

NOAA/NESDIS



NESDIS-PLN-1312.1

REQUIREMENTS MANAGEMENT PLAN

September 2020

COMPLIANCE IS MANDATORY



Prepared by:

U.S. Department of Commerce

National Oceanic and Atmospheric Administration (NOAA)

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



NESDIS
Requirements
Management Plan

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1. Introduction

1.1. Purpose

- a. The National Environmental Satellite, Data, and Information Service (NESDIS) Requirements Management Plan (RqMP) describes how requirements management is performed within NESDIS Headquarters in compliance with NESDIS-PR-1302.1, NESDIS Requirements Management Procedure.
- b. This plan describes the:
 - Requirements management roles and responsibilities at the NESDIS level;
 - Methods used to perform requirements management functions such as requirements gathering, adjudication, analysis, decomposition, and validation;
 - Requirements metrics that are generated and communicated; and
 - Methods used to manage requirement changes and requirement waivers.

1.2. Applicability

This document applies to NESDIS offices/programs that develop and manage NESDIS Controlled Requirements signed by the NESDIS Assistant Administrator (AA). NESDIS Controlled Requirements include NESDIS Level Requirements (NLR), NESDIS Program-level Requirements (formerly known as Level 1 Requirements), and NESDIS Project-level Requirements that are not derived from Program Requirements.

1.3. Authority

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

1.4. Applicable Documents

- a. NESDIS-REQ-1001.1, NESDIS Level Requirements Document.
- b. NESDIS-PD-1100.1, NESDIS Enterprise Directives Publication Policy.
- c. NESDIS-PLN-1220.1, NESDIS Project Approval Plan.
- d. NESDIS-PR-1300.1, NESDIS Systems Engineering Procedural Requirements.
- e. NESDIS-PR-1302.1, NESDIS Requirements Management Procedural Requirements.
- f. NESDIS-PLN-1314.1, NESDIS Configuration Management Plan.
- g. NESDIS-PLN-1315.1, NESDIS Validation Plan.



2. Roles and Responsibilities

2.1. NESDIS Assistant Administrator

- a. The NESDIS AA will approve new requirements, change requests, and waiver requests.
- b. The NESDIS AA ensures the appropriate approvals are obtained outside of NESDIS (e.g., Deputy Under Secretary for Operations [DUS/O]).

2.2. Director, Office of Systems Architecture and Advanced Planning

- a. The Director of the Office of Systems Architecture and Advanced Planning (OSAAP) will establish requirements management in accordance with NESDIS-PR-1302.1, NESDIS Requirements Management Procedural Requirements.
- b. The OSAAP Director will establish a Requirements Management Board (RqMB) to implement the requirements management process.
- c. The OSAAP Director will direct and utilize the RqMB and NESDIS Enterprise Architecture Committee (NEAC) to manage and evaluate NESDIS requirements.

2.3. System Architecture and Requirements Division Chief, OSAAP

- a. The System Architecture and Requirements Division (SARD) Chief is the RqMB Manager.
- b. The SARD Chief will define and implement the requirements management process.
- c. The SARD Chief will determine, acquire, and manage the resources and tools required to perform requirements management.



3. NESDIS Requirements Management Process

3.1. NESDIS Requirements Management Board

The purpose of the RqMB is to define and implement the requirements management process, and establish the procedures and resources necessary to perform requirements management. The RqMB will:

- a. Work with the NEAC to maintain consistency between the requirements, applicable Concept of Operations (ConOps), and NESDIS architecture;
- b. Establish a schedule for requirements management activities;
- c. Receive, analyze, and organize requirements;
- d. Establish bidirectional traceability and ensure that requirements are validated against the stakeholder expectations, mission objectives and constraints, operational objectives, and mission success criteria;
- e. Manage requirements changes and requirements waivers requests by using the process described in NESDIS-PLN-1314.1, the NESDIS Configuration Management Plan;
- f. Establish requirements metrics and status reporting guidelines;
- g. Report requirements metrics and status periodically and on-demand;
- h. Support CCB in configuration control of the requirements;
- i. Select appropriate requirements management tools; and
- j. Provide training to requirements management personnel.

3.2. Requirements Assessment and Approval Process

A description of the requirements assessment and approval process is provided below. Figure 1 illustrates this process.

