APPENDIX A: ACRONYMS AND ABBREVIATIONS

A

ABD	Architecture Block Diagram
A/C	Aircraft
AC	Alternating Current
ADS-B	Automatic Dependent Surveillance – Broadcast
AMP	Analysis Management Plan
AMS	Acquisition Management System
ANSI	American National Standards Institute
ARP	Aerospace Recommended Practice
ASDE-3	Airport Surface Detection Equipment – Model 3
ASDE-X	Airport Surface Detection Equipment – Model X
ASR	Airport Surveillance Radar
ASQ	American Society of Quality
AT	Air Traffic (organization within FAA)
ATCT	Air Traffic Control Tower
ATM	Air Traffic Management
ATO	Air Traffic Organization
ATO-P	Air Traffic Organization – Operations Planning
Avg	Average

B

BP	Base Practice

C

C&A	Certification and Accreditation
CA	Certifying Agent
CAI	Contractor Acceptance Inspection
CAS	Cost Accounting Standard
CCB	Configuration Control Board
CCD	Configuration Change Decision
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CDTI	Cockpit Display of Traffic Information
CFE	Contractor-Furnished Equipment
CFR	Code of Federal Regulations
CHI	Computer-Human Interface
CI	Configuration Item
CM	Configuration Management
CMP	Configuration Management Plan
CNS	Communications, Navigation, Surveillance
Comm	Communications
CONOPS	Concept of Operations
CONUSE	Concept of Use
COTS	Commercial-Off-The-Shelf
CPI	Cost Performance Index

CPU	Central Processing Unit
CRD	Concept and Requirements Definition
CSA	Configuration Status Accounting
CSAR	Configuration Status Accounting Report
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
CSE	Computer Software Elements
CTE	Critical Technology Element

D

DAA	Designated Approving Authority
DAG	Defense Acquisition Guidelines
DAR	Design Analysis Report
DAU	Defense Acquisition University
DC	Direct Current
Dept	Department
DID	Data Item Description
DM	Data Management
DO	Defense Order
DoD	Department of Defense
DoDAF	DoD Architecture Framework
DOORS	Dynamic Object-Oriented Requirements System
DOT	Department of Transportation

E

E^3	Electromagnetic Environmental Effects
EA	Enterprise Architecture
ECP	Engineering Change Proposal
EIA	Electronics Industries Alliance
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EME	Electromagnetic Environment
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EMS	Electromagnetic Susceptibility
Eng	Engineering
EPA	Environmental Protection Agency
ESD	Electrostatic Discharge
ESS	Environmental Stress Screening
Est	Estimate
EVM	Earned Value Management
EXT	External

F

5M	Mission, Man, Machine, Management, Media
FA	Functional Analysis
FAA	Federal Aviation Administration
FAD	Functional Analysis Document

FAST	Federal Aviation Administration Acquisition System Toolset
FBR	Functional Baseline Review
FCA	Functional Configuration Audit
FCC	Federal Communications Commission
FFBD	Functional Flow Block Diagram
FIPS	Federal Information Processing Standard
FISMA	Federal Information Security Act
FMEA	Failure Mode and Effects Analysis
FMECA	Failure Mode and Effects Criticality Analysis
FMO	Frequency Management Officer
fPR	final Program Requirements
FRACAS	Failure Reporting Analysis and Corrective Action System
FRAT	Field Reliability Aceptance Tests
fPR	Final Program Requirements (Document)
FTA	Fault Tree Analysis

G

GA	General Aviation
GAO	General Accountability Office
GFE	Government-Furnished Equipment
GFP	Government Furnished Property
GIPEP	Government-Industry Data Exchange Program
Govt	Government
GPS	Global Positioning System
GSA	General Services Administration

H

H/W	Hardware
HCI	Human-Computer Interface
HDR	Hardware Discrepancy Report
HERF	Hazard of EM Radiation to Fuels
HERP	Hazard of EM Radiation to Personnel
HF	Human Factors
HFE	Human Factors Engineering
HFWG	Human Factors Working Group
HHA	Hazard Health Assessment
HMM/EE	Hazardous Material Management/Environmental Engineering
HPI	Human Performance Interface
HSPD	Homeland Security Presidential Directive
HTRR	Hazard Tracking Resolution
HVAC	Heating, Ventilating, and Air-Conditioning
HWCI	Hardware Configuration Item

I

IA	Integrity of Analyses
IARD	Investment Analysis Readiness Decision
IARR	Investment Analysis Readiness Review
ISAP	Implementation Strategy and Planning

IAT	Investment Analysis Team
IBR	Integrated Baseline Review
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
iCMM	integrated Capability Maturity Model
ICR	Interface Change Request
ID	Identification
IDEF	Integrated Definition for Function Modeling
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IEC	International Electrical Commission
I/F	Interface
IFR	Instrument Flight Rules
ILS	Integrated Logistical Support
ILSP	Integrated Logistical Support Plan
ILSPG	Integrated Logistics Support Process Guide
IM	Interface Management
IMS	Integrated Master Schedule
INCOSE	International Council on Systems Engineering
Intl	International
I/O	Input and Output
IOC	Initial Operational Capability
IOT&E	Independent Operational Test & Evaluation
iPR	Initial Program Requirements
IPT	Integrated Product Team
iRD	initial Requirements Document
IRD	Interface Requirements Document
ISAP	Implementation Strategy and Planning
ISD	In Service Decision
ISE	Information Security Engineering
ISO	International Organization for Standardization
ISPR	In Service Performance Review
ISR	In Service Review
ISP	Integrated Safety Plan
ISPR	In-Service Performance Review
ISS	Information Systems Security
ISSM	Information System Security Manager
ISSP	Information Systems Security Plan
IT	Information Technology
ITP	Integrated Technical Planning
ITS	Intelligent Transportation System
IWG	Interface Working Group

J

JRC	Joint Resources Council

K

KPP	Key Performance Parameter
KSA	Knowledge, Skills, and Abilities
KSLOC	Thousands Source Lines of Code

L

LCE	Lifecycle Engineering
LCP	Lifecycle Plan
LOM	Level of Maturity
LRU	Lowest Replaceable Unit

M

MA	Mission Analysis
MASPS	Minimum Aviation System Performance Standards
MCI	Master Configuration Index
MCO	Designation for Orlando International Airport
Mhr	Man-Hour
MIL-HDBK	Military Handbook
MIL-STD	Military Standard
MNS	Mission Need Statement
MOE	Measure of Effectiveness
MOPS	Minimum Operational Performance Standards
MOU	Memorandum of Understanding
MRS	Mature Requirements Statement
MSE	Maintain System Engineering (process)
MTBF	Mean Time Between Failure
MTTF	Mean Time to (Initial) Failure
MTTR	Mean Time To Restore
MVP	Master Verification Plan

N

N/A	Not Applicable
N^2	N-squared (used to denote an N by N open field matrix)
NAILS	National Airspace Integrated Logistics Support
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NASEA	NAS Enterprise Architecture
NATCA	National Association of Air Traffic Controllers
NCP	NAS Change Proposal
NDI	Non-developmental Item
NEC	National Electronic Code
NEXCOM	Next Generation Air/Ground Communications
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NOTAM	Notice to Airmen
NSA	National Security Administration
NTIA	National Telecommunications and Information Administration

O

O&SHA	Operating and Support Hazard Analysis
OEA	Operational Environmental Assessment

