

**FAA AMS LIFECYCLE
VERIFICATION AND VALIDATION
GUIDELINES**

Version 3.0



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1 INTRODUCTION

1.1 Scope

This document provides general guidance in the application of Verification and Validation (V&V) policies across the Federal Aviation Administration (FAA) Acquisition Management System (AMS) lifecycle by defining terminology, illustrating how to accomplish V&V, and describing its application in each phase of the AMS lifecycle as defined in the FAA Acquisition Management Policy.

This document provides guidance for V&V planning, performing and reporting in support of decision activities

- Section 1 defines the scope of the document, key V&V terms, and the V&V philosophy.
- Section 2 provides V&V implementation guidance including planning, performance, reporting and decision support.
- Section 3 defines key work products, product components, and products and their responsible stakeholders for each decision point and phase of the AMS lifecycle.

This document will be updated as better practices are identified and new lessons are learned. The latest version is available on the FAA Acquisition System Toolset (FAST) website: <http://fast.faa.gov/VerificationValidation.cfm>. Additionally, the V&V Practice Toolkit that contains templates and samples, advice for Subject Matter Experts (SMEs), and additional resources can be found on the FAA Acquisition Practices website: https://ksn2.faa.gov/aa/AcquisitionProfessions/Practices/Pages/Disc_VV.aspx.

1.2 V&V Terms and Definitions

V&V is a disciplined approach to assessing select products, along with associated product components and work products, throughout the lifecycle of a system, service, facility, or operational change. The conduct of V&V ensures that a quality product is built and that it satisfies operational requirements and service needs. The order and significance of verification versus validation may change throughout the lifecycle based on the state of the mission definition, operational concept, requirements, product development, and product.

1.2.1 V&V Terms

V&V is performed on government and contractor work products, product components and products, and is required to be done by government and contractor organizations. Work products, product components, and products may be subject to V&V more than once during their lifecycle if modifications or additional levels of V&V are required. The definitions of work product, product component, and product are:

- 1) Work Product. A work product represents, defines, or directs the final product. A work product can include documents, processes, procedures, designs, descriptions, specifications, simulations, models, prototypes, and contracts.
- 2) Product Component. A product component is a lower-level part, element, or module of the product. Product components are integrated to produce the product. There may be multiple levels of product components.
- 3) Product. The final or end system, service, facility, or operational change that is intended for delivery to a customer or end user.

Figure 1 depicts the relationship between work products, product components, and products. The early phases of the AMS lifecycle will generate a number of work products which must be verified and validated, such as the solution concept of operations and program requirements document that define and direct the development of product components and the final product. Likewise, as product components become available, they too must be verified and validated before being integrated into the final product. The final product must be verified and validated before it is accepted into the operational environment.

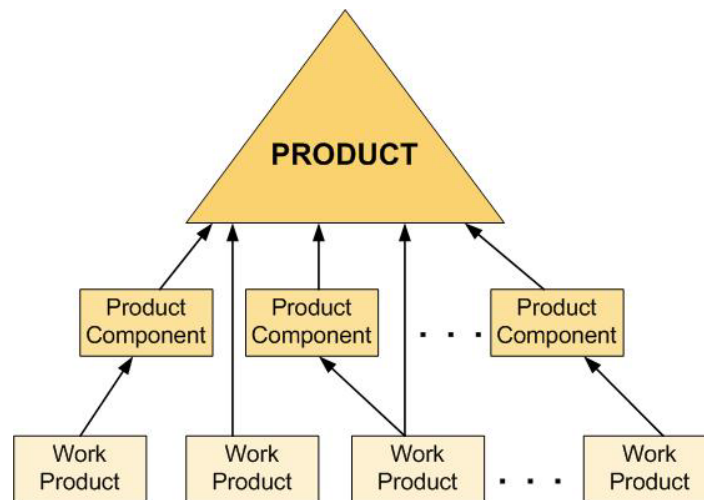


Figure 1. Work Product/Product Component/Product Relationships

1.2.2 V&V Definitions

Simply stated, verification ensures a product is built right according to specifications, while validation ensures the right product is built to fulfill its intended use. More formally, verification and validation are defined as follows*:

- 1) Verification. Confirmation that selected work products meet their specified requirements. This includes verification of the end product (system, service or operational change) and intermediate work products against all applicable

requirements. Verification is inherently an incremental process since it occurs throughout the development lifecycle of the work products, beginning with initial requirements, progressing through subsequent changes, and culminating in verification of the completed end product.

- 2) Validation. Confirmation that an end product or end product component will fulfill its intended purpose and user needs when placed in its intended environment. The methods employed to accomplish validation are applied to selected work products as well as to the end product and end product components. The work products should be selected on the basis of which are the best predictors of how well the end product and end product components will satisfy the intended purpose and user needs. Validation can apply to all aspects of an end product in any of its intended environments, such as operation, training, manufacturing, maintenance or support services.

**Note: Capability Maturity Model Integration® (CMMI®) for Development, Version 1.2, Carnegie Mellon Software Engineering Institute, Pittsburgh, PA, August 2006. The V&V definitions are consistent with Capability Maturity Model® Integration (CMMI®). CMMI® is an internationally recognized model for development and acquisition. It is the best-practices model used by the Government Accountability Office as the basis for quality audits and process assessments. Additionally, V&V and Quality Assurance (QA) are complimentary processes with different purposes and objectives. V&V focuses on ensuring that requirements are met, the overall project is focusing on user/mission needs, and risk is managed. QA, on the other hand, focuses on ensuring that established processes are followed in producing the product.*

1.3 V&V Philosophy

V&V systemically applies across the AMS lifecycle to support the FAA in creating the best products for the agency and its stakeholders. V&V supports key decisions and ensures that the developed product will fulfill mission needs and specification requirements. These products may be systems, services, operational changes, or facilities. V&V improves the overall efficiency and effectiveness of a program and its management across the AMS lifecycle. It is a systematic activity that supports decision-making and risk management.

The Enterprise Architecture (EA) is a major V&V source criterion and should be verified and validated (V&V'd) in accordance with this guidelines document. The EA defines the operational and technical framework for all capital assets of the FAA. It describes the agency's current and target architectures, as well as the transition strategy for moving from the current to the target architecture. The V&V of critical work products and products are premised on the EA, which supports the FAA Strategic Initiatives, National Airspace System (NAS) Requirements Documents, and NAS Segment Implementation Plan (NSIP). The EA infrastructure roadmaps are fully integrated plans of new initiatives (or upgrades to existing investments already in the field), which enhance visualization of new investments and their contribution to the NAS, including linkages to benefits, requirements, and other elements affecting the NAS. The EA also supports the sizing and scoping of investments in terms of complexity (e.g., number of interfaces, stakeholders impacted, etc.). Therefore, it is used to verify and validate critical work products such as

needs, requirements, concepts of use, and strategies. Finally, the EA is updated and refined based on the results and knowledge acquired from the conduct of V&V.

Senior management makes decisions regarding the progress and status of an investment initiative at critical milestones (decision points) to ensure that transition throughout the AMS lifecycle is based on knowledge and acceptable risk. In support of decision-making, V&V reduces risk by ensuring the information used to make the decision is accurate and dependable. Each decision point requires the development of verified and validated work products that provide information about the progress and status of service or product being developed.

