2.4 Concept and Requirements Definition Revised 1//2021

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

Activity during concept and requirements definition achieves the following primary objectives:

- Translate priority operational needs in the enterprise architecture into preliminary requirements and a solution concept of operations for the capability needed to improve service delivery;
- Quantify the service shortfall in sufficient detail for the realistic estimation of potential costs; and
- Identify and define the most promising alternative solution(s) able to satisfy the service need, one of which must be consistent with the conceptual framework in the enterprise architecture.

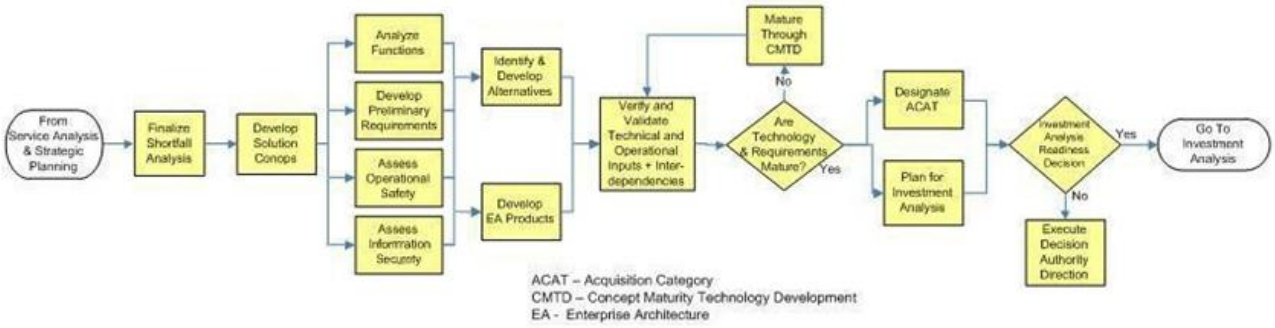
Concept and requirements definition is authorized to begin when the FAA Enterprise Architecture Board determines that action must be taken to address a priority service or infrastructure need in an enterprise architecture roadmap. These needs typically relate to existing or emerging shortfalls in the "as is" architecture or to 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 during concept and requirements definition 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 management team responsible for achieving the operational capability participates in and contributes to CRD activity. The management 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.

Figure 2.4-1defines the key activities of concept and requirements definition for a New Investment Level 1 acquisition category, which is the most complex and highest risk investment initiative undertaken by the FAA. For other acquisition categories, these activities are adjusted to require what is needed for each individual initiative using the ACAT table as the basis. As an example, a Sustainment initiative to replace obsolete processors in a radar system with a form-fit-function equivalent does not impact the solution concept of operations or performance requirements of the operational asset and would not need to develop those artifacts.

Figure 2.4-1 Key Activities of Concept and Requirements Definition



2.4.1 What Must Be Done **Revised 1/2021**

- **Convene Collaboration Team.** A collaboration team of key stakeholder organizations and the program office or service organization with the need is formed at the start of CRD phase activity to facilitate determination of the appropriate acquisition category for each initiative and to foster teamwork and shared goals during the conduct of concept and requirements definition. The collaboration team typically has representatives from the program office (or service team) proposing the initiative; key stakeholder organizations such as the NAS Systems Engineering Office, ATO Technical Operations, safety, information security, and testing; and the AMS policy team. The collaboration team is also available throughout execution of concept and requirements definition to resolve issues that are delaying or affecting the quality of the work effort.
- **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. Results are recorded in the final shortfall analysis report.
- **Determine Preliminary ACAT.** The collaboration team evaluates the complexity, risk, political sensitivity, safety, and security associated with the investment initiative to recommend the appropriate acquisition category. The program office or service team prepares a preliminary ACAT determination request based on this evaluation and presents it to the Acquisition Executive Board for approval.
- **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.
- **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 the 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. Multiple solution concept of operations may be required if more than one alternative is proposed and they differ significantly from each other.

