief summary of the context of the operation developed and transferred by the program. It describes the motivation and mission of the program according to NESDIS strategic plan(s), with desired features, tactics, methods, and techniques envisioned to achieve those goals.

List of objectives with description of desired capabilities that accomplish the mission goals, which are associated with NESDIS requirement level 0.

3.2. Assumption, Policies and Constraints

This section describes operational policies and constraints that are applicable to the NESDIS enterprise and this target operation,

- Guidelines for standards compliances (e.g. NOAA/NESDIS directives)
- Limitations and policies on technology
- Limitations on operation environment

3.3. A high-level graphical overview of the target operation

The graphical diagram shall be used to illustrate overall operational concepts of how the mission goals and objectives are accomplished and achieved, and description of the target operation of the capability. This can be in the form of a physical layout diagram, a top-level functional capability block and node diagram, or some other type of diagram as needed that depicts the operation, its environment, and users.



3.4. Description of the target operation

This section provides a description of the target operation illustrated in the last section, including the following, as appropriate:

- The operational environment and its characteristics;
- Capabilities or functional nodes of the target operation and anticipated outputs or products that the operation produces
- Major components of the operation and the interconnections among these components;
- Interfaces to external systems or procedures;
- Conceptual level charts and accompanying descriptions depicting inputs, outputs, data flow, and manual and automated processes sufficient to understand the target operation or situation from the stakeholder's point of view;
- Performance characteristics, such as speed, throughput, volume, frequency;
- Quality attributes, such as: reliability, availability, correctness, efficiency, expandability, flexibility, interoperability, maintainability, portability, reusability, supportability, survivability, and usability; and
- Provisions for safety, security, privacy, integrity, and continuity of operations in emergencies.

Since the purpose of this section is to describe the target operation and how it should operate, it is appropriate to introduce tools and/or techniques that serve the purpose. It is important that the description of the operation be simple enough and clear enough that all intended audiences of the document could fully understand it. It is important to keep in mind that the CONOPS shall be written in the plain English language.

3.5. User and other involved personnel

This section describes the types of users or operators, or personnel involved in the target operation including, as applicable, organizational structures, training and skills, responsibilities, activities, and interactions with one another. This section may include organizational views of detailing the users and roles/responsibilities, and organizational relationships.

3.5.1 User classes

This section can be further divided into lower-level sections if it is helpful in communicating the content.

User classes can be defined by the roles that users acts on in the operation. Different user classes may have distinct operational scenarios for their interactions with operational nodes/systems. In this context, a user is anyone who will interact in the target operation, including operational users, data entry personnel, system operators, operational support personnel, system maintainers, etc.



Each user class for the target operation, including operators and maintainers, should be described in a separate section. Each section should provide a description of the user class, including responsibilities, required skill level, activities, and envisioned modes of interactions for the target operation.

3.5.2 Interactions among users

This section describes interactions among the various user classes that may be involved in the target operation. In particular, interaction among user groups, operators, and maintainers should be described. Interactions that will occur among the users of the target operation, and between users and non-users, both within the organization and across interfacing organizations, if they are relevant to the operation of the target operation, should be described. Informal as well as formal interactions should be included.

3.6. Support Environment

This section describes the support concepts and support environment for the target operation, including the support agency or agencies; facilities; equipment; support software; repair or replacement criteria; maintenance levels and cycles; and storage, distribution, and supply methods.

3.7. Operational Scenarios

This section provides envisioned operational concepts that will be directly associated with operational processes specification and support the capability planning. The operational scenarios should be about concepts envisioned by SMEs on how these operations are performed from various perspectives, e.g. business processes, operational functions, data, business rules, users, security, operation mode, continuation, system, etc.

A scenario is a step-by-step description of how the target operation should operate and interact with its users and its external interfaces under a given set of circumstances. 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 target operation function and interact. The scenarios tie together all parts of the system, the 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 organized into clauses and sections, each describing an operational sequence that illustrates the roles of the system, its interactions with users, and interactions with other systems. Operational scenarios should be described for all operational modes and all classes of users identified for the target operation. Each scenario should include events, actions, stimuli, information, and interactions as appropriate to provide a comprehensive understanding of the operational aspects of the target operation. Prototypes, storyboards, and other media, such as video or hypermedia presentations, may be used to provide part of this information.

In most cases, it will be necessary to develop several variations of each scenario, including one for normal operation, one for stress load handling, 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 target operation; this enables them to understand the users' roles, how the system should operate, and the various operational features to be provided.

Scenarios can also support the development of simulation models that help in the definition and allocation of derived requirements, identification, and preparation of prototypes to address key issues.

