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2.4 Concept and Requirements Definition Revised 10/2015

All investment opportunities that require funding outside the scope of an approved acquisition program baseline undergo concept and requirements definition. This includes upgrades or replacements to existing capability without approved investment funding.

Concept and requirements definition translates priority operational needs in the enterprise architecture 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 the estimation of potential costs and benefits. Finally, concept and requirements definition identifies the most promising alternative solutions able to satisfy the service need, one of which must be consistent with the conceptual framework in the enterprise architecture.

Planning for concept and requirements definition begins when a roadmap in the enterprise architecture specifies action must be taken to address a priority service or infrastructure need. These needs typically relate to existing or emerging shortfalls in the "as is" architecture or essential building blocks of the "to be" architecture. Should a service organization wish to pursue an investment opportunity not in an enterprise architecture roadmap, it must first develop architectural change products and amendments and get endorsement from the FAA Enterprise Architecture Board and approval by the Joint Resources Council.

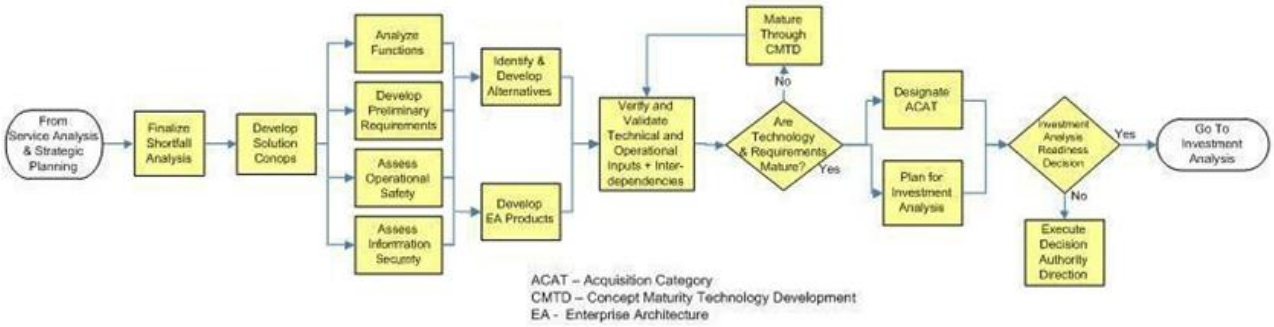
The FAA may undertake research activity or employ research by other agencies or industry to define the operational concept, develop preliminary requirements, demonstrate and refine computer-human interfaces, reduce risk, or achieve customer buy-in to potential solutions to service need.

When the investment initiative entering concept and requirements definition is an element of an operational capability (NAS only), the capture team responsible for achieving the operational capability (if established) participates in and contributes to CRD activity. The capture team is populated with representatives from each service team or program office that will provide an increment of the overall operational capability. These team members ensure all preliminary alternatives emerging from concept and requirements definition for each investment increment fit within the strategy for obtaining the capability and can provide the necessary performance and functionality.

A nonmateriel solution that emerges during concept and requirements definition may proceed to solution implementation upon approval of implementation and resource planning, provided it satisfies the need, can be achieved within approved budgets, and is acceptable to users and customers. This determination is made by the Vice President or Director of the service organization with the service need with the concurrence of the FAA Enterprise Architecture Board.

The key activities of concept and requirements definition are shown in Figure 2.4-1. They apply to all investment initiatives seeking investment funding, whether a stand-alone investment initiative or an element of a complex operational capability.

Figure 2.4-1 Key Activities of Concept and Requirements Definition



2.4.1 What Must Be Done Revised 10/2015

NOTE: The plan for concept and requirements definition must be approved by the Vice Presidents (ATO) or Directors (non-ATO) of the service organization with the service need and the operating service organization and by the FAA Enterprise Architecture Board chairperson before the start of any CRD activity (see AMS Section 2.3.1). Roadmap planning in the enterprise architecture specifies when concept and requirements definition activity must begin.