1. **New Request:** A new request to fulfill needs can come from sources both internal and external as outlined below.
 - **NOAA Needs:** The NOAA Observing Systems Council (NOSC) is the primary source of NOAA validated needs flowed down to NESDIS. The needs can come from various councils such as the NOAA Research Council (NRC), NOAA Ocean and Coastal Council, and the Weather, Water, and Climate Board (WWCB), and also from users.
 - **USG Laws, Policies, and Agreements:** These include NOAA and Department of Commerce Policy Directives, laws and regulations, budget reductions, and any other non-NOSC requests.
 - **NESDIS Internal Sources:** These include Strategic Plan initiatives, requirements change requests, risk reduction initiatives, on-orbit asset retirement or performance degradation, and recommendations from a NESDIS employee or office/program.



assessment. This will be a collaborative effort that requires support from all affected offices/programs.

4. **Impact Assessment:** The impact assessment is a high-level, short-duration effort meant to gauge the feasibility of the new request. Typical outputs of the impact assessment include an initial set of derived requirements based upon the request, as well as Analyses of Alternatives (AoA) and a Rough Order of Magnitude (ROM) cost and schedule to implement that initial set of derived requirements. Some situations may warrant external stakeholder analysis due to impacts on other NESDIS Line Offices and partners. All findings will be reported to the OSAAP Director and NEAC.
5. **NESDIS AA Approval:** The NEAC will review the impact assessment results and provide its recommendations. The OSAAP Director presents the results of the impact assessment and a recommendation to the NESDIS AA or Designated Decision Body. The NESDIS AA or the Designated Decision Body may approve or disapprove the recommendations.
6. **Baseline New Requirement:** If the recommendations are approved, the affected requirements documents must be updated and submitted to the NESDIS Configuration Control Board (CCB) for approval. The Configuration Change Management Process described in NESDIS-PR-1314.1, NESDIS Configuration Management Plan, Section 3.4 is used to update the requirements baseline document.
7. **Decompose Requirements or Perform Detailed Concept Study:** The approved requirements may either be decomposed to the next level, or a detailed concept study may be initiated per NESDIS-PLN-1220.1, Project Approval Plan, to further refine the concept.

3.3. Requirements Change Management

The process to modify an existing requirement is the same as that to add a new requirement described in Section 3.2.

- a. Requirements change requests may come from different sources. After initial review and approval by the NESDIS AA or Designated Decision Body, the OSAAP Director will task the NEAC/RqMB to perform an initial evaluation of change requests and determine whether an impact assessment is needed.
- b. If the impact assessment is needed and approved by the NESDIS AA or Designated Decision Body, the impact assessment team will perform the impact assessment and provide the results to the NEAC.
- c. The OSAAP Director presents the results of the impact assessment and a recommendation to the NESDIS AA or Designated Decision Body for approval. If approved, the RqMB will modify the requirement as approved and flow down the changes to the affected offices, programs, and projects.



3.4. Requirements Waiver Assessment and Approval Process

A description of the requirements waiver assessment and approval process is provided below. Figure 2 illustrates this process.

- a. A requirement waiver is a documented authorization releasing an office, program, or project from meeting a requirement after the requirement is put under configuration control. This could be for a specific time or specific effectivity (e.g., single instance or permanent) and does not require revision of approved requirements. This applies only to NESDIS-level requirements or requirements in program/project-level requirements documents.
- b. The OSAAP Director, supported by the NEAC and/or RqMB as needed, will perform an initial evaluation of change requests and determine whether an impact assessment is needed.
- c. If the recommendation for an impact assessment is approved by the NESDIS AA or Designated Decision Body, a team will be established to perform the assessment. Upon completing the impact assessment, the team provides the results to the OSAAP Director for review and NEAC assessment. The impact assessment will include a re-validation of the requirement with the customer, user organization, and/or DUS/O. The re-validation will also be the basis for determining the consequences in user satisfaction if the waiver request is accepted. The assessment must include a cost and schedule impact of affected programs or projects if the waiver is rejected. Based on the effectivity of the waiver, a recovery plan to meet the original requirement must be part of the impact assessment.
- d. The OSAAP Director presents the results of the impact assessment and a recommended course of action to the NESDIS AA, or Designated Decision Body, for approval. This approval may involve the DUS/O or a higher authority depending upon the level of document approval authority for the affected requirement (see Section 2.1)
- e. The results of the waiver request will be provided officially by the RqMB to the waiver originator and other stakeholders.
- f. The RqMB will ensure the results of the waiver request are flown to the affected offices, programs, and projects and their respective requirements documents.