Figure 2 depicts a generic flow of how V&V is applied. Current work products, products and product components are verified against requirements and validated against needs, as identified in previous work products, products, and product components. As an example, a system specification is verified against the required standards and templates that define content and format. The system specification would be validated against the needs in the program requirements document, which is a higher-level specification that defines mission needs in the form of operational requirements. The results of V&V support key program decisions and risk mitigation. Each work product then becomes the basis for V&V of future work products (or the final product). This process puts great emphasis on work products developed early in the AMS lifecycle such as gap analyses, solution concept of operation documents, and requirements documents. These work products must be validated to ensure the right product is built.

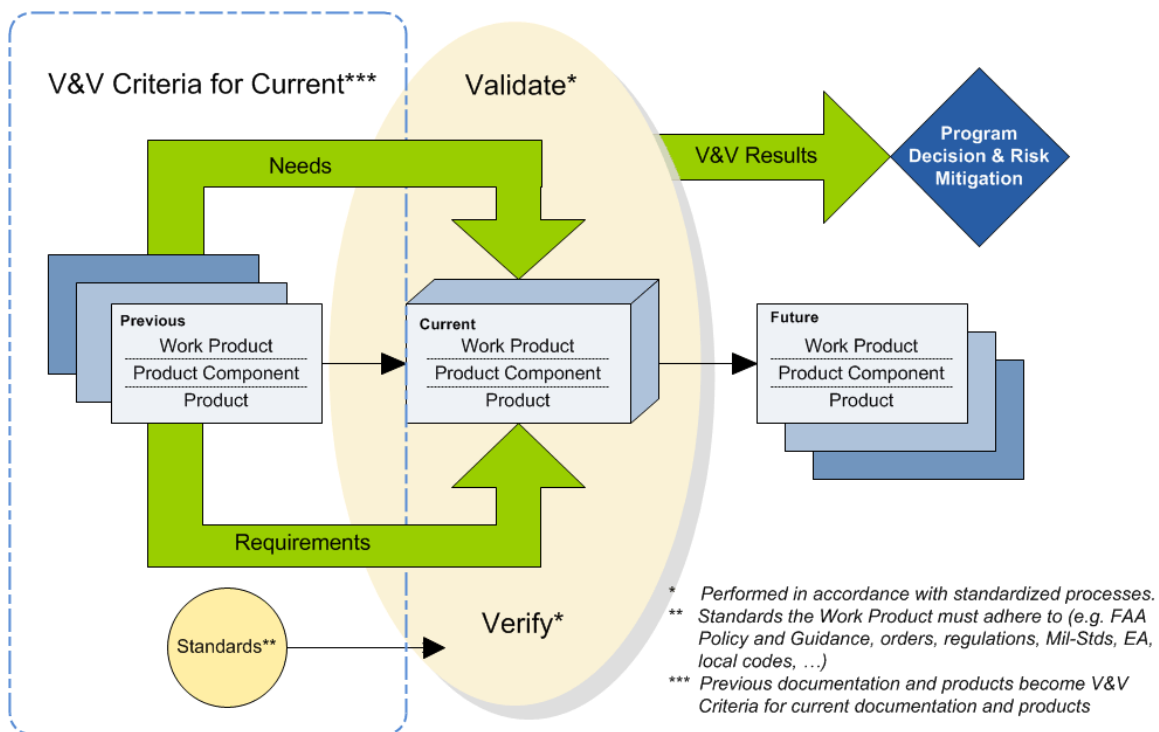


Figure 2. Basic Application of V&V

2 V&V IMPLEMENTATION GUIDANCE

2.1 V&V Planning

V&V planning is required for all acquisition programs and must be incorporated into the appropriate phase and program planning documents throughout the lifecycle of the product. These planning documents include, but are not limited to, the plan for Concept and Requirements Definition, plans for initial and final Investment Analysis, the Implementation Strategy and Planning Document (ISPD), the Test and Evaluation Master Plan (TEMP), the Program Management Plan, the System Engineering Management Plan, and the Quality Assurance Plan. These planning documents must incorporate the V&V planning elements listed below as they apply to each document:

- 1) Description of Verification methods
- 2) Description of Validation methods
- 3) Identification of work products, product components, and products to be verified and/or validated
- 4) Identification of processes, standards and criteria to be used for verification and validation at each phase of the investment initiative, such as:
 - a) Systems Engineering Manual
 - b) Concept Development and Validation Guidelines
 - c) Test and Evaluation Handbook
- 5) Identification of measures and reports required to track and document V&V events and activities
- 6) Definition of roles and responsibilities for V&V events and activities
- 7) Identification of independent stakeholder(s) or reviewer(s) to perform V&V (Note: An independent stakeholder or reviewer is not directly involved in the development of the work product, product component or product being V&V'd)
- 8) Description of tools, models, prototypes, laboratories, and simulators required to support V&V events and activities
- 9) Identification of training required for successful completion of V&V events and activities

Further planning guidance can be found at the following websites:

- 1) FAA Acquisition System Toolset (FAST) website:
http://fast.faa.gov/VerificationValidation.cfm?p_title=Acquisition_Practices
- 2) ANG-E Test and Evaluation (T&E) Portal:
<https://ksn2.faa.gov/ajp/ajp7te/Pages/Default.aspx>¹

¹ Organizations outside of ANG-E must request T&E Portal access by contacting the TCDC Help Desk at: <mailto:9-ACT-TCDC@faa.gov?subject=Request%20for%20ANG-E%20Test%20and%20Evaluation%20Portal%20Access>.

2.2 Performing V&V

V&V is performed by independent stakeholders or reviewers, as identified in Tables 1 through 6, that are not directly involved with the development of the work product, product component or product being V&V'd. While performing V&V, all independent stakeholders and reviewers must be cognizant of the validity of V&V activities that were performed (or missed) on prerequisite work products, product components, and products. If inconsistencies or conflicts are found with the validity of previous V&V activities, or if it is determined that a requisite V&V activity was not performed, these issues must be documented and resolved prior to proceeding.

Critical technical documents that form the basis for future work products, product components, or products during a program's lifecycle must be verified and validated prior to their use in all subsequent processes including the V&V process. These critical technical documents include: the National Airspace System (NAS) Concept of Operations, the NAS Requirements Document, the NAS Segment Implementation Plan, the National Air Research Plan, the NextGen Implementation Plan, and the Enterprise Architecture. V&V of these critical technical documents is necessary to ensure a valid basis for programs, that no service gaps exist, and that programs are in line with the overall goals of the agency. The criteria used for the V&V of these documents are the FAA Strategic Initiatives document and all applicable standards associated with the document (i.e. manuals, handbooks, templates, and guidance documents).

2.2.1 V&V of Work Products

All major work products developed by a program or that are required by the acquisition category should be subject to formal and structured V&V in accordance with processes and standards described in this document. A work product represents, defines, or directs product components and/or the end product (system, service, facility, or operational change). This includes solution concepts of operation, processes, plans, procedures, designs, descriptions, requirements, specifications, models, prototypes, contracts and other documents. The scope of specific verification and validation activities for work products, along with the specific work products to undergo V&V, will vary based on program complexity and available resources. Section 3 of this document identifies the minimum set of work products (if required for the acquisition) that must undergo V&V during the AMS lifecycle.

Verification

Work product verification ensures that standards, templates, or other requirements that define their content and purpose are properly followed.

The primary verification methods for work products are listed below. The verification of a specific work product will use one or more of these methods to ensure the work product's consistency, completeness, and correctness. Definitions and descriptions of these methods can be found in Appendix C.

Work Product Verification Methods

- Inspections
- Peer reviews
- Audits
- Checklists

Validation

Work product validation ensures that the work product supports the development of an operationally effective and suitable end product.