OMB	Office of Management and Budget
ORD	Operational Requirements Document
OSA	Operational Safety Assessment
OSED	Operational Services and Environmental Description
OSHA	Occupational Safety and Health Administration
OT	Operational Tests
OT&E	Operational Test and Evaluation
OV	Operational View

P

P-Static	Precipitation Static
PA	Process Area
PBM	Process-Based Management
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PHA	Preliminary Hazard Analysis
PID	Probability Impact Diagram
Pkg	Package
PMBOK®	Project Management Body of Knowledge
PMI	Project Management Institute
PMR	Program Monthly Review
PPM	Program Performance Measurement
PPP	Program Performance Parameter
pPR	preliminary Program Requirements
PRS	Primitive Requirements Statement
PSL	Program Support Library
PT	Product Team
PTR	Program Trouble Report
PUB	Publication
PUI	Program-Unique Identifier

Q

QA	Quality Assurance
QE	Quality Engineering
QFD	Quality Function Deployment
QRO	Quality/Reliability Officer
Qtr	Quarter

R

RAA	Responsibility, Authority, and Accountability
RADHAZ	Hazards of Electromagnetic Radiation
RAM	Requirements Allocation Matrix
RCM	Reliability-Centered Maintenance
RCN	Requirements Change Notice
Ref	Reference
RF	Radio Frequency
RFA	Request for Action
RFD	Request for Deviation

RFI	Radio Frequency Interference
RFP	Request for Proposal
RFW	Request for Waiver
RM	Requirements Management
RMA	Reliability, Maintainability, Availability
RMP	Risk Management Plan
ROI	Return on Investment
RPG	Radar Product Generator
RSK	Risk Management
RTCA	RTCA, Inc.
RVCD	Requirements Verification Compliance Document

S

SAE	Society of Automotive Engineers
SARP	Standards and Recommended Practices
SAT	Site Acceptance Testing
SBD	Schematic Block Diagram
SCAP	Security Certification and Authorization Package
SCN	Specification Change Notice
SE	System Engineering
SEBOK	System Engineering Body of Knowledge
SEC	System Engineering Council
SEM	System Engineering Manual
SEMP	System Engineering Management Plan
SFRA	System Functional Requirements Analysis
SHA	System Hazard Analysis
SHELL	Software, Hardware, Environment, Liveware
SIAR	SE Investment Analysis Review
SIR	Screening Information Request
SLC	System Life Cycle
SLMN	Service Level Mission Need
SMS	Safety Management System
SOO	Statement of Objectives
SOP	Standard Operating Procedure
SOS	System of Systems
SOW	Statement of Work
SP	Special Publication
SQA	Software Quality Assurance
SQAP	Software Quality Assurance Plan
SpecEng	Specialty Engineering
SPI	Schedule Performance Index
SRR	System Requirements Review
SRVT	Safety Requirements Verification Table
SSAR	System Safety Assessment Report
SSE	System Safety Engineering
SSH	System Safety Handbook
SSHA	Subsystem Hazard Analysis
SSMP	System Safety Management Plan
SSPP	System Safety Program Plan
STD	Standard

SV	System View
SYN	Synthesis

T

T&E	Test and Evaluation
TAAF	Test, Analyze, and Fix
TBD	To Be Determined
TIA	Telecommunications Industries Association
TPM	Technical Performance Measurement (or Measure)
TPP	Technical Performance Parameter
TRA	Technology Readiness Assessment
TS	Trade Studies
TSO	Technical Standing Order

U

UML	Unified Modeling Language
URL	Uniform Resource Locator
US	United States

V

VFR	Visual Flight Rules
VOR	Very High Frequency Omni directional Range
VR	Validation of Records
VRR	Verification Readiness Review
VRTM	Verification Requirements Traceability Matrix
V&V	Validation and Verification

W

WAAS	Wide Area Augmentation System
WARP	Weather and Radar Processor
WBS	Work Breakdown Structure
WSP	Weather System Processor
Wx	Weather

APPENDIX B: SYSTEM ENGINEERING MANUAL GLOSSARY

TERM	DEFINITION
Allocated Baseline	The approved documentation describing a CI's functional, performance, interoperability, and interface requirements that are allocated from those of a system or higher level configuration item; interface requirements with interfacing configuration items; and the verifications required to confirm the achievement of those specified requirements. *(MIL-STD-973)*
Allocation	Top-down distribution of system-level requirements to the subsystem, element, component, or to the project team that delegated to meet the requirement. Allocation is also the assignment of performance requirements to functions. *(Refer to SEM 4.3)*
Analysis	Logical examination or study of a system to determine the nature, relationships, and interaction of its parts and environment. *(FAA SEM 4.1)*
AND	(Functional Analysis) A condition where all preceding or succeeding paths are required. *(FAA SEM 4.4)*
Availability	The probability that a system or constituent piece will be operational during any randomly selected period of time, or, alternatively, the fraction of the total available operating time that the system or constituent piece is operational. *(FAA SEM 4.8.2)*
Baseline	An agreed-to description of the attributes of a product at a point in time, which serves as a basis for defining change. *(ANSI/EIA-649-1998)*
Behavior Diagram	Graphical representation of system dynamics that incorporates system responses to inputs. A type of functional flow diagram. The behavior diagram differs from functional flow block diagrams in that behavior diagrams contain data flow and control elements. *(See Functional Flow Block Diagram.)*
Change	Any alteration to a product or its released configuration documentation. A configuration change may involve modification of the product, product information and associated interfacing products. *(ANSI/EIA-649-1998)*
Component	A clearly identified (set of) part of the product being designed or produced. *(FAA SEM 2.2)*
Computer Software Component	A functionally or logically distinct part of a CSCI, typically an aggregate of two or more software units. *(FAA SEM 2.2)*
Computer Software Configuration Item	An aggregation of software that is designed for configuration management and treated as a single entity in the Configuration Management process. *(FAA SEM 2.2)*
Computer Software Unit	An element specified in the design of a CSC that is separately testable or able to be compiled. *(FAA SEM 2.2)*
Concept of Operations (CONOPS)	Description of what is expected from the system, including its various modes of operation and time-critical parameters. *(FAA SEM 4.3)*

TERM	DEFINITION
Concept of Use (CONUSE)	A textual document representing the results of high-level Functional Analysis efforts. It is usually derived solely from the user's perspective as an extension of a higher-level CONOPS with an emphasis on a particular system and its operating environment. It explains the existing system, current environment, users, interaction among users and the system, and organizational impacts. *(FAA SEM 4.4)*
Configuration Control Board	An Agency-authorized forum for establishing configuration management baselines and for reviewing and acting upon changes to these baselines. A CCB ensures the functional and operational integrity of a baseline through the establishment and enforcement of effective change management and control practices and processes. *(FAA SEM 4.11)*
Configuration Identification	The systematic process of selecting product attributes, organizing associated information about the attributes, and stating those attributes. It includes assigning and applying unique identifiers for the product and its associated documentation, as well as maintaining document revision relationships to the product configurations. *(FAA SEM 4.11)*
Configuration Item	Aggregation of hardware, software, processed materials, services, or any of its discrete parts that is demonstrated for configuration management and treated as a single entity in the configuration management process. *(FAA SEM 4.11)*
Configuration Management	A management process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design, and operational information throughout its life. *(ANSI/EIA-649-1998)*
Configuration Status Accounting (CSA)	The systematic recording and reporting of system or product configuration status. Configuration Status Accounting includes baseline change status and history for all items shown in the Master Configuration Index from initial delivery to end of product service. *(FAA SEM 4.11)*
Constraint	Internal or externally imposed boundary conditions which place limits within which the system or process must remain. *(FAA SEM 4.3)* A restriction, limit, or regulation, or, a type of requirement that is not tradable against other requirements. *(EIA Standard 731*)
Control Gate	A formal decision point along the life cycle that are used by the system owner and stakeholders to determine if the current phase of work has been completed and the team is ready to move into the next phase of the lifecycle. *(FAA SEM 4.2.6)*
Critical Design Review	Formal technical review conducted to evaluate the completeness of the design, its interfaces, and suitability to start initial manufacturing. *(FAA SEM 3.3)*
Decomposition	Partitioning/dividing a requirement into its lower-level discrete elements or parts. (Refer to SEM 4.3)