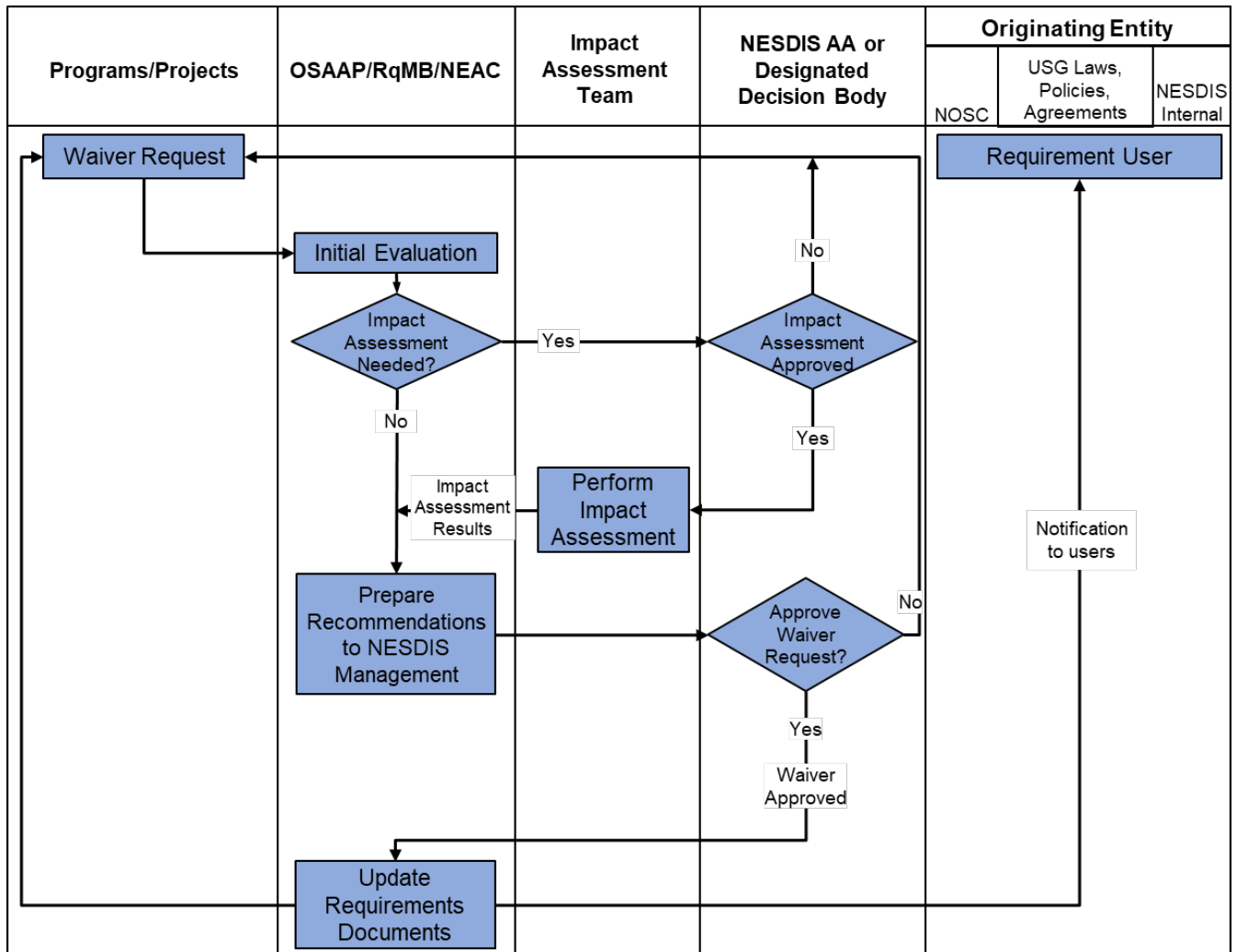


Figure 2: Requirements Waiver Process

3.5. Requirements Verification and Traceability

When developing the requirements, the RqMB will identify an approach for verifying the requirements. Every requirement in the requirements documents will be identified by the keyword “[REQ-*nnn*]”, where “*nnn*” represents the requirement number. For every requirement document, the RqMB will create a requirements verification matrix with the following information:

1. Requirement number;
2. Verification method;
3. Phases in which the verification is performed;
4. Organization, program, or project responsible for performing the verification; and
5. Documents that contain the objective evidence that the requirement was satisfied.



The RqMB will fill out this matrix with as much information as possible. Further updates will be made as more information is learned about the implementation of the requirements.