The primary validation methods for work products are listed below. The validation of a specific work product will use one or more of these methods to ensure that they support the intended use of the end product. Definitions and descriptions of these methods can be found in Appendix C.

Work Product Validation Methods

- Discussions with users
- User surveys
- Functional presentations
- Walk-throughs/dry runs
- Inspections
- Peer reviews
- Audits
- Analyses
- Checklists
- Testing
- Demonstrations
- Modeling
- Storyboarding

2.2.2 V&V of Products and Product Components

As defined previously in Paragraph 1.2.1, a product is a system (hardware and/or software), service, facility or operational change intended for delivery to a customer or end user. Product components are lower-level elements of the product, which are integrated to produce the final product. V&V is performed on both products and product components. Verification ensures that products or product components have been built properly to the specifications, as delineated in supporting work products. Validation ensures that major product components and final integrated products are operationally effective and suitable to end users and maintainers. The scope of verification and validation activities for products and product components will vary based on the program complexity and available resources.

V&V of products and product components is primarily accomplished via Test and Evaluation (T&E). While V&V efforts performed by T&E personnel occur in all phases of the AMS lifecycle, T&E of products and product components primarily occurs in Solution Implementation and In-Service Management. During Solution Implementation, T&E is divided into three major activities: Development Test (DT), Operational Test (OT), and Independent Operational Assessment (IOA).

DT supports the objectives of verification, ensuring the product or product component under test meets all specified technical and performance requirements. Additionally, for final products, DT verifies that the product is fully integrated and stable, and has no adverse effect on the rest of the NAS. DT is conducted by the product or product component developer and the FAA witnesses.

The verification of a specific product or product component uses one or more of the primary verification methods listed below. Definitions and descriptions of these methods can be found in Appendix C.

Product and Product Component Verification Methods

- Inspections
- Peer reviews
- Audits
- Analyses
- Checklists
- Testing
- Demonstrations
- Simulations
- Accreditation

OT and IOA support the objectives of validation, ensuring that major product components and the final product are operationally effective and suitable for use in the NAS and that the NAS infrastructure is ready to accept the product. OT is performed by the ANG-E OT Test Director and OT test team with Air Traffic (AT), Technical Operations, and second-level maintenance personnel. Other participants may include representatives of other FAA organizations and/or external entities (e.g., airlines, cargo carriers, military, private industry) as required. For designated products, an IOA is led by a program manager from the Independent Safety Assessment Team and provides decision-makers with an independent determination of operational readiness in support of the production and in-service decisions.

The validation of a specific product or major product component will use one or more of the primary validation methods listed below. Definitions and descriptions of these methods can be found in Appendix C.

Product and Product Component Validation Methods

- Discussions with users
- User evaluation questionnaires
- Functional presentations
- Inspections
- Peer reviews
- Audits
- Analyses
- Checklists
- Testing
- Demonstrations
- Simulations

2.3 V&V Reporting

V&V reporting supports AMS decision points and should be factored into the entrance criteria for these major decisions. Quality V&V reporting supports informed decision-making and contributes to the overall effectiveness and efficiency of the program. V&V reports also support performance measurement and analysis by providing quantitative and qualitative results against the program's technical performance criteria.

The following practices are essential to quality V&V reporting:

- 1) V&V events must be documented and the corresponding documentation must be controlled and archived to ensure that historical records are kept;
- 2) V&V reporting should take into account that specific decision-making events, risk management and work products will be based on the information contained in the report;
- 3) V&V reporting on the quality of work products should identify how well the work product supports development of an operationally effective and suitable end product; and
- 4) V&V reporting of the results of test and evaluation activities (contained in final test reports) should identify how well the product or product component is built and to what degree it fulfills operational needs.
- 5) The report should at a minimum contain the following:
 - a. Introduction
 - b. Purpose – Objectives of the V&V event
 - c. Criteria – Source criteria that is used as a basis for the V&V event
 - d. V&V Approach – Description of the V&V event
 - e. V&V Participants
 - f. V&V Results
 - g. Recommendations

2.4 V&V Decision Support

The performance of structured V&V prior to a planned decision point reduces the risk of defects in a work product, product components, or product that supports the decision by ensuring completeness and quality. Structured V&V aids decision-makers by providing assessments of critical work products for each acquisition management phase and by discovering risk levels (both technical and non-technical) that affect program success. For example, V&V applied against program planning documentation may uncover inconsistencies within the document and its predecessor documents which could lead to increased risk, increased cost, and schedule delays.

The following practices are essential to V&V decision support:

- 1) V&V events and results should be formally identified in plans as entrance criteria for associated decision points;
- 2) V&V events and their results should be scheduled and planned well in advance of decision points;
- 3) V&V results must be consistently applied so that decision-makers have reliable data and information for making sound and low-risk decisions based on the maturity and quality of work products; and,
- 4) V&V results must support objectives of the associated decision point prior to accepting/approving results.

3 V&V APPROACH IN THE AMS LIFECYCLE

The AMS lifecycle is comprised of the following phases:

- Service Analysis & Strategic Planning (SASP)
- Concept & Requirements Definition (CRD)
- Investment Analysis (IA)
- Solution Implementation (SI)
- In-Service Management (ISM)

In addition to these formal phases, Research for Service Analysis (RSA) is a separate activity that precedes and/or is conducted during the early phases of the AMS lifecycle. RSA matures and validates new concepts and technologies for potential investment and deployment in the NAS. RSA may also provide information that supports SASP, CDR, IA, and the early stages of SI. The independent stakeholders and reviewers responsible for the V&V of RSA activities are the same as those for SASP, CRD, IA, and SI.

The V&V process incorporates common tools and techniques for verifying and validating work products, product components, and products. However, the specific items undergoing V&V and the independent stakeholders and reviewers responsible for conducting V&V vary depending on the phase or activity of the AMS lifecycle.

All critical work products, product components, and products, including those used as V&V criteria, are subject to systematic V&V by various program disciplines during every activity/phase of the lifecycle. Each functional discipline plans, executes, and reports on V&V in accordance with AMS and standardized integrated processes maintained by the respective organization.

While both verification and validation activities occur throughout the AMS lifecycle, Figure 3 depicts only the primary emphasis of V&V between the major decision points. For the complete set of minimum required V&V activities by lifecycle, see Tables 1-6.