- **Develop Preliminary Requirements.** The service organization or program office prepares preliminary requirements in consultation with the NAS Systems Engineering Services organization (NAS) or the Office of Information & Technology, Solution Delivery Service, Solution Strategy Division, EA Branch (Mission Support). Preliminary requirements specify only function and performance, and do not define a solution. They are expressed such that the degree to which different solutions satisfy them can be measured and evaluated. Research and analysis or even prototyping 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 be traceable to overall operational capability requirements, when applicable.
- **Develop Alternatives.** The service organization or program office surveys the marketplace to identify feasible and economic solutions to the service need or shortfall. Both materiel and non-materiel alternatives can be evaluated. When multiple solutions are identified, 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. When multiple alternatives are identified, they should be qualitatively different from each other. Low-risk, cost-effective, and operationally suitable commercial or non-developmental solutions are preferred. Alternative(s) 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 which 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 the results of the cloud suitability assessment are documented.
- **Assess Information System Security.** The service organization or program office assesses each proposed alternative solution to determine information security: (1) risk factors, (2) requirements for the preliminary program requirements document, (3) rough cost estimates to mitigate security risk for each alternative solution, and (4) a rough estimate of annual operational benefits to be gained from implementing security requirements.
- **Assess Operational Safety.** The service organization or program office works with ATO Safety and Technical Training to assess the operational safety of each alternative solution. This assessment identifies, assesses, and documents operational hazards and risks. No alternative is pursued whose operational risk cannot be mitigated to an acceptable level at affordable cost.
- **Develop Enterprise Architecture Products.** The service organization or program office engages with the appropriate architecture organization (NAS or Mission Support) to develop required products, views, and amendments. These include the operational (business rule) and systems (engineering) view families.
- **Verify and Validate Technical and Operational Work Products.** The service organization or program office uses the FAA AMS Lifecycle Verification and Validation Guidelines to evaluate whether key work products produced during concept and requirements definition are sufficiently 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, Solution Delivery Service, Solution Strategy Division, EA Branch (Mission Support) evaluates preliminary requirements and the technology base to ensure sufficient maturity of singular or multiple solutions 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.
- **Conduct Research or Analysis.** For NAS initiatives, the Technical Review Board recommends further research or analysis when technology or requirements are not sufficiently mature. 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 in the FAA Acquisition System Toolset for more information. For Mission Support initiatives, the Architecture Review Board defines what analytical activity may be needed.
- **Validate Acquisition Category.** The collaboration team either concurs with the preliminary ACAT designation or recommends a different designation based on the results of concept and requirements definition. The concurrence or recommendation is vetted through NAS Systems Engineering Services for NAS initiatives or the Office of Information &Technology, Solution Delivery Service, Solution Strategy Division, EA Branch for Mission Support initiatives and submitted to the Acquisition Executive Board.
- **Plan for Investment Analysis.** The plan for investment analysis: (1) defines scope and assumptions; (2) describes the singular or multiple 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 **Revised 1/2021**

Refer to the ACAT Table found on the FAST website (link) and the JRC checklist for required outputs and products for each decision point for New Investment Level I.

2.4.3 Who Does it? **Revised 1/2021**

Organization(s)	Responsibilities
Collaboration team	- Facilitates determination of the appropriate acquisition category for each investment initiative and fosters cooperation and common goals among key stakeholders of concept and requirements definition - Assists in the resolution of issues delaying or affecting the

	quality of the work effort during concept and requirements definition
Implementing service Organization or program office	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 & Technology, Solution Delivery Service, Solution Strategy Division, EA Branch (Mission Support)	Provides engineering services in such areas as specialty engineering, safety and security assessments, and architecture products Validates technical and operational products of CRD 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, Solution Delivery Service, Solution Strategy Division, EA Branch (Mission Support)	Assists the implementing service organization or program office in completing CRD activities Maintains guidance and acquisition aids for service analysis and concept and requirements definition
Operational capability management 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? Revised 1/2021

Artifact	Approval Authority
Acquisition category	Acquisition Executive Board recommends, FAA Acquisition Executive approves, Joint Resources Council 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 **Revised 1/2021**

The artifacts required for all acquisition categories at the investment analysis readiness decision are located in the ACAT Table found on the FAST website (link).

2.4.5.2 Joint Resources Council Actions **Revised 1/2021**

The Joint Resources Council makes the decision to enter investment analysis when it determines:

- The initiative is consistent with agency strategic goals and plans;
- Investment action needs to be taken now; and
- The required artifacts and activities of concept and requirements definition have been completed, validated, and verified.