3.6. Requirements Metrics and Status Reporting

The RqMB will report the following metrics and status quarterly and on-demand to the NESDIS AA, Designated Decision Body, and NESDIS Office/Program Directors.

1. Updates to the NESDIS Controlled requirements documents.
2. A summary of impact analyses and status of execution.
3. Current requirements waiver requests and status.

3.7. Other Requirements Management Activities

- a. The RqMB will work with the Systems Engineering and Project Management Working group to select appropriate tools for requirements development and management.
- b. At this time, the RqMB does not anticipate any training necessary for those who will be performing requirements management activities. If special tools are identified for requirements management, the RqMB will provide the required training.
- c. The RqMB does not anticipate that any tailoring to the requirements management process will be required. If specific tailoring is identified for requirements management, the tailoring request will be sent to the OSAAP Director for approval.



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Appendix A: Glossary

Analysis of Alternatives (AoA): A formal analysis method that compares alternative approaches by their ability to satisfy requirements. The results are used to produce a comparison that allows decision makers to assess the relative value or potential programmatic returns of the alternatives. An analysis of alternatives broadly examines multiple elements of project alternatives (including technical performance, risk, implementation complexity, and life cycle costs).

Baseline: An agreed-to set of requirements, designs, budgets, schedules, or documents that will have changes controlled through a formal approval and monitoring process.

Concept of Operations (ConOps): Describes the overall high-level concept of how the system will be used to meet stakeholder expectations, usually in a time sequenced manner. It describes the system from an operational perspective and helps facilitate an understanding of the system goals. It stimulates the development of the requirements and architecture related to the user elements of the system. It serves as the basis for subsequent definition documents and provides the foundation for the long-range operational planning activities.

NESDIS Controlled Requirements: NESDIS Controlled requirements include the NESDIS Level Requirements (NLR), NESDIS Program-level Requirements (formerly known as Level 1 Requirements), and NESDIS Project-level Requirements that are not derived from Program Requirements.

NESDIS Level Requirements (NLR): Requirements that define customer expectations in the context of the NESDIS mission, strategic plans, Mission Essential Functions (MEFs), policies, and regulations.

NESDIS Office(s): A term used in the widest sense to include NESDIS Headquarters elements, NESDIS Operations and Acquisitions offices, the Center for Satellite Applications and Research (STAR), and the National Centers for Environmental Information (NCEI).

Process: A set of activities used to convert inputs into desired outputs to generate expected outcomes and satisfy a purpose.

Program: A strategic investment that has defined goals, objectives, architecture, funding levels, and a management structure that supports one or more projects.

Project: A specific investment that has defined goals, objectives, requirements, lifecycle cost, a beginning, and an end. A project yields products or services that directly address one or more of NESDIS' strategic needs. In this document, the term 'project' applies in the widest sense to include projects, programs, portfolios, and major initiatives.



Requirement: A statement that identifies a system, product, or process characteristic or constraint. A requirement statement must be clear, correct, feasible to obtain, unambiguous in meaning, and able to be validated at the level of the system structure at which it is stated.

Requirements Management: A process used to gather, analyze, decompose, verify, validate, track, and manage changes to requirements.

Stakeholder: A group or individual for whose need or mission a requirement or project is created. Also known as the “customer”.

System: The combination of elements that function together to produce the capability required to meet a need. The elements include all hardware, software, equipment, facilities, personnel, processes, and procedures needed for this purpose.

Tailoring: The process used to seek relief from in the implementation of PR requirements consistent with program or project objectives, allowable risk, and constraints.

Traceability: A discernible association among two or more requirements, system elements, verifications or tasks.

Validation (of Requirements): The continuous process of ensuring that requirements are well-formed (clear and unambiguous), complete (agrees with customer and stakeholder needs and expectations), consistent (conflict free), and individually verifiable and traceable to a higher-level requirement or goal.

Waiver: A documented authorization releasing a program or project from meeting a requirement after the requirement is put under configuration control. This may be for a single instance or permanent.