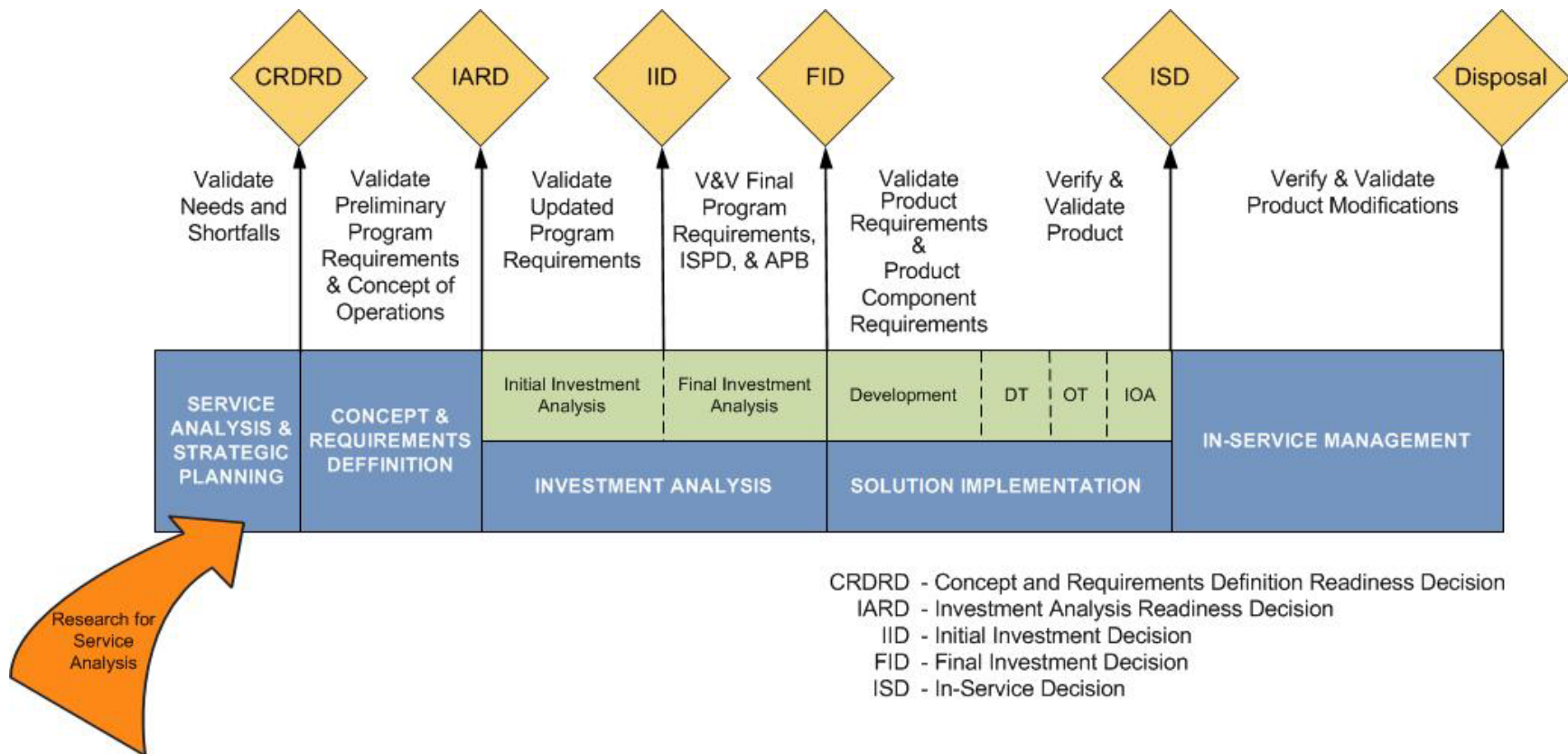


Figure 3. AMS Lifecycle Primary V&V Activities

There are five primary management documents that are required to support critical decision points early in the acquisition lifecycle. They are essential for planning, management, and control of the entire acquisition lifecycle and are subjected to formal and structured V&V. These documents and their purpose are provided below:

1. Acquisition Program Baseline - Establishes the performance, cost, and schedule baselines for an investment program segment
2. Program Requirements Document - Defines the operational framework and performance requirements an investment program must achieve
3. Business Case - Summarizes results of the business case analysis and provides the analytical and quantitative basis for investment decisions
4. Implementation Strategy and Planning Document - Defines overall implementation strategy and planning for an investment program
5. Program Management Plan - Defines how the service team will manage the investment program to execute the strategy in the ISPD

Appendix B provides four checklists to aid in the V&V of the PRD, APB, ISPD, and PMP. Each checklist identifies the key elements in each document that must be verified or validated. For each of these key elements, the methods used and the artifacts produced have to be identified. These checklists provide authors with a structure that will help ensure that the documents accurately provide the information required for the approving authorities to make critical lifecycle decisions.

The office of Investment Planning & Analysis is responsible for the verification and validation of the Business Case as described in the AFI Business Case Evaluation and Assessment Guideline. The Investment Planning and Analysis Independent Evaluation Review (IER) satisfies the documentation and reporting requirements for the V&V of the Business Case.

3.1 V&V in Service Analysis & Strategic Planning

Service Analysis & Strategic Planning is the process used to determine what capabilities must be in place now and in the future to meet agency goals and the service needs of customers. Results are captured in the “as is” and “to be” states of the EA, as well as the roadmaps for moving from the current state to the future state. The responsible Line of Business includes the results in their business plans and service organizations describe them in their operating plans. These activities develop the information necessary for determining which service shortfalls or new ideas for improving service delivery are approved for inclusion in agency strategic planning documents.

The primary focus of V&V during SASP is to verify and validate the Preliminary Shortfall Analysis, the Concept & Requirements Definition Plan and the ISS Risk Factors Assessment.

Table 1 identifies the following for Service Analysis & Strategic Planning:

- The major decision point
- The minimum required work products that must be verified and validated at the decision point
- The criteria that each work product must be V&V'd against
- The stakeholders responsible for each V&V activity

Table 1. V&V in Service Analysis & Strategic Planning²

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Concept and Requirements Definition Readiness Decision	Preliminary Shortfall Analysis	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • NextGen Implementation Plan • NAS Segment Implementation Plan • FAA Strategic Initiatives • National Air Research Plan (NARP) (if applicable) • NAS ConOps <u>Verification:</u> <ul style="list-style-type: none"> • Guidelines for Service Analysis Planning and Concept and Requirements Definition • Service Shortfall Analysis Guidance and Templates • AMS Policy 	Lines of Business (Mission Support)/Service Team (NAS), Office of Investment Planning & Analysis, and Advanced Concepts and Technology Development Office

² Table 1 content is based on AMS policy as of the time this document was published. Detailed guidelines for the SASP AMS lifecycle phase and document template exists and should be reviewed for current guidance.

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Concept and Requirements Definition plan	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture NextGen Implementation Plan NAS Segment Implementation Plan <u>Verification:</u> <ul style="list-style-type: none"> Guidelines for Service Analysis Planning and Concept and Requirements Definition AMS Policy 	Lines of Business (Mission Support)/Service Team (NAS)
	ISS Risk Factors Assessment	<u>Validation</u> <ul style="list-style-type: none"> FIPS-199 Security Categorization Table <u>Verification</u> <ul style="list-style-type: none"> Information Security Guidance for System Acquisition (ISGSA) 	Lines of Business (Mission Support)/Service Team (NAS)

3.2 Concept and Requirements Definition

Concept and Requirements Definition translates priority operational needs in the EA into preliminary requirements and a solution concept of operations for the capability needed to improve service delivery. It also quantifies the service shortfall in sufficient detail for the definition of realistic preliminary requirements and an estimation of potential costs and benefits. Finally, CRD identifies the most promising alternative solutions able to satisfy the service need, one of which must be the alternative in the EA.

The primary focus of V&V during CRD is to validate the preliminary program requirements, concept of use, EA products and amendments, shortfall analysis, the initial investment analysis plan, and the Preliminary ISS Assessment to ensure that the existing or planned product properly addresses mission needs.

Table 2 identifies the following for CRD:

- The major decision point
- The minimum required work products that must be verified and validated at the decision point
- The criteria that each work product must be V&V'd against
- The stakeholders responsible for each V&V activity

Table 2. V&V in Concept and Requirements Definition³

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Investment Analysis Readiness Decision	Solution Concept of Operations (Concept development and validation focusing on technical and operational feasibility)	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • NextGen Implementation Plan • NAS Segment Implementation Plan • NAS Requirements Documents <u>Verification:</u> <ul style="list-style-type: none"> • Guidelines for Service Analysis Planning and Concept and Requirements Definition • Concept of Operations Guidance and Template • Preliminary ISS Assessment 	Lines of Business (Mission Support)/Service Team (NAS) and ANG Engineering Services

³ Table 2 content is based on AMS policy as of the time this document was published. Detailed guidelines for the CRD AMS lifecycle phase and document template exists and should be reviewed for current guidance.