TERM	DEFINITION
Demonstration	Type of verification accomplished by operation, adjustment, or reconfiguration of items performing their design functions under specific scenarios. It is similar to test except that it does not require instrumentation. *(FAA SEM 4.12)*
Demonstrated Performance	The ability of an analysis to produce results that compare favorably with results obtained from the system being modeled over common areas of performance. *(FAA SEM 4.9)*
Derived Requirements	Any requirement that is not explicitly identified by the Customer or Stakeholder. *(Refer to SEM 4.3)*
Design Analysis Report	A report that documents the results of a specific Specialty Engineering analysis with rationale. Each DAR contains a description of the system's special characteristics, a list of existing requirements that have undergone the Validation and Verification process, residual risks, and candidate requirements found as a result of the analysis. *(FAA SEM 4.3)*
Deviation	Specific, written authorization, granted prior to the manufacture of an item, to depart from a particular requirement(s) of an item's current approved configuration documentation for a specific number of units or a specified period of time. (A deviation differs from an engineering change in that an approved engineering change requires corresponding revision of the item's current approved configuration documentation, whereas a deviation does not.) *(MIL-STD-973)*
Digital Data	Information prepared and maintained by electronic means and provided by electronic data access, interchange, transfer, or on electronic media. *(FAA SEM 4.11)*
Digital Device	Any unintentional radiator (device or system) that generates and uses timing pulses at a rate in excess of 9000 pulses (cycles) per second and uses digital techniques . . . *(FCC – Refer to SEM 4.8.4)*
Disposal	*(Lifecycle perspective)* All activities associated with disposal management, dismantlement/demolition/removal, restoration, degaussing, or destruction of storage media and salvage of decommissioned equipment, systems, or sites. *(FAA SEM 4.13)*
Effectivity	Designation defining the point in time, an event, or a product range (e.g., serial, lot number, model, date) at which changes or variances to specific products are to be effected. The authorized and documented point of usage for a specific configuration of a part/assembly/installation, etc. *(Refer to SEM 4.11)*
Electromagnetic Compatibility	The ability of a system to function within its electromagnetic environment and, itself, not be a source of troublesome electromagnetic interference. *(American National Standards Institute (ANSI) C63.14)*
Electromagnetic Environment	Consists of the systems and other elements (such as humans and nature) that exist within the area that a given system is (or is to be) operated. *(American National Standards Institute (ANSI) C63.14)*

TERM	DEFINITION
Electromagnetic Environmental Effects (E^3) Engineering	The technical discipline dealing with safe and efficient operation of electronic devices regarding radiated and conducted electromagnetic emissions. This includes both a given system's ability to deal with such emissions from its operational environment and how the device itself affects that environment. *(FAA SEM 4.8.4)*
Electromagnetic Pulse	An intense burst of electromagnetic interference caused by a nuclear explosion. Such a pulse may damage sensitive electronic systems or cause them to temporarily malfunction. *(American National Standards Institute (ANSI) C63.14)*
Electromagnetic Susceptibility	The weaknesses or lack of resiliency a system may have to certain electromagnetic conditions. *(American National Standards Institute (ANSI) C63.14)*
Electrostatic Discharge	An unintentional transfer of static electricity from one object to another. *(American National Standards Institute (ANSI) C63.14)*
(System) Element	An integrated set of components that comprise a defined part of a subsystem (e.g., the fuel injection element of the propulsion subsystem) *(FAA SEM 2.2)*.
(NAS) Enterprise Architecture	A strategic and evolutionary plan for modernizing the NAS that supports investment analysis tradeoffs. It focuses on defining and delivering the services that meet aviation industry and public needs, which it accomplishes by decomposing the services into capabilities that are the functions and activities necessary to deliver a service. Each capability is defined by the operational improvements required to deliver the capabilities. Each operational improvement is defined in terms of the mechanisms required to provide each step. Finally, each mechanism is defined in terms of the people, systems, and support activities provided by the procuring office. *(FAA SEM 4.3)*
Environment	Natural and induced conditions experienced by a system, including its people, product, and processes. *(Refer to SEM 4.4)*
Exclusive OR	(Functional Analysis) A condition where one of multiple preceding or succeeding paths is required, but not all. *(FAA SEM 4.4)*
Extensibility	The ability of a design alternative to serve new or multiple uses. (As opposed to flexibility) *(FAA SEM 4.5)*
Facility Baseline	The information needed to identify and control changes as well as record configuration and change implementation status of all CIs under Regional CCB authority. *(FAA SEM 4.11)*
Failure Modes and Effects Analysis	An evaluation process for analyzing and assessing the potential failures in a system, i.e. a systematic method of identifying the failure modes of a system, a constituent piece, or function and determining the effects on the next higher level of the design. *(FAA SEM 4.8.2)*
Failure Modes and Effects Criticality Analysis	An analysis method used to identify potential design weaknesses through a systematic analysis approach that considers all possible ways in which a component may fail (the modes of failure); possible causes for each failure; likely frequency of occurrence; criticality of failure;

TERM	DEFINITION
	effects of each failure on systems operation (and on various system components); and any corrective action that may be initiated to prevent (or reduce the probability of) the potential problem from occurring in the future. *(FAA SEM 4.8.2)*
Federal Aviation Administration Order	A permanent directive on individual subjects or programs that apply to the FAA. It directs action or conduct using action verbs. Orders also prescribe policy, delegate authority, and empower and/or assign responsibility for compliance with stated requirements or direction. Orders empower or direct only FAA personnel and carry no weight with contractors. *(FAA SEM 4.3)*
Flexibility	The ability (of a design alternative) to adapt to and accommodate growth needs (as opposed to extensibility) *(FAA SEM 4.5)*
Function	Characteristic action, or activity that needs to be performed to achieve a desired system objective (or stakeholder need). *(FAA SEM 4.4)*
Function name	An action that describes the desired system behavior. A *function name* is stated in the form of an action verb followed by a noun or noun phrase. *(FAA SEM 4.4)*
Functional Analysis	A System Engineering process that translates stakeholders' needs into a sequenced and traceable functional architecture. *(FAA SEM 4.1)*
Functional Architecture	Hierarchical arrangement of functions and interfaces providing a complete representation of the system from a performance and behavioral perspective. *(FAA SEM 4.4)*
Functional Baseline	The approved documentation describing a system's or item's functional, interoperability, and interface characteristic, and the verifications required to demonstrate the achievement of those specified requirements. *(MIL-STD-973)*.
Functional Baseline Review	A formal review to ensure that requirements have been completely and properly identified and that there is a mutual understanding between the implementing organization and stakeholders. *(FAA SEM 3.3)*
Functional Configuration Audit	A formal review to verify that the system and all subsystems can perform all of their required design functions in accordance with their functional and allocated configuration baselines. *(FAA SEM 3.3)*
Functional Decomposition	Approach to reducing functional complexity by allocating functionality and interfaces to more readily understood and managed sublevel functions. *(FAA SEM 4.4)*
Functional Flow Block Diagram	A Multi-tier, time-sequenced, step-by-step diagram that defines the detailed, step-by-step operational and support sequences for systems. (See also Behavior Diagram.) *(FAA SEM 4.4)*
Functional Interface	Logical or physical association between functions that allows transmission of a quantity across a boundary. Quantities may include electrical, hydraulic, and pneumatic power; mechanical forces and torques; gases; heat; vibration, shock, and loads; data; and other quantities. *(FAA)*