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

Scenarios can be presented in several different ways. One approach is to specify scenarios for each major processing function of the target operation. Using this approach, this clause would contain one section for each process. Each section would then contain several more lower-level sections, one for each scenario supported by that process. An alternative approach is to develop thread-based scenarios, where each scenario follows one type of transaction type through the target operation. In this case, each section would contain one scenario for each interaction type, plus scenarios for degraded, stress loaded, and back-up modes of operation. Other alternatives include following the information flow through the system for each user capability, following the control flows, or focusing on the objects and events in the system.

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



4. Analysis of the operations transition

This section lays out the concepts that supports enterprise transformation planning and tasking planning.

4.1. Justification for and nature of changes

This section describes the shortcomings of the current operation or situation that motivate development of a new capability or modification of an existing operation. It provides a capability transition from current operation or situation described in the Section 2 to the target operation described in Section 3. If there is no current operation on which to base changes, this section should so indicate and provide justification for the features of the new operation.

4.2. Analysis of the target operation

This clause provides an analysis of the benefits, limitations, advantages, disadvantages, and alternatives and trade-offs considered for the target operation.

4.2.1 Summary of improvements

This section provides a qualitative (and to the extent possible, quantitative) summary of the benefits to be provided by the target operation. This summary should include the below items, as applicable. In each case, the benefits should be related to deficiencies identified in 4.1 of the CONOPS.

- New capabilities. Additional new features or functionality.
- Enhanced capabilities. Upgrades to existing capabilities.
- Deleted capabilities. Unused, obsolete, confusing, or dangerous capabilities removed.
- Improved performance. Better response time, reduced storage requirements, improved quality, etc.

4.2.2 Disadvantages and limitations

This section provides a qualitative (and to the extent possible, quantitative) summary of the disadvantages and/or limitations of the target operation. Disadvantages might include the need to retrain personnel, rearrange work spaces, or change to a new style of user interface; limitations might include features desired by users but not included, degradation of existing capabilities to gain new capabilities, or greater-than-desired response time for certain complex operations.

4.2.3 Alternatives and trade-offs considered

This section should describe major alternatives considered, the trade-offs among them, and rationale for the decisions reached. In the context of a CONOPS document, alternatives are operational alternatives and not design alternatives, except to the extent that designs alternatives may be limited by the operational capabilities desired in the new system. This information can be



useful to determine, now and at later times, whether a given approach was analyzed and evaluated, or why a particular approach or solution was rejected. This information would probably be lost if not recorded

4.3. Summary of impacts

This section describes the operational impacts of the target system on the users, the developers, and the support and maintenance organizations. It also describes the temporary impacts on users, buyers, developers, and the support and maintenance organizations during the period of time when the new system is being developed, installed, or trained on.

This information is provided in order to allow all affected organizations to prepare for the changes that will be brought about by the new system and to allow for planning of the impacts on the buyer agency or agencies, user groups, and the support maintenance organizations during the development of, and transition to the new system.

4.3.1 Operational impacts

This section should be further divided into lower-level sections to describe the anticipated operational impacts on the user, development, and support or maintenance agency or agencies during operation of the target system. These impacts may include the following:

- Interfaces with primary or alternate computer operating centers;
- Changes in procedure;
- Use of new data sources;
- Changes in quantity, type, and timing of data to be input into the system;
- Changes in data retention requirements;
- New modes of operation based on emergency, disaster, or accident conditions;
- New methods for providing input data if the required data are not readily available;
- Changes in operational budget; and
- Changes in operational risks.

4.3.2 Organizational impacts

This section should be further divided into lower-level sections to describe the anticipated operational impacts on the user, development, and support or maintenance agency or agencies during operation of the target system. These impacts may include the following:

- Modification of responsibilities;
- Addition or elimination of job positions;
- Training or retraining users;
- Changes in numbers, skill levels, position identifiers, or locations of personnel; and
- Numbers and skill levels of personnel needed for contingency operation at one or more alternate sites following an emergency, disaster, or accident.



4.3.3 Impacts during development

This section should be further divided into lower-level sections that describe the anticipated impacts on the user, development, and support or maintenance agency or agencies during the development project for the target system. These impacts may include the following:

- Involvement in studies, meetings, and discussions prior to award of the contract;
- User and support involvement in reviews and demonstrations, evaluation of initial operating capabilities and evolving versions of the system, development or modification of databases, and required training;
- Parallel operation of the new and existing systems; and
- Operational impacts during system testing of the target system.



To facilitate ease of use and maintenance of the CONOPS document, some information may be placed in appendices to the document. Charts and classified data are typical examples. 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.

Appendix A: 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.



Appendix B: Acronyms

Spell out the acronyms used in the document.



Appendix C: References

References are documents that may include resources considered to be useful as background information for the reader to help in understanding the subject-matter.