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	preliminary Program Requirements Document	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture Solution Concept of Operations NAS Requirements Documents <u>Verification:</u> <ul style="list-style-type: none"> Program Requirements Document template System Engineering Manual AMS Policy 	Lines of Business (Mission Support)/Service Team (NAS) and ANG Engineering Services
	Enterprise Architecture products and amendments	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture Solution Concept of Operations preliminary Program Requirements Document NAS Segment Implementation Plan NAS Requirements Documents FAA Strategic Initiatives <u>Verification:</u> <ul style="list-style-type: none"> NAS Integrated Systems Engineering Framework 	Enterprise Architecture Control Board (NAS and Mission Support) and ANG Engineering Services

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Shortfall Analysis	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture NextGen Implementation Plan NAS Segment Implementation Plan FAA Strategic Initiatives NARP (if applicable) Operational analysis report(s) (if applicable) Preliminary Shortfall Analysis V&V results (if applicable) <u>Verification:</u> <ul style="list-style-type: none"> Guidelines for Service Analysis Planning and Concept and Requirements Definition Shortfall Analysis Guidance AMS Policy 	Lines of Business (Mission Support)/Service Team (NAS) and ANG Engineering Services

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Initial Investment Analysis plan	<u>Validation:</u> <ul style="list-style-type: none"> • Solution Concept of Operations • preliminary Program Requirements Document • Enterprise Architecture <u>Verification:</u> <ul style="list-style-type: none"> • Initial Investment Analysis Plan Guidance and Template • AMS Policy 	Lines of Business (Mission Support)/Service Team (NAS), Office of Investment Planning and Analysis AFI, and ANG Engineering Services
Investment Analysis Readiness Decision	Preliminary ISS Assessment	<u>Validation</u> <ul style="list-style-type: none"> • FIPS-199 Security Categorization Table <u>Verification</u> <ul style="list-style-type: none"> • Information Security Guidance for System Acquisition (ISGSA) 	<u>Lines of Business (Mission Support)/Service Team (NAS)</u>

3.3 V&V in Investment Analysis

IA is a flexible process that is tailored for the specific analysis to be performed. Tailoring actions are approved by the Acquisition Executive or the Investment Decision Authority (IDA) and recorded in the appropriate plan and record of decision for Initial or Final Investment Analysis.

3.3.1 Initial Investment Analysis

Initial Investment Analysis evaluates alternative solutions to mission need and provides realistic options to the IDA that satisfies FAA strategic and performance goals and achieves best overall value for the FAA and its customers. The principal outputs are the initial PRD, initial ISPD, initial Business Case, preliminary Test and Evaluation Master

Plan (TEMP), updated EA products and amendments, and plan for Final Investment Analysis.

The primary focus of V&V during Initial Investment Analysis is to validate the previously mentioned work products to ensure selection of the best alternative for implementation.

Table 3 identifies the following for Initial Investment Analysis:

- The major decision point
- The minimum required work products that must be verified and validated at the decision point
- The criteria that each work product must be V&V'd against
- The stakeholders responsible for each V&V activity

Table 3. V&V in Initial Investment Analysis⁴

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Initial Investment Decision	initial Program Requirements Document	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • Solution Concept of Operations • Functional Analyses Products • Results of assessments conducted during Initial Investment Analysis • NAS Requirements Documents • preliminary Program Requirements Document V&V Results • Initial ISS assessment <u>Verification:</u> <ul style="list-style-type: none"> • Program Requirements Document template • System Engineering Manual • AMS Policy • ISGSA 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1) and ANG Engineering Services

⁴ Table 3 content is based on AMS policy as of the time this document was published. Detailed guidelines for the Initial Investment Analysis AMS lifecycle phase and document template exists and should be reviewed for current guidance.

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	initial Business Case	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture Solution Concept of Operations Functional Analyses Products initial Program Requirements Document <u>Verification:</u> <ul style="list-style-type: none"> Business Case template AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1) and Office of Investment Planning and Analysis
	initial Implementation Strategy and Planning Document	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture initial Program Requirements Document initial Business Case Solution Concept of Operations <u>Verification:</u> <ul style="list-style-type: none"> Implementation Strategy and Planning Document template AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1)

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	preliminary Test and Evaluation Master Plan	<u>Validation:</u> <ul style="list-style-type: none"> • initial Implementation Strategy and Planning Document • initial Program Requirements Document • initial Business Case • Solution Concept of Operations <u>Verification:</u> <ul style="list-style-type: none"> • Test and Evaluation Handbook • TEMP template • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1), ANG-E Test Standards Board

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Enterprise Architecture products and amendments	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture Solution Concept of Operations initial Program Requirements Document NAS Segment Implementation Plan NAS Requirements Documents FAA Strategic Initiatives <u>Verification:</u> <ul style="list-style-type: none"> NAS Integrated Systems Engineering Framework 	Enterprise Architecture Control Board (NAS and Mission Support) and ANG Engineering Services

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	final Investment Analysis plan	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • Solution Concept of Operations • Functional Analyses Products • initial Program Requirements Document • Results of assessments conducted during Initial Investment Analysis <u>Verification:</u> <ul style="list-style-type: none"> • Investment Analysis Plan template • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1) and Office of Investment Planning and Analysis.

3.3.2 Final Investment Analysis

Final Investment Analysis develops detailed plans and final requirements for the selected investment opportunity. The principal outputs are program baseline work products, including: final PRD, final BC, ISPD, APB, Program Management Plan (PMP), initial TEMP, updated EA products and amendments, tailored In-Service Review (ISR) checklist and the Screening Information Request (SIR).

The primary focus of V&V during Final Investment Analysis is to validate the previously mentioned work products to mitigate risk and support implementation of the best alternative.

Table 4 identifies the following for Final Investment Analysis:

- The major decision point
- The minimum required work products that must be verified and validated at the decision point

- The criteria that each work product must be V&V'd against
- The stakeholders responsible for each V&V activity

Table 4. V&V in Final Investment Analysis⁵

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Final Investment Decision	final Program Requirements Document	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • Solution Concept of Operations • Functional Analyses Products • Results of assessments conducted during Final Investment Analysis • NAS Requirement Documents • initial Program Requirements Document V&V Results • Final ISS Assessment <u>Verification:</u> <ul style="list-style-type: none"> • Program Requirements Document template • System Engineering Manual • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1) and ANG Engineering Services

⁵ Table 4 content is based on AMS policy as of the time this document was published. Detailed guidelines for the Final Investment Analysis AMS lifecycle phase and document template exists and should be reviewed for current guidance.