- **Finalize Shortfall Analysis.** The service organization or program office updates, refines, and quantifies the preliminary shortfall identified during service analysis in sufficient detail to serve as the basis for (1) clearly understanding the nature, urgency, and impact of the service need; (2) defining preliminary requirements; (3) determining realistic and economic alternative solutions; and (4) quantifying likely program costs and benefits.
- **Develop Solution Concept of Operations.** The solution concept of operations describes how users will employ the new capability within the operational environment and how it will satisfy service need. The solution ConOps defines the roles and responsibilities of key participants (e.g., controllers, maintenance technicians, pilots); explains operational issues that system engineers must understand when developing requirements; identifies procedural issues that may lead to operational change; and establishes a basis for identifying alternative solutions and estimating their likely costs and benefits. More than one solution concept of operations may be required if proposed alternative solutions differ significantly from each other.
- **Analyze Functions.** The service organization or program office translates stakeholder needs in the shortfall analysis, solution concept of operations, and NAS Requirements Document (NAS only) into high-level functions that must be obtained to achieve the desired service outcome. These are then decomposed into sequentially lower level functions. For NAS investment initiatives, this decomposition may have been done during service analysis when operational improvements and sustainments in the NAS ConOps were decomposed into functional and performance requirements and investment increments.
- **Perform Preliminary Information System Security (ISS) Assessment.** Service organizations assess the investment initiative to determine: (1) ISS risk factors for input to the ACAT determination, (2) ISS requirements for the preliminary program requirements document, (3) a rough ISS cost estimate for each alternative solution, and (4) a rough estimate of annual operational benefits gained from implementing security requirements.

- **Develop Preliminary Requirements.** The service organization prepares preliminary requirements in consultation with the NAS Systems Engineering Services organization (NAS) or the Office of Information & Technology, Strategy & Performance Service, EA Division (non-NAS). Preliminary requirements specify only function and performance, and do not define a solution. They must be expressed such that the degree to which different solutions satisfy them can be measured and evaluated. Research and analysis or even prototyping during service analysis may be necessary to define preliminary requirements adequately. When the investment increment is an element of an operational capability, preliminary program requirements must be derived from and traceable to operational capability requirements, when applicable.
- **Identify and Develop Alternatives.** The service organization or program office surveys the marketplace to identify feasible and economic solutions. Both material and non- material alternatives are evaluated. One candidate solution must be the hypothesized "best" alternative in the enterprise architecture. Key factors are safety, security, operational cost efficiencies, technological maturity, and impact on the workforce and enterprise architecture. Alternatives should be qualitatively different from each other. Low risk, cost-effective, and operationally suitable commercial or non-developmental solutions are preferred. Alternatives may not meet 100 percent of preliminary requirements. Rough lifecycle costs are developed for each alternative and compared to the monetized shortfall as a basis for determining whether it should be retained or eliminated from consideration. Rough lifecycle costs are also calculated for sustaining the legacy case in service. When a new capability involves information processing and storage, use of cloud computing is considered and results of the cloud suitability assessment are documented.
- **Assess Operational Safety.** The service organization works with ATO Safety and Technical Training to assess operational safety of the proposed initiative. This assessment identifies, assesses, and documents operational hazards and risks associated with alternative solutions. No alternative is pursued whose operational risk cannot be mitigated to an acceptable level at affordable cost.
- **Develop Enterprise Architecture Products.** The service organization engages with the appropriate architecture organization to develop required products and amendments. These include the operational (business rule) and systems (engineering) view families.
- **Verify and Validate Technical and Operational Inputs and Interdependencies.** Key technical and operational work products are verified and validated to be complete and mature as the basis for proceeding to the investment analysis readiness decision. This includes the solution ConOps, preliminary requirements document, safety and security risk assessments, architecture products, and interdependencies with other investment increments.
- **Are Technology and Requirements Mature?** NAS Systems Engineering Services (NAS) or Office of Information & Technology, Strategy & Performance Service, EA Division (non-NAS) evaluates preliminary requirements and the technology base of alternative solutions to ensure they are sufficiently mature for further progression in the AMS lifecycle management process. The objective is to have only low-risk investment initiatives entering investment analysis and solution implementation. Additional research and development may be prescribed when technological risk is too high or when requirements are not mature or the investment initiative may be deferred or terminated.
- **Mature Through Concept Maturity and Technology Development (NAS only).** The Technical Review Board recommends further development for NAS initiatives when

technological risk is too great or requirements are not sufficiently known. Prescribed activity may take the form of simulation, analysis, operational prototyping, or field demonstration in a controlled operational environment. See the Guidelines for Concept Maturity and Technology Development for more information.