TERM	DEFINITION
Handbook	A guidance document that contains information or guidelines for use in design, engineering, production, acquisition, and/or supply management operations. These documents present information, procedural and technical use data, or design information related to processes, practices, services, or commodities. *(FAA SEM 4.3)*
Hazard	Any real or potential condition that can cause injury, illness, or death to people; damage to, or loss of, a system (hardware or software), equipment, or property; and/or damage to the environment. *(FAA SEM 4.8.1)*
Hazardous Material Management/ Environmental Engineering	The mechanism applied within the system engineering process to ensure a program's ongoing compliance with applicable environmental laws. It is also the process designed to provide early, pre-deployment planning and coordination to minimize the negative impacts that site-specific environmental conditions may have on a program's operability. *(FAA SEM 4.8.7)*
Human Factors Engineering	A multidisciplinary effort to generate and compile information about human capabilities and limitations, and apply that information to (the design and acquisition of complex systems) produce safe, comfortable, and effective human performance. *(FAA SEM 4.1)*
In-Service Performance Review	A formal technical review to characterize in-Service technical and operational health of the deployed system by providing an assessment of risk, readiness, technical status, and trends in a measurable form that will substantiate in-Service support, budget priorities, and/or possible disposal. *(FAA SEM 3.3)*
Inclusive OR	(Functional Analysis) A condition where one, some, or all of the multiple preceding or succeeding paths is required. *(FAA SEM 4.4)*
Inspection	Type of verification method accomplished by visually examining the item, reviewing descriptive documentation, and comparing the appropriate characteristics with predetermined standards to determine conformance to requirements without the use of laboratory equipment or procedures. *(FAA SEM 4.12)*
Integrity of Analyses	A disciplined process applied throughout a program to ensure that analyses provide the required levels of fidelity, accuracy, and confirmed results in a timely manner. Integrity is ensured by competent users iteratively applying a validated set of tools to a clearly defined data set. *(FAA SEM 4.1 and 4.9)*
Integrated Logistics Support (ILS)	a structured discipline for defining support constraints and acquiring support assets so that fielded products can be operated, supported, and maintained effectively over their entire service life. (FAA SEM 4.13)
Integrated Technical Planning	The tactical and strategic means of defining problems, forecasting conditions, and coordinating program elements to maximize program focus on providing superior products and services. *(Forsberg, Mooz, and Cotterman)*

TERM	DEFINITION
Integration	The progressive linking and testing of system components to merge their functional and technical characteristics into a comprehensive, interoperable system. *(Institute for Telecommunications, US Dept of Commerce)*
Interface	The performance, functional, and physical attributes required to exist at a common boundary. *(FAA SEM 4.1)*
Interface Control Document (ICD)	A design document that describes the detailed, as-built implementation of the functional requirements contained in the IRD *(FAA SEM 4.7)*
Interface Management	An element of System Engineering (SE) that helps to ensure that all the pieces of the system work together to achieve the system's goals and continue to operate together as changes are made during the system's lifecycle. *(FAA SEM 4.1)*
Interface Requirements	Requirements specifying the performance, functional or physical attributes that are required to exist at a common boundary. This boundary can exist between two or more functions, systems, system elements, configuration items, or systems. *(FAA SEM 4.7)*
Interface Requirements Document (IRD)	Document that provides FAA interface requirements between two elements, including type of interface (electrical, pneumatic, hydraulic, etc.) and the interface characteristics (functional or physical). *(FAA SEM 4.7)*
Interface Working Group (IWG)	A forum for discussing interface issues. IWG meetings serve two purposes: to ensure effective, detailed definition of interfaces by all cognizant parties, and to expedite baselining of initial IRDs, ICDs, and subsequent drawing changes by encouraging resolution of interface issues. *(FAA SEM 4.7)*
Lifecycle	Entire spectrum of activity for a given system, commencing with the identification of a need and extending through system design and development, production and/or construction, operational use, sustaining support, and system retirement and phaseout. *(FAA SEM 4.1)*
Lifecycle Engineering	An objective process to evaluate the constraints and dependencies associated with developing and operating a product or service, while seeking to maximize the product or service's value while minimizing the cost of ownership of the product or service over the entire life cycle. *(FAA SEM 4.1)*
Maintainability	The measure of the ability of a failed system or constituent piece to be restored to its fully operational status. *(FAA SEM 4.8.2)*
Master Configuration Index	A list of all baselined systems, equipment and software currently operational or under procurement for the National Airspace System (NAS) with current approved baseline documentation. *(FAA SEM 4.3)*
Mature Requirement Statement	A written statement of a requirement in one or more complete sentences in a familiar language (normally English) using the idiom of a particular business sector, such as air traffic control or avionics. *(FAA SEM 4.3)*

TERM	DEFINITION
Mean Time Between Failure (MTBF)	The mean number of life units during which all parts of the system or constituent piece perform within their specified limits, during a particular measurement interval under stated conditions. *(FAA SEM 4.8.2)*
Mean Time To Failure (MTTF)	The average time for a system to fail initially, based on the behavior of similar systems, operated under specified conditions for the duration of a specified time interval. *(FAA SEM 4.8.2)*
Mean-Time-To-Restore	The average total elapsed time from initial failure to resumption of operation. *(FAA SEM 4.8.2)*
Measure of Effectiveness (MOE)	Measures of operational effectiveness and suitability in terms of operational outcomes that identify the most critical performance requirements to meet system-level mission objectives. *(FAA SEM 4.3)*
Mechanism	A control gate that assesses the progress of the system against criteria established for a given point in the system's life cycle. *(FAA SEM 4.2.6)*
Minimum Aviation System Performance Standard (MASPS)	A standard (published by RTCA) that address the user-level service requirements used to qualify an aviation system for operational acceptance and to allocate requirements for the subsystems (including avionics). The standards provide information that explains the rationale for system characteristics, operational goals, requirements, and typical applications. *(FAA SEM 4.3)*
Minimum Operational Performance Standard (MOPS)	A standard (published by RTCA) that describes typical (avionics) equipment applications and operational goals and establishes the basis for required performance and test procedures for verification under a common set of standards. Definitions and assumptions essential to proper understanding are provided, as well as installed equipment tests and operational performance characteristics for equipment installations. The MOPS also provide information that explains the rationale for equipment characteristics and stated requirements. *(FAA SEM 4.3)*
(Service level) Mission Need	A document that translates a CONOPS into the needs and requirements of the users and service providers. It identifies the decision factors relevant to a capability shortfall or a technological opportunity to satisfy a mission more efficiently or effectively. *(Refer to SEM 4.4)*
Model	Representation of an actual or conceptual system that involves mathematics, logical expressions, or computer simulations that may be used to predict how the system might perform or survive under various conditions or in a range of hostile environments. *(See also Simulation)*
Module (Computer Software)	A program unit that is discrete and identifiable with respect to compiling, combining with other units, and loading. *(FAA SEM 2.2)*
N^2 Diagram	Visual matrix representing functional or physical interfaces between system elements. *(FAA SEM 4.4)*
National Air Space (NAS)	the overall environment in which aircraft operate, including aircraft, pilots, tower controllers, terminal area controllers, en route controllers, oceanic controllers, maintenance personnel, and airline dispatchers, as well as the associated infrastructure (facilities, computers,