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	final Business Case	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • Solution Concept of Operations • Functional Analyses Products • final Program Requirements Document • Results of assessments conducted during Final Investment Analysis • initial Business Case V&V Results <u>Verification:</u> <ul style="list-style-type: none"> • Business Case Analysis Guidelines • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1) and Office of Investment Planning and Analysis

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Acquisition Program Baseline	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture Solution Concept of Operations Functional Analyses Products final Program Requirements Document Business Case <u>Verification:</u> <ul style="list-style-type: none"> FAA Acquisition Baseline Management Standard Operating Procedure Acquisition Program Baseline Template AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1), Office of Investment Planning and Analysis, and Office of Budget and Programs
	Program Management Plan	<u>Validation:</u> <ul style="list-style-type: none"> final ISPD final Program Requirements Document final Business Case <u>Verification:</u> <ul style="list-style-type: none"> Program Management Plan Template AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1), Office of Investment Planning and Analysis, and Office of Budget and Programs

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	initial Test and Evaluation Master Plan	<u>Validation:</u> <ul style="list-style-type: none"> • final Implementation Strategy and Planning Document • final Program Requirements Document • final Business Case • Acquisition Program Baseline • preliminary Test and Evaluation Master Plan V&V Results <u>Verification:</u> <ul style="list-style-type: none"> • Test and Evaluation Handbook • TEMP template • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1), ANG-E Test Standards Board

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Updated Enterprise Architecture products and amendments	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture Solution Concept of Operations final Program Requirements Document NAS Segment Implementation Plan NAS Requirements Documents FAA Strategic Initiatives <u>Verification:</u> <ul style="list-style-type: none"> NAS Integrated Systems Engineering Framework 	Enterprise Architecture Control Board (NAS and Mission Support) and ANG Engineering Services

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	final Implementation Strategy and Planning Document	<u>Validation:</u> <ul style="list-style-type: none"> Enterprise Architecture final Program Requirements Document Business Case initial Implementation Strategy and Planning Document V&V Results <u>Verification:</u> <ul style="list-style-type: none"> Implementation Strategy and Planning Document template AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1)
	Tailored In-Service Review Checklist	<u>Validation:</u> <ul style="list-style-type: none"> Implementation Strategy and Planning Document final Program Requirements Document Solution Concept of Operations <u>Verification:</u> <ul style="list-style-type: none"> In-Service Review Checklist template AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1)

Decision Point	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Screening Information Request, including: <ul style="list-style-type: none"> • Statement of Work • Contract Data Requirements List/Data Item Descriptions • System Specification 	<u>Validation:</u> <ul style="list-style-type: none"> • final Program Requirements Document • Implementation Strategy and Planning Document • initial Test & Evaluation Master Plan <u>Verification:</u> <ul style="list-style-type: none"> • Statement of Work template • Templates for DD Form 1423-1 and DD Form 1664 • System Specification template • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1) and the Contracting Officer

3.4 V&V in Solution Implementation

The overarching goal of SI is to satisfy user requirements and achieve the benefit targets in the Business Case. Plans and baselines from the Final Investment Analysis are revalidated, and updated if necessary, after/before contract award – typically through the FAA Integrated Baseline Review (IBR) process – to ensure they can realistically serve as the management construct for program implementation. SI involves the following seven major activities:

- 1) Finalize program planning
- 2) Obtain the solution
- 3) Verify operational readiness
- 4) Prepare for In-Service Decision
- 5) Update planning for ISM
- 6) In-Service Decision
- 7) Deploy solution at all sites

The primary focus of V&V during Solution Implementation is to verify and validate products and product components and their associated work products that serve as the artifacts of these activities. Developmental and operational testing are the primary methods used to verify and validate the product and product components. In support of these tests, plans, procedures, and reports are generated which must be verified and validated to ensure test results provide accurate and complete data to support the In-Service Decision. In addition to the primary V&V activities, technical milestones such as the Preliminary Design Review (PDR) and Critical Design Review (CDR) also represent key opportunities for the conduct of a structured V&V of the system/service allocated and product baselines respectively.

Table 5 identifies the following for SI:

- The major decision points
- The minimum required work products, product components, and products that must be verified and validated at each decision point
- The criteria that each work product, product component, or product must be V&V'd against
- The stakeholders responsible for each V&V activity

Table 5. V&V in Solution Implementation⁶

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Contract Award	Contract including: <ul style="list-style-type: none"> • Updated Statement of Work • Updated Contract Data Requirements List/ Data Item Descriptions • Updated System Specification 	<u>Validation:</u> <ul style="list-style-type: none"> • Final Program Requirements Document • Implementation Strategy and Planning Document • Results from negotiations with contractor <u>Verification:</u> <ul style="list-style-type: none"> • Statement of Work template • Templates for DD Form 1423-1 and DD Form 1664 • System Specification template 	Service Team (including functional organizations such as systems engineering, test and evaluation, etc.) and Contracting Officer

⁶ Table 5 content is based on AMS policy as of the time this document was published. Detailed templates and guidance for the SI AMS lifecycle exist and should be reviewed for current direction.
 FAA AMS Lifecycle Verification and Validation Guidelines Version 3.0
 April 2017

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	final Test and Evaluation Master Plan	<u>Validation:</u> <ul style="list-style-type: none"> • final Implementation Strategy and Planning Document • final Program Requirements Document • final Business Case • Acquisition Program Baseline • Updated Statement of Work • Updated Contract Data Requirements List/ Data Item Descriptions • initial Test and Evaluation Master Plan V&V Results <u>Verification:</u> <ul style="list-style-type: none"> • Test and Evaluation Handbook • TEMP template • AMS Policy 	Investment Analysis Team (includes all specialists as defined in AMS Policy Section 2.5.1), ANG-E Test Standards Board

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Product Demonstration Decision (if required)	Contract Specifications (Decomposed from the FAA System Specification)	<u>Validation:</u> <ul style="list-style-type: none"> • FAA System Specification • Contract <u>Verification:</u> <ul style="list-style-type: none"> • Statement of Work • Data Item Description from contract for specifications 	Service Team (including functional organizations such as systems engineering, test and evaluation, etc.)
	Design Documents	<u>Validation:</u> <ul style="list-style-type: none"> • Contractor System Specification • Contract <u>Verification:</u> <ul style="list-style-type: none"> • Data Item Description from contract for design documents 	Service Team (including functional organizations such as systems engineering, test and evaluation, etc.)

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
Product Acceptance/Contractor Acceptance and Inspection (CAI) Production Decision (if required) In-Service Decision	System/Service <i>Note: Major V&V activities include DT, OT, and IOA</i>	<u>Validation:</u> <ul style="list-style-type: none"> Final Program Requirements Document including Critical Operational Issues and Critical Performance Requirements Solution Concept of Operations <u>Verification:</u> <ul style="list-style-type: none"> System Specification and/or lower-level specifications Safety Risk Management Document Contract 	Service Team (including functional organizations such as systems engineering, test and evaluation, etc.) and ATO Office of Safety and Technical Training
	Safety Risk Management Document or System Safety Assessment Report	<u>Validation:</u> <ul style="list-style-type: none"> Prior safety assessments Solution Concept of Operations Final Program Requirements Document <u>Verification:</u> <ul style="list-style-type: none"> FAA Safety Management System (SMS) 	Service Team (including functional organizations such as systems engineering, test and evaluation, etc.) and ATO Office of Safety and Technical Training

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	System Security Authorization	<u>Validation:</u> <ul style="list-style-type: none"> Plan of Actions and Milestones (POA&M) <u>Verification:</u> <ul style="list-style-type: none"> Security Authorization Handbook AMS Policy 	Service Team (including functional organizations such as systems engineering, test and evaluation, Information Systems Security Manager, etc.)
	Completed In-Service Review Checklist	<u>Validation:</u> <p>Assess completed checklist Issues/Action Plans/Remarks against the associated checklist question</p> <u>Verification:</u> <ul style="list-style-type: none"> In-Service Review Checklist Template AMS Policy 	Service Team (including functional organizations such as systems engineering, test and evaluation, etc.) and ATO Office of Safety and Technical Training

3.5 V&V in In-Service Management

The primary goal of ISM is to support execution of the FAA mission of providing air traffic control and other services. Systems, products, services, and facilities are operated, maintained, secured, and sustained in real time to provide the level of service required by users and customers. In addition, fielded products and services receive periodic monitoring and evaluation, and performance data is provided to ongoing MA and IA activities as the basis for revalidating the need to sustain deployed assets or taking other action to improve service delivery. This includes configuration management, preventive and corrective maintenance, training, infrastructure support and logistics support, emergency sustainment actions, and the removal/disposal of obsolete assets. Also included is the sustainment of flight inspection, aircraft certification, and regulatory requirements.