Appendix B: Acronyms

AA	Assistant Administrator
AoA	Analysis of Alternatives
ConOps	Concept of Operations
DUS/O	Deputy Under Secretary for Operations
NCEI	National Centers for Environmental Information
NEAC	NESDIS Enterprise Architect Committee
NESDIS	National Environmental Satellite, Data, and Information Service
NLR	NESDIS Level Requirements
NOAA	National Oceanic and Atmospheric Administration
NOSC	NOAA Observing Systems Council
OSAAP	Office of Systems Architecture and Advanced Planning
PR	Procedural Requirements
ROM	Rough Order of Magnitude
RqMB	Requirements Management Board
SAR	Systems Architecture and Requirements
STAR	Satellite Applications and Research



Appendix C: Compliance Matrix

This appendix shows compliance of this document with NESDIS-PR-1302.1 requirements. The column titled “Section” refers to sections within this document.

REQ#	Requirement	Compliance	Section
001	OSAAP ensures compliance with this PR.	Y	2.2
002	NESDIS Office Directors establish policies, processes, and procedures within their Office to execute the requirements of this PR.	Y	2.2
003	Deleted.	NA This requirement has been deleted in the PR.	
004	The Project Manager allocates adequate resources to meet the requirements of this PR commensurate with the scope, size, and complexity of the project.	Y	2.3
005	All NESDIS requirements management activities will use the requirements levels defined in Table 1.	Y NESDIS level and program levels correspond to Level 0 and Level 1, respectively.	1.2
006	NESDIS offices, portfolios, programs, and projects will establish their own Requirements Management Board (RqMB) to manage their respective requirements. NESDIS offices may use a single RqMB to manage requirements for multiple projects.	Y	2.2
007	The RqMB will establish a Requirements Management Plan to	Y	3.1



REQ#	Requirement	Compliance	Section
	provide specific guidance on how the requirements management process is executed.		
008	The RqMB will receive requirements, analyze and organize them in a hierarchical tree structure.	Y	3.2
009	The RqMB will establish bidirectional traceability between requirements.	Y	3.2
010	The RqMB will validate requirements against the stakeholder expectations, the mission objectives and constraints, the operational objectives, and the mission success criteria.	Y	3.2
011	The RqMB will define a verification method for each requirement.	Y	3.5
012	The RqMB will trace each requirement to a suitable verification event.	Y	3.5
013	The RqMB will perform and maintain configuration control of their requirements.	Y	3.2
014	The RqMB will evaluate change requests to the requirements baseline over the life of the project and make changes if approved.	Y	3.3
015	The RqMB will maintain consistency between the requirements, the ConOps, and the architecture/design.	Y	3.2
016	The RqMB will establish requirements metrics and status reporting guidelines.	Y	3.6



REQ#	Requirement	Compliance	Section
017	The RqMB will report requirements metrics and status to internal and/or external stakeholders.	Y	3.6
032	If a requirement is identified for a waiver request, the requirements change management process defined in the RqMP is used to request and obtain a requirements waiver.	Y	3.4
018	Determine the appropriate level within the system structure at which the Requirements Management Plan is to be developed, taking into account the factors such as number and complexity of interfaces, operating environments, and risk factors.	Y	3.1
019	Ensure that the Requirements Management Plan is consistent with higher-level requirements management plans.	NA This is the highest-level RqMP in NESDIS.	
020	Define how the requirements management process, including tailoring, will be applied during each applicable life-cycle phase.	Y	3.0
021	Identify the relevant stakeholders.	Y	3.2
022	Identify the tools that will be used for requirements management, build requirements traceability, change control, and status reporting.	Y	3.1
023	Describe the assigned resources, roles and responsibilities to perform requirements management activities.	Y	2.2, 3.0



REQ#	Requirement	Compliance	Section
024	Provide a schedule for performing the requirements management activities.	Y Schedule will be established for impact assessments, requirement changes and requirement waivers.	3.2, 3.3, 3.4, 3.6
025	Define the level of configuration management control for all requirements management work products.	Y NLR and Program Level Requirements documents, change requests, and waiver requests are managed at the NESDIS CCB.	3.2, 3.3, 3.4
026	Baseline the Requirements Management Plan for the System Requirements Review (SRR) or equivalent milestone.	Y	3.2
027	Identify the training for those who will be performing the requirements management activities.	Y No specific training is anticipated at this time.	3.7
028	Update, review, and reapprove the Requirements Management Plan in accordance with the project schedule for requirements management activities or when significant changes occur.	Y	3.7
029	Requests for tailoring are submitted through the configuration management process.	Y No specific tailoring is anticipated at this time.	3.7
030	The results of tailoring are documented in the Requirements Matrix	Y	3.7



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	(Appendix C) and submitted to OSAAP for approval along with supporting rationale.		
031	The results of the tailoring will be documented in the next revision of the Requirements Management Plan.	Y	3.7



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