TERM	DEFINITION
	communications equipment, satellites, navigation aids, and radars) *(FAA SEM 2.2)*
Operational Baseline	The Product Baseline adapted to local conditions, i.e. the approved technical documentation representing installed operational hardware and software. *(FAA SEM 4.11)*
Operational Services and Environmental Description (OSED)	A comprehensive, holistic system description that describes the services, environment, functions, and mechanizations that form a system's characteristics. *(FAA SEM 4.4)*
Order (FAA)	A permanent directive on individual subjects or programs that apply to the FAA. It directs action or conduct using action verbs. *(FAA SEM 4.3)*
Precipitation-Static (P-Static)	The buildup of static electricity resulting from an object's exposure to moving air, fluid, or tiny solid particles (e.g., snow or ice). *(American National Standards Institute (ANSI) C63.14)*
Part	One, two, or more pieces joined together to make a component; these pieces are not normally subject to disassembly without destruction or impairment of designed use – the lowest level of separately identifiable items within a system. *(FAA SEM 2.2)*
Performance	Quantitative measure characterizing a physical or functional attribute relating to the execution of an operation or function. Performance attributes include quantity (how many or how much), quality (how well), coverage (how much area, how far), timeliness (how responsive, how frequent), and readiness (availability, mission/operational readiness). Performance is an attribute for all systems, people, products, and processes, including those for development, production, verification, deployment, operations, support, training, and disposal. Thus, supportability parameters, manufacturing process variability, reliability, and so forth are all performance measures.
Physical Architecture	Hierarchical arrangement of hardware and/or software components along with associated interfaces depicting the physical definition of the system. *(FAA SEM 4.4)*
Physical Configuration Audit	the formal examination of the "as-built" configuration of a configuration item against its technical documentation to establish or verify the configuration item's product baseline. *(MIL-STD-973)*
Practice (ICAO recommended)	Identical to a standard except that it is not considered necessary - only desirable. *(See Standard (ICAO)below)*
Preliminary Design Review	Formal technical review of initial design concepts and documentation to confirm the preliminary design logically follows the SRR findings, meets the requirements, and to further define physical and functional interface requirements. *(FAA SEM 3.3)*
Primitive Requirement Statement	A form of a requirement statement that has no punctuation or formal sentence structure and is not written in a formal specification style. *(FAA SEM 4.3)*

TERM	DEFINITION
Product	Whole system, entity, or process being designed, developed, and/or produced. *(FAA SEM 4.3)*
Product Baseline	The configuration of the system or product being delivered to the customer. It is comprised of the combined performance/design documentation utilized for the production/procurement of the CI. This documentation package incorporates the allocated baseline documents describing a CI's functional, performance, interoperability and interface requirements and the verifications required to confirm the achievement of those specified requirements. It also includes additional design documentation, ranging from form and fit information about the proven design to a complete design disclosure package, as is deemed necessary for acquisition of the CI. *(MIL-STD-973)*
Product Definition	The aggregation of configuration item (CI) descriptions and supporting documentation necessary to define a product. This includes all hardware configuration items (HWCI) and computer software configuration items (CSCI). After the product baseline is established, the product definition includes ALL documentation required to design, build, assemble, test, modify, repair or support the product. This includes tooling, planning, analyses, parts lists, material standards and other product related items. *(FAA SEM 4.11)*
Quality Engineering	An objective analysis of all planned and systematic activities to ensure that a product or service fulfills requirements and is of the highest quality. *(FAA SEM 4.8.5)*
Quality Function Deployment	Method for capturing and delineating requirements based on identifying what is desired by the customer or stakeholder, along with how that desire may be satisfied. *(Refer to SEM 4.6)*
Reference Analyses	A set of authorized, validated analyses (certified in the case of simulations) established as reference analysis methods for use in subsequent analyses. *(FAA SEM 4.9)*
Reference Model	The function modeled in one particular validated tool is identified as a standard for comparison. A reference model is established to capitalize on primary expertise in specific areas of performance and to provide consistency at the subsystem level. *(FAA SEM 4.9)*
Reference Database	A database that represents the selected subsystem performance through tabulated values. *(FAA SEM 4.9)*
Reference Check Case	A representative set of conditions or characteristics for a situation under study that is used as the basis for certification comparison. *(FAA SEM 4.9)*
Reliability	Ability of a system and its parts to perform its mission without failure, degradation, or demand on the support system. It is generally characterized by the Mean-Time-Between-Failure (MTBF). *(FAA SEM 4.8.2)*

TERM	DEFINITION
Requirement	An essential characteristic, condition or capability that shall be met or exceeded by a system or a component to satisfy a contract, standard, specification, or other formally imposed document. *(FAA SEM 4.3)*
Requirement Set	An aggregate of requirements for a system that specifies its characteristics in totality. *(FAA SEM 4.3)*
Requirements Analysis	The determination of system specific characteristics based on analyses of customer needs, requirements, and objectives; missions; projected utilization environments for people products and processes; constraints; and measures of effectiveness. *(FAA SEM 4.3)*
Requirements Document	Collection of requirements and related information/attributes presented in a user-defined format. *(FAA SEM 4.3)*
Requirements Management	a process performed throughout a system's lifecycle, to elicit, identify, develop, manage, and control requirements and associated documentation in a consistent, traceable, correlatable, verifiable manner. *(FAA SEM 4.1)*
Requirements Verification Compliance Document	A document that provides evidence of system design compliance for each product requirement at all levels. *(FAA SEM 4.3)*
Risk	A future event or situation with a realistic (non-zero nor 100 percent) likelihood/probability of occurring and an unfavorable consequence/impact to the successful accomplishment of well-defined goals if it occurs *(FAA SEM 4.1)*
Risk *(Information Security)*	The combination of a threat, its likelihood of successfully attacking a system, and the resulting effects and harm from that successful attack. *(FAA SEM 4.8.6)*
Risk Identification	A systematic effort to uncover possible events or conditions that, if they occur, may hinder achievement of program or organization objectives. *(FAA SEM 4.10)*
Risk Management	An organized, systematic decision-support process that identifies risks, assesses or analyzes risks, and effectively mitigates or eliminates risks to achieve program or organizational objectives. *(FAA SEM 4.1)*
Risk Realization (Date)	The point in time of an event that either makes the risk a real part of the program or eliminates the need to track the risk. *(FAA SEM 4.10)*
SE Investment Analysis Review	A formal SE review to determine if the mission need capabilities shortfall and attendant solution set of alternatives are complete enough to support a Mission Need Decision. *(FAA SEM 3.3)*
Similarity	Type of verification by analysis. Applicable to components and subsystems similar in characteristics and usage to those on previous systems, and the prior system was qualified to equivalent or greater specifications. *(FAA SEM 4.12)*
Simulation	Execution of a system model to examine the response of the system to injected inputs, usually performed before development of system hardware and software. *(See also Model above) (Refer to SEM 4.12)*