The primary focus of V&V during ISM is to ensure that any modifications to the product meet new/modified requirements and that any new/modified requirements or operational concepts are valid. It is particularly important to ensure the product continues to fulfill its

intended purpose throughout its lifecycle. Additionally, during ISM, all major work products associated with product modifications are subject to V&V.

Table 6 identifies the following for ISM:

- The major decision points
- The minimum required work products, product components, and products that must be verified and validated at each decision point
- The criteria that each work product, product component, or product must be V&V'd against
- The stakeholders responsible for each V&V activity

Table 6. V&V in In-Service Management⁷

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
<p>Decision to Implement an Improvement or Change</p> <p>Decision to Deploy an Improvement or Change</p>	Updates to Enterprise Architecture products and amendments	<p><u>Validation:</u></p> <ul style="list-style-type: none"> Enterprise Architecture NAS Segment Implementation Plan NAS Requirements Documents Operational Analysis Reports <p><u>Verification:</u></p> <ul style="list-style-type: none"> NAS Integrated Systems Engineering Framework 	Service Team (including functional organizations such as systems engineering), Enterprise Architecture Control Board (NAS and Mission Support), and ANG Engineering Services
	NAS Change Proposals (NCPs)/Changed Requirements	<p><u>Validation:</u></p> <ul style="list-style-type: none"> Post Implementation Reviews Operational Analyses Final Program Requirements Document <p><u>Verification:</u></p> <ul style="list-style-type: none"> FAA Form 1800-2 (Case File/NCP Form) FAA Order 1800.66 Configuration Management Policy 	Service Team (including functional organizations such as systems engineering)

⁷ Table 6 content is based on AMS policy as of the time this document was published. Detailed templates and guidance for the ISM AMS lifecycle exist and should be reviewed for current guidance.

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	<p>Implemented changes to the baseline system/service (supported by and documented in plans, procedures and reports)</p> <p><i>Note: Major V&V activities include ISM DT and OT activities (IOA if applicable)</i></p>	<p><u>Validation:</u></p> <ul style="list-style-type: none"> • Final Program Requirements Document including Critical Operational Issues and Critical Performance Requirements • NAS Change Proposal • Functional Description Document <p><u>Verification:</u></p> <ul style="list-style-type: none"> • System Specification and/or lower-level specifications • Functional Description Documents • Safety Risk Management Document • Contract 	Service Team (including functional organizations such as systems engineering)
	System Support Directives	<p><u>Validation:</u></p> <ul style="list-style-type: none"> • System/service procedures <p><u>Verification:</u></p> <ul style="list-style-type: none"> • FAA Order 1320.58A, Instructions for Writing Notices, Maintenance Technical Handbooks, and System Support Directives 	Service Team (including functional organizations such as systems engineering)

Decision Points	Work Products/Product Components/Products Subject to V&V	V&V Criteria	Stakeholder Responsible for V&V
	Updates to the Implementation Strategy and Planning Document	<u>Validation:</u> <ul style="list-style-type: none"> • Enterprise Architecture • Solution Concept of Operations • Functional Analyses Products • Updated Program Requirements Document • Detailed strategy for procuring, implementing, testing, and supporting the solution • Final Implementation Strategy and Planning Document V&V Results <u>Verification:</u> <ul style="list-style-type: none"> • Implementation Strategy and Planning Document template • AMS Policy 	Service Team (including functional organizations such as systems engineering)

APPENDIX A - ACRONYMS

ACAT	Acquisition Categories
AMS	Acquisition Management System
APB	Acquisition Program Baseline
ATO	Air Traffic Organization
BC	Business Case
CAI	Contractor Acceptance and Inspection
CDR	Critical Design Review
CMMI [®]	Capability Maturity Model [®] Integration
CPR	Critical Performance Requirement
CRD	Concept and Requirements Definition
CRDRD	Concept and Requirements Definition Readiness Decision
DT	Development Test
EA	Enterprise Architecture
FAA	Federal Aviation Administration
FAST	FAA Acquisition System Toolset
FID	Final Investment Decision
FPRD	Final Program Requirements Document
IA	Investment Analysis
IARD	Investment Analysis Readiness Decision
IBR	Integrated Baseline Review
IDA	Investment Decision Authority
IER	Independent Evaluation Review
IID	Initial Investment Decision
IOA	Independent Operational Assessment
ISD	In-Service Decision
ISGSA	Information Security Guidance for System Acquisition
ISM	In-Service Management
ISPD	Implementation Strategy and Planning Document
ISR	In-Service Review
ISS	Information System Security
NARP	National Aviation Research Plan
NAS	National Airspace System
NCP	NAS Change Proposal
NSIP	NAS Segment Implementation Plan
OT	Operational Test

PDR	Preliminary Design Review
PMP	Program Management Plan
POA&M	Plan of Actions and Milestones
PRD	Program Requirements Document
QA	Quality Assurance
RMA	Reliability Maintainability Availability
RSA	Research for Systems Analysis
SASP	Service Analysis & Strategic Planning
SI	Solution Implementation
SIR	Screening Information Request
SME	Subject Matter Expert
SMS	Safety Management System
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TSB	Test Standards Board
V&V	Verification and Validation

APPENDIX B - VERIFICATION AND VALIDATION CHECKLISTS

PROGRAM REQUIREMENTS DOCUMENT

VERIFICATION AND VALIDATION CHECKLIST

Title of Program Requirements Document: _____

Document Revision: _____

Document Date: _____

	Verify/Validate the Following	Method(s) Used*	Identify Artifact(s)**	Comments
1	PRD conforms to FAA Template for the Program Requirements and the standards in the System Engineering Manual			
2	Critical Performance Requirements (CPRs) are identified and meet CPR criteria			
3	Each requirement is:			
	a. Clearly stated			
	b. Unambiguous			
	c. Complete			
	d. Necessary/traceable			
	e. Verifiable/measurable/testable			
	f. Solution independent			
	g. Achievable with current or emerging technology (fPRD only)			
4	Requirements are complete based on functionality specified in:			
	a. Enterprise Architecture			
	b. Solution Concept of Operations			
	c. Functional Analysis Report			
	d. Enterprise Architecture Shortfall Analysis			
	e. Investment Analysis Assessments (fPRD only)			
	f. Others: Identify specific specifications or standards that apply such as NAS-RD-2010 and NAS-RD-2025.			
5	Requirement areas validated by appropriate stakeholders:			
	a. Performance			
	b. Supportability			
	c. Safety			
	d. Security			
	e. Interfaces			
	f. Human Factors			
	g. Transition			
	h. Reliability, Maintainability, & Availability			

* Method Used: Inspection = I, Peer Review = P, Audit = A, Checklist = C, Discussion = D, User Survey = U, Functional Presentation = F, Walk-through/dry run = W, Analysis = An, Testing = T, Demonstration = Dem, Modeling = M

** An Artifact is an objective and authenticated record that documents a verification or validation action or outcome (e.g. validation table, report, traceability matrix, minutes, completed checklist, survey results, or email).