- **Designate Acquisition Category.** The service team or program office prepares an acquisition category determination request based on preliminary financial data, as well as subjective assessments of complexity, risk, political sensitivity, safety, and security. The request is vetted through NAS Systems Engineering Services (NAS) or Office of Information & Technology, Strategy & Performance Service, EA Division (non-NAS) and submitted to the Acquisition Executive Board for a designation.
- **Plan for Investment Analysis.** The plan for investment analysis: (1) defines scope and assumptions; (2) describes alternatives and their associated rough lifecycle costs; (3) describes planned activities and specifies how tasks will be accomplished; (4) defines output and exit criteria; (5) establishes a schedule for completion; (6) defines roles and responsibilities of participating organizations; and (7) estimates resources needed to complete the work. By signing the plan for investment analysis, the organizations that will conduct the analysis agree to provide the resources necessary to complete the work. This activity includes development of the investment analysis readiness decision package and pre-briefings to decision-makers.

2.4.2 Outputs and Products Added 4/2013

- Solution concept of operations;
- Preliminary program requirements document;
- Architecture products and amendments;
- Realistic alternatives with rough cost estimates;
- Detailed shortfall and functional analyses;
- Safety risk assessment;
- Shortfall analysis report;
- Acquisition category designation request; and
- Investment analysis plan.

Key work products are verified and validated according to the FAA AMS Verification and Validation Guidelines before the investment analysis readiness decision.

2.4.3 Who Does it? Added 1/2015

Organization(s)	Responsibilities
Implementing service organization	Leads and completes all activities and outputs of concept and requirements definition unless otherwise specified in the plan for CRD Prepares the acquisition category designation request
NAS Systems Engineering Services Office (ANG-B), Office of Information	Provides engineering services in such areas as specialty engineering, safety and security analysis, and architecture products Validates technical and operational products of CRD

& Technology, Strategy & Performance Service, EA Division (non-NAS)	Assesses maturity of solution technology and requirements
NAS Lifecycle Integration Office (ANG-D), Program Management Office, lines of business, operating service organization, Office of Information & Technology, Strategy & Performance Service, EA Division (non-NAS)	Assists the implementing service organization in completing CRD activities Maintains guidance and acquisition aids for service analysis and concept and requirements definition
Capture team (NAS only)	• Monitors and oversees CRD activity when the investment initiative is an element of an operational capability • Ensures alternatives can provide the performance and functionality necessary to achieve the overall operational capability

Detailed roles and responsibilities of participating organizations for each CRD activity and output or product are found in the Service Analysis and Concept and Requirements Definition Guidelines.

2.4.4 Who Approves? Added 4/2013

Artifact	Approval Authority
Acquisition category	Acquisition Executive Board approves, JRC concurs
CRD outputs and products	Approval authorities are found in the Service Analysis and Concept and Requirements Definition Guidelines.

2.4.5 Investment Analysis Readiness Decision Added 4/2013

The investment analysis readiness decision determines whether the solution ConOps, preliminary requirements, architecture products and amendments, and preliminary alternatives are sufficiently mature to warrant entry into investment analysis. The decision is made within context of all ongoing and planned investment activities to sustain and improve service delivery. It ensures proposals for new investment are consistent with overall corporate needs and planning.

2.4.5.1 Entrance Criteria Added 4/2013

The following are required for the investment analysis readiness decision:

- Preliminary program requirements document;

- Realistic alternative solutions;
- Architecture products and amendments;
- Approved shortfall analysis report;
- Signed plan for investment analysis.

The full list of work products that may be required for the investment analysis readiness decision is found on the JRC Secretariat website.

2.4.5.2 Joint Resources Council Actions **Added 4/2013**

The Joint Resources Council makes the decision to enter investment analysis.