TERM	DEFINITION
Software	A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions. *(FAA SEM 2.2)*
Specialty Engineering	A System Engineering domain that defines and evaluates a system's specific areas, features, or characteristics. Specialty Engineering supplements the design process by defining these characteristics and assessing their impact on the program. *(FAA SEM 4.1)*
Specification	A document prepared specifically to support an acquisition that clearly and accurately describes the essential technical requirements for purchased material or products and the criteria for determining whether the requirements are satisfied. *(FAA SEM 4.3)*
Standard	A document that establishes engineering and technical requirements for processes, procedures, practices, and methods that have been adopted as standard. *(FAA SEM 4.3)* Any specification for physical characteristics, configuration, material performance, personnel, or procedure that is applied uniformly for the safety or regularity of international air navigation and to which the international aviation community conforms. *(ICAO – see FAA SEM 4.3)*
Subsystem	A system in and of itself (reference the system definition) contained within a higher-level system. The functionality of a subsystem contributes to the overall functionality of the higher-level system. The scope of a subsystem's functionality is less than the scope of functionality contained in the higher-level system. *(FAA SEM 2.2)*
Synthesis	The creative process which translates requirements (performance, function, and interface) into alternative solutions resulting in a physical architecture for the "best-value" design solution, made up of people, products, and process solutions for the logical, functional grouping of the requirements. *(FAA SEM 4.1)*
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services, and other support facets. *(FAA SEM 2.2)*
System Boundary	The interface between system elements under design control and elements that are not. *(FAA SEM 4.3)*
System Engineer	Individual who concentrates on the design and application of the whole (system), as distinct from the parts, and who looks at a problem in its entirety, taking into account all the facets and all the variables and relating the social to the technical aspects. *(Ref SEM 1.0)*
System Engineering	A discipline that concentrates on the design and application of the whole (system) as distinct from the parts. It involves looking at a problem in its entirety, taking into account all the facets and all the variables and relating the social to the technical aspects. *(FAA SEM 1.0)*

TERM	DEFINITION
System Engineering Management Plan (SEMP)	A document that identifies what items are to be developed, delivered, integrated, installed, verified and supported. It identifies when these tasks will be done, who will do them, and how the products will be accepted and managed. It also defines the technical processes to be used to produce each of the project's products. *(California Department of Transportation, Systems Engineering Handbook for ITS, V1.1)*
System Requirements Review	A formal review to verify that requirements have been completely and properly identified and are correct. This review can be conducted at different levels, depending on the requirements set being reviewed. *(FAA SEM 4.2.6)*
Technical Performance Measurement	a process to continuously assess and evaluate the adequacy of architecture and design as they evolve to satisfy the requirements and objectives of the program. *(FAA SEM 4.2.6)*
Technical Performance Parameter	A critical technical performance requirement that supports critical operational needs and essentially measures the extent of success or failure of a design to meet those needs. *(FAA SEM 4.2.6)*
Technology Maturity	A measure of the degree to which proposed critical technologies meet program objectives; and, is a principal element of program risk. A technology readiness assessment examines program concepts, technology requirements, and demonstrated technology capabilities in order to determine technological maturity. *(DOD 5000.2)*
Technology Readiness Assessment	A multi-disciplined technical review that assesses the maturity of Critical Technology Elements (CTEs) being considered to address user needs; analyzes operational capabilities & environmental constraints within the Enterprise Architecture (EA) framework. *(FAA SEM 3.3)*
Test	Type of verification accomplished through systematic exercising of the application item under appropriate conditions, with instrumentation, and the collection, analysis, and evaluation of quantitative data. It includes both laboratory and flight tests. *(FAA SEM 4.12)*
Thread	A system input, system output, description of the transformations to be performed, and the conditions under which these transformations are to occur. *(Refer to SEM 4.4)*
Threshold requirement	Those requirements considered so important to satisfying the user needs that a system not meeting them is deemed unnecessary or unacceptable. *(FAA SEM 4.5)*
Traceability	Characteristic by which requirements at one level of design may be related to requirements at another level. Traceability encompasses the relationship between a performance requirement and the function from which the performance requirement was derived. *(Refer to SEM 4.3)*
Trade Study	Analysis conducted to methodically evaluate a series of design alternatives and recommend the preferred feasible solution(s) that enhance the value and performance of the overall system and/or functions. Each assessment is taken to an appropriate level of detail that allows differentiation between alternatives. *(FAA SEM 4.1)*

TERM	DEFINITION
Validated (method, model, or tool)	One that has been proven to provide credible results at the associated level of fidelity for a given analysis or study. *(FAA SEM 4.9)*
Validation	the determination that the requirements for a product are sufficiently correct and complete. *(SAE ARP 4761, 1996)*
Validation Table	A listing of all requirements that describes if a requirement has been validated, where the requirement may be found, source of validation, corrective action to be taken if necessary, and the corrective action owner. *(Refer to SEM 4.12)*
Variance	Specific, written authorization to depart from a particular requirement(s) of a product's current approved configuration documentation for a specific number of units or a specified period of time. (A variance differs from an engineering change in that an approved engineering change requires corresponding revision of the product's current approved configuration documentation, whereas a variance does not.) *(Refer to SEM 4.11)*
Verification	The evaluation of an implementation [system] to determine that applicable requirements are met. *(SAE ARP 4761, 1996)*
Verification Readiness Review	A formal review to ensure that all system engineering considerations are satisfied and that the readiness of all support, test, and operational systems is in order to perform the Verification process. *(FAA SEM 3.3)*
Verification Requirements Traceability Matrix	Matrix correlating requirements and the associated verification method(s). The VRTM defines how each requirement (functional, performance, and design) is to be verified, the stage in which verification is to occur, and the applicable verification levels. *(FAA SEM 4.3)*
Waiver	A written authorization to accept an item, which during manufacture, or after having been submitted for inspection or acceptance, is found to depart from specified requirements, but nevertheless is considered suitable for use "as is" or after repair by an approved method. *(MIL-STD-973)*
Work Breakdown Structure	A key element of planning that details the activities to be performed. It is a deliverable oriented grouping of project elements, which organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of a project component. *(FAA SEM 4.2)*

Appendix C — System Engineering Technical Reviews and Associated Checklists

C1.0 Introduction

This appendix and associated Risk checklists are used to support implementation of the System Engineering (SE) Technical Reviews specified in subsection 4.2.6 of Integrated Technical Planning (Section 4.2). This appendix contains sections on 10 individual SE Technical Reviews and the technical elements of two supporting reviews. These sections describe the purpose, entry criteria, planning, timing, conduct, exit criteria, and completion of each type of SE Technical Review. For the purposes of this appendix, the lifecycle phases of the Acquisition Management System (AMS) and their related reviews/audits are based on the November 2005 AMS policy.