ACQUISITION PROGRAM BASELINE

VERIFICATION AND VALIDATION CHECKLIST

Title of Acquisition Program Baseline Document: _____

Document Revision: _____

Document Date: _____

	Verify/Validate the Following	Method(s) Used*	Identify Artifact(s)**	Comments
1	APB conforms to FAA Template for the Acquisition Program Baseline Document			
2	Ensure all sections of the APB are consistent and cohesive in approach and direction. (This is especially important when each section is authored by a different individual.)			
3	Ensure Critical Performance Requirements are identified and consistent with those in the Program Requirements Document.			
4	Selection of Acquisition Baselines			
	a. Level 1, 2, and 3 milestones have been selected from the AMS Policy and represent an accurate estimate of the program schedule.			
	b. Costs estimates are accurately presented by fiscal year and include costs for:			
	1) Prime contract			
	2) Testing			
	3) Deployment			
	4) Site preparation			
	5) Installation			
	6) Headquarters and Field support contracts			
	c. Approved Critical Performance Requirements obtained from the Program Requirements Document			
	1) Requirements are clearly stated			
	2) Associate values for each requirement are provided			

* Method Used: Inspection = I, Peer Review = P, Audit = A, Checklist = C, Discussion = D, User Survey = U, Functional Presentation = F, Walk-through/dry run = W, Analysis = An, Testing = T, Demonstration = Dem, Modeling = M

** An Artifact is an objective and authenticated record that documents a verification or validation action or outcome (e.g. validation table, report, traceability matrix, minutes, completed checklist, survey results, or email).

IMPLEMENTATION STRATEGY AND PLANNING DOCUMENT

VERIFICATION AND VALIDATION CHECKLIST

Title of Implementation Strategy and Planning Document: _____

Document Revision: _____

Document Date: _____

	Verify/Validate the Following	Method(s) Used*	Identify Artifact(s)**	Comments
1	ISPD conforms to FAA Template for the Implementation Strategy and Planning Document			
2	Ensure all sections of the ISPD are consistent and cohesive in approach and direction. (This is especially important when each section is authored by a different individual.)			
3	Acquisition Strategy (For the initial ISPD, the strategy for each alternative should be identified.)			
	a. Prospective sources have been identified			
	b. Competition strategy has been formulated			
	c. Source selection criteria have been determined			
	d. Prime and support contract management processes have been defined			
	e. The strategy and plans in the ISPD support and fulfill the concepts and requirements in the EA and PRD.			
4	Program management controls for the following have been determined:			
	a. Schedule			
	b. Cost			
	c. Program activity			
	d. Physical and Functional Implementation			
	e. Facilities and Infrastructure			
	f. Deployment			
	g. Tracking and management of Critical Performance Requirements			
5	Engineering approaches validated by appropriate stakeholders:			
	a. Hardware			
	b. Software			
	c. RMA			
	d. Configuration Management			
	e. Interfaces			
	f. Human Factors			
	g. Maintenance			
	h. Safety			
	i. Security			
	j. Test and Evaluation			
	k. Production			

* Method Used: Inspection = I, Peer Review = P, Audit = A, Checklist = C, Discussion = D, User Survey = U, Functional Presentation = F, Walk-through/dry run = W, Analysis = An, Testing = T, Demonstration = Dem, Modeling = M

** An Artifact is an objective and authenticated record that documents a verification or validation action or outcome (e.g. validation table, report, traceability matrix, minutes, completed checklist, survey results, or email).

PROGRAM MANAGEMENT PLAN

VERIFICATION AND VALIDATION CHECKLIST

Title of Program Management Plan: _____

Document Revision: _____

Document Date: _____

	Verify/Validate the Following	Method(s) Used*	Identify Artifact(s)**	Comments
1	PMP conforms to FAA guidelines and template for the Program Management Plan			
2	Ensure all sections of the PMP are consistent and cohesive in approach and direction.			
3	Program management controls for the following have been determined:			
	a. Planning			
	b. Schedule			
	c. Cost			
	d. Risk			
	e. Requirements			
	f. Contracts			
	g. Physical and Functional Implementation			
	h. Integrated Logistics Control			
	i. Safety			
	j. Security			
	k. Test and Evaluation			
	l. Deployment			
	m. Communications			
5	Work Breakdown Structure validated by appropriate stakeholders:			
	a. Hardware			
	b. Software			
	c. RMA			
	d. Configuration Management			
	e. Interfaces			
	f. Human Factors			
	g. Maintenance			
	h. Safety			
	i. Security			
	j. Test and Evaluation			
	k. Production			

* Method Used: Inspection = I, Peer Review = P, Audit = A, Checklist = C, Discussion = D, User Survey = U, Functional Presentation = F, Walk-through/dry run = W, Analysis = An, Testing = T, Demonstration = Dem, Modeling = M

** An Artifact is an objective and authenticated record that documents a verification or validation action or outcome (e.g. validation table, report, traceability matrix, minutes, completed checklist, survey results, or email)

APPENDIX C - DEFINITIONS

Accreditation - The formal certification that a test capability is acceptable for a specific application.

Analyses - This is a method of verification which consists of comparing hardware or software design with known scientific and technical principles, technical data, or procedures and practices to validate that the proposed design will meet the specified functional or performance requirements.

Audits - (1) An independent examination of a work product or set of work products to assess compliance with specifications, standards, contractual agreements, or other criteria. (2) To conduct an independent review and examination of system records and activities in order to test the adequacy and effectiveness of data security and data integrity procedures, to ensure compliance with established policy and operational procedures, and to recommend any necessary changes.

Checklists - A list of items needed to be verified, checked or inspected.

Demonstrations - This is a method of verification where qualitative versus quantitative validation of a requirement is made during a dynamic test of the equipment. Additional definitions applied to this term are: (1) If a requirement is validated by test during first article qualification testing and the requirement has enough significance that it is "retested" during acceptance test, then this acceptance testing can be indicated in the VRTM as a Demonstration. (2) In general, software functional requirements are validated by demonstration since the functionality must be observed through some secondary media.

Discussions with Users – Self-explanatory.

Functional Presentations – A presentation illustrating the hierarchical arrangement of functions and interfaces providing a complete representation of the system from a performance and behavioral perspective.

Inspections - Is a method of verification to determine compliance with specification requirements and consists primarily of visual observations, or mechanical measurements of the equipment, physical locations, or technical examination of engineering-support documentation.

Modeling - Construction of programs used to model the effects of a postulated environment for investigating the dimensions of a problem for the effects of algorithmic processes on responsive targets.

Peer reviews - A peer review is a structured type of review that involves a methodical examination of a completed draft document for quality improvement purposes. Peer reviews are conducted by unbiased subject matter experts (SME) who have independence from the development and approval of the work product, component product or product.

Simulation - A model(s) that behaves or operates like a given system when provided a set of controlled inputs.

Storyboarding - Is a graphic arrangement of illustrations or images displayed in sequence for the purpose of visualizing a story or concept.

Testing - The process of operating a system or component under specified conditions, observing or recording the results, and making an evaluation of some aspect of the system or component.

User Surveys – User surveys are a method of gathering information from individuals. Surveys have a variety of purposes, and can be conducted in many ways. Surveys may be conducted to gather information through a printed questionnaire, over the telephone, by mail, in person, by diskette, or on the web.

Walk-throughs/dry runs – Is a technique where the effects of a possible failure are intentionally mitigated by the conduct of a rehearsal of the process or procedure prior to performing the real one.