The SE Technical Reviews (or milestones) in subsection 4.2.6 are integral parts of the FAA SE process and lifecycle management. Figure 3.3-1 shows the relationship of these milestones with the acquisition phases and decision points. The Technical Reviews provide an independent assessment of the technical progress of the program and highlight areas that corrective action may need to be taken.

Tip

These reviews are **not the place for problem-solving**, but to verify that the problems are being addressed. They are a risk-reduction approach that manages the progress of the technical aspects of a system development or deployment.

The contents of this appendix are provided for guidance. The application of specific reviews and associated checklists are intended to be tailored based on program needs and experience. Tailoring or elimination of a specific SE milestone should be coordinated with the System Engineering Council (SEC) and documented in the program System Engineering Management Plan (SEMP). Programs need not conduct certain reviews based on the structure of the program and the AMS entry point. Certain reviews may be performed incrementally by configuration item, especially for complex systems. The SEC is the point of contact for the contents of this appendix and associated documentation. Up-to-date reference materials and lessons learned are available on SEVirtual. Please contact the Air Traffic Organization (ATO), Operations Planning (ATO-P) System Engineering, for more information about SEVirtual.

C2.0 System Engineering Milestones and Technical Reviews

Each technical review or audit should establish the readiness of a program to proceed to the next phase of the system's lifecycle. Typically, reviews focus on the development phases, where SE provides the largest benefit to the investment. Reviews and audits are scheduled at strategic points within the development cycle and are usually conducted in conjunction with, or in preparation for, a lifecycle phase milestone at which the decision to advance to the next phase is made. Technical reviews employ specific criteria tailored to each phase of the lifecycle. These criteria verify the extent of technical progress made toward the solution of the identified capabilities shortfall.

The FAA has a set of reviews established to support its system lifecycle model (see Figure 3.3-1). Subsection 4.2.6.2 discusses the generic use and structure of Technical Reviews, but it is recognized that this generic construct must be tailored to some extent for each review. This

appendix contains the application of the generic review model and details of specific review tailoring along with some best practice techniques and approaches.

At any given SE Technical Review, a chairperson leads the review. The review itself is conducted and approved in accordance with the provisions of the governing SEMP. SE Technical Review approval, as it relates to this appendix, is defined as the following:

1. Approval of the Request(s) For Action (RFA) generated during the review

2. The readiness of the design/development to proceed to the next technical phase of the program

3. Dissemination of the assessment of risk generated during the review

Completion of a Technical Review occurs after all RFA forms have been addressed and assessed, the status agreed upon, an updated Risk Assessment completed, and the review minutes promulgated.

C2.1 Mission Analysis Phase

Per the FAA AMS, Mission Analysis is the crucial beginning phase of the lifecycle management process. It establishes the basis for long-range strategic planning by individual Service Organizations and the FAA as a whole. It also identifies, defines, evaluates, and prioritizes alternative options for improving service delivery. Mission analysis consists of corporate-level mission analysis, service-area analysis, and concept and requirements development. Research projects often support and provide information to mission analysis. The following SE milestones are associated with the Mission Analysis phase:

- Technology Readiness Assessment (TRA)
- SE Investment Analysis Review (SIAR)

C2.2 Investment Analysis Phase

Per the FAA AMS, the Investment Analysis phase of the Acquisition lifecycle is conducted to ensure that the critical needs of the FAA are satisfied by practical and affordable solutions. Initial investment analysis rigorously evaluates alternative solutions to mission need and determines which offers the best value and most benefit to the FAA and its customers within acceptable cost and risk. Final investment analysis develops detailed plans and final requirements for the proposed investment program, including an acquisition program baseline that establishes cost, schedule, performance, benefits, and risk-management boundaries for program execution. The following SE milestones support the effort to obtain a favorable investment decision:

- Functional Baseline Review (FBR)
- System Requirements Review (SRR) — Program level

C2.3 Solution Implementation Phase

The Solution Implementation phase of the AMS begins at the final investment decision, when the JRC approves and funds an investment program, establishes its program baseline for variance tracking, and authorizes the Service Organization to proceed with full implementation. Solution implementation ends when a new service or capability is commissioned into operational use. The following SE Technical Reviews support execution of a program during Solution Implementation:

- System Requirements Review (SRR) — Contract level
- Preliminary Design Review (PDR)
- Critical Design Review (CDR)
- Verification Readiness Review (VRR)
- Functional Configuration Audit (FCA)
- Physical Configuration Audit (PCA)

C2.4 In-Service Management

Activity during In-Service management supports execution of the FAA mission of providing air traffic control and other services. This includes operating, maintaining, securing, and sustaining systems, products, services, and facilities in real time to provide the level of service required by users and customers. It also entails periodic monitoring and evaluation of fielded products and services as well as feedback of performance data into Mission and Investment Analysis as the basis for revalidating the need to sustain deployed assets or taking other action to improve service delivery. The following SE Technical Reviews support In-Service Management:

- In-Service Performance Review (ISPR)
- Technology Readiness Assessment (TRA)

C2.5 Disposal

The AMS states that "Service organizations must remove and dispose of fielded assets and services when they are no longer needed. This includes restoration of sites where obsolete products or services were deployed, government property disposal, precious metals recovery, and cannibalization of useful assets. The cost of removal and restoration is included in the Exhibit 300 Program Baseline of the *replacement program*. If there is no replacement program, the cost must be otherwise factored into the service-area operating plan. Removal and disposal includes decommissioning, dismantling, and demolishing of systems and equipment; restoring sites including environmental cleanup and disposal of hazardous materials; disposing of government property; recovering precious metals; and reusing surplus assets."

There are no SE milestones uniquely associated with the Disposal phase. The SE decision efforts are conducted during earlier phases of the lifecycle.

C3.0 FAA System Engineering Milestones and Technical Reviews

A total of 10 SE milestones are described in this section — each on its own "fact sheet." These sheets describe the purpose, timing, entry criteria, planning, conduct, exit criteria, completion of each SE milestone (also called a Technical Review), and helpful tips.

Each SE Technical Review has an associated Program Risk Assessment Checklist. These checklists should be used in conjunction with the SEMP during execution of the program. The Risk checklists are living documents, intended to be updated based on user experiences. The checklists are an effective tool for preparing for and conducting a review. Use the following criteria to complete the checklist(s):

- **Green.** The requisite criteria and/or documentation is available and of sufficient quality to conduct the review.
- **Yellow.** The requisite criteria and/or documentation is available and/or partially suitable to conduct the review.
- **Red.** The requisite criteria and/or documentation is NOT available or not sufficient to conduct the review.

C3.1 Technology Readiness Assessment (TRA)

The TRA is a multidisciplined technical review that assesses the maturity of Critical Technology Elements (CTE) being considered to address user needs and analyzes operational capabilities and environmental constraints within the Enterprise architectural framework. The TRA validates capability gaps at the NAS (or non-NAS) level to be addressed by the service units or Lines of Business (used to support service unit's initial Mission Need submission) and determines extent that new and/or novel technologies may be mature enough to be considered to address the gap. If a specific technology or its application is either new or novel, then that technology is considered a CTE. The TRA is not a risk assessment but is a systematic metrics-based tool for the ATO to identify and allow for early attention to technology maturation events. The TRA will score each identified CTE using 09 Levels of Maturity (LOM) (Table C-1) for both hardware and software.

Table C-1. LOM TML Descriptions

LOM Level	Definition	Description	Supporting Documentation
1	Basic principles observed and reported	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties.	• Published research that identifies the principles that underlie this technology. • References to who, where, when.
2	Technology concept and/or application formulated	Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.	• Publications or other references that outline the application being considered and that provide analysis to support the concept.

3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.	• Results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. • References to who, where, and when these tests and comparisons were performed.
4	Component and/or breadboard validation in laboratory environment	Basic technological components are integrated to establish that they will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in the laboratory.	• System concepts that have been considered and results from laboratory-scale breadboard(s). • References to who did this work and when. • Provide an estimate of how breadboard hardware and test results differ from the expected system goals.
5	Component and/or breadboard validation in relevant environment	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment. Examples include "high fidelity" laboratory integration of components.	• Results from testing a laboratory breadboard system are integrated with other supporting elements in a simulated operational environment. • How does the "relevant environment" differ from the expected operational environment? • How do the test results compare with expectations? • What problems, if any, were encountered? • Was the breadboard system refined to more nearly match the expected system goals?
6	System/subsystem model or prototype demonstration in a relevant environment	A representative model or prototype system, which is well beyond that of LOM 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in a simulated operational environment.	• Results from laboratory testing of a prototype system that is near the desired configuration in terms of performance, weight, and volume. • How did the test environment differ from the operational environment? • Who performed the tests? • How did the test compare with expectations? • What problems, if any, were encountered? • What are/were the plans, options, or actions to resolve problems before moving to the next level?

7	System prototype demonstration in an operational environment	Prototype near, or at, planned operational system. Represents a major step up from LOM 6, requiring demonstration of an actual system prototype in an operational environment such as an aircraft, vehicle, or space. Examples include testing the prototype in a test bed aircraft.	• Results from testing a prototype system in an operational environment. • Who performed the tests? • How did the test compare with expectations? • What problems, if any, were encountered? • What are/were the plans, options, or actions to resolve problems before moving to the next level?
8	Actual system completed and qualified through test and demonstration	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this LOM represents the end of true system development. Examples include developmental test and evaluation of the system in its intended weapon system to determine if it meets design specifications.	• Results of testing the system in its final configuration under the expected range of environmental conditions in which it will be expected to operate. • Assessment of whether it will meet its operational requirements. • What problems, if any, were encountered? • What are/were the plans, options, or actions to resolve problems before finalizing the design?
9	Actual system proven through successful mission operations	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions.	• Operational Test and Evaluation (OT&E) reports.

C3.1.1 Timing and Relationship to AMS

The assessment of new and/or promising technologies occurs at two distinct points in the AMS lifecycle as shown on Figure 3.3-1, Product Planning and Development Process, in Chapter 3: (1) during Mission Analysis to support a determination of those alternate technologies to be considered during Investment Analysis, and (2) during the In-Service Management phase of the AMS to determine if technology insertion is warranted to address user needs.

Related AMS products:

- Mission Need Analysis
- Standards, guidance, and tools for Service-level Mission Analysis

C3.1.2 Entrance Criteria and Inputs

These include the following:

- Enterprise Architecture
- Concept of Operations
- Concerns and Issues
- Technology
- Market Research
- Need
- Corporate Strategy and Goals
- Legacy System

C3.1.3 Tasks

(Reserved)

C3.1.4 Exit Criteria and Outputs

These include the following:

- Validated NAS Functional portion of Enterprise Architecture
- Technology opportunities
- Updated Risk Assessment
- Gap Analysis

C3.1.5 Metrics

(Reserved)

C3.1.6 Tools

- TRA Risk Reduction Checklist (see file 060517 FAA TRA Checklist V31)

C3.2 SE Investment Analysis Review (SIAR)

The intent of the SIAR is to determine if the mission need capabilities shortfall can be fulfilled by candidate solutions (concepts and preliminary requirements), technical constraints are sufficiently understood, and risk definition is complete enough to support a Mission Need Decision. This checkpoint verifies that the identified needs, shortfalls, and technical constraints have been validated; that initial feasibility assessments have been accomplished; and that proposed solutions are consistent with the NAS Architecture or that required changes to the NAS Architecture have been identified. The technical part of this review involves reviewing the preliminary Program Requirements (pPR) for readiness to proceed to investment analysis. The SIAR also establishes an initial set of Technical Performance Parameters (TPP).

C3.2.1 Timing and Relationship to AMS

The SIAR occurs late in Mission Analysis during the Concepts and Requirements definition phase.

C3.2.2 Entrance Criteria and Inputs

These include the following:

- Preliminary Concept of Use (CONUSE)
- FAA Policy
- Standards
- Preliminary Operational Services and Environmental Description (OSED)
- Constraints
- Integrated Program Schedule
- Initial Description of Alternatives

C3.2.3 Tasks

(Reserved)

C3.2.4 Exit Criteria and Outputs

These include the following:

- Service Level Mission Need (SLMN)
- Preliminary Exhibit 300 Attachment 1 (pPR — previously the iRD)
- Final Description of Alternatives
- Lifecycle Cost Estimate
- OSED
- CONUSE

C3.2.5 Metrics

(Reserved)

C3.2.6 Tools

- SIAR Risk Reduction Checklist (see file TBD)

C3.3 Functional Baseline Review (FBR)

The FBR is a formal review to ensure that requirements have been completely and properly identified and that there is a mutual understanding between the implementing organization and stakeholders. It validates program cost, schedule, and performance to support Milestone approvals. It captures functional requirements that go with the Mission Analysis and Investment Analysis phases and establishes the functional baseline as the governing technical description, which is required before proceeding to the next AMS phase or Decision gate.

C3.3.1 Timing and Relationship to AMS

It is conducted just before the Initial Investment Decision (AMS Milestone 3).

C3.3.2 Entrance Criteria and Inputs

These include the following:

- Preliminary Exhibit 300 Attachment 1 (pRD — previously the iRD)
- Constraints
- FAA Policy
- Standards
- Integrated Master Schedule (IMS)
- Investment risks

C3.3.3 Tasks

(Reserved)

C3.3.4 Exit Criteria and Outputs

These include the following:

- Final Requirements Set — Exhibit 300 Attachment 1 (previously the fRD)
- Program Work Breakdown Structure (WBS)
- Program Statement of Work (SOW)
- Final SEMP

C3.3.5 Metrics

(Reserved)

C3.3.6 Tools

- FBR Risk Reduction Checklist (see file TBD)

C3.4 System Requirements Review (SRR)

The SRR determines whether the System Requirements Document (Type A Specification) correctly and completely represents the operational and constraint requirements defined in the fPR. This review also determines if the proposed functional architecture is consistent with the system requirements. The SRR occurs early in the development process before expenditure of any extensive design definition effort. As part of the process of determining whether the system requirements and architecture capture the mission's needs, values for all TPPs are projected based on system requirements and compared to the target values and critical limits set during investment analysis. The results of the TPM analysis become part of the output of the SRR. Additional TPPs might be added depending on requirement changes approved at the SRR. Critical performance limits might also be adjusted based on approved requirement changes.

Program level. The SRR is a formal internal FAA review to ensure that the system requirements have been completely and properly identified. It validates program cost, schedule, and performance to support Milestone approvals. It assesses the technical readiness of the program to begin implementation and establishes the Allocated baseline as the governing technical description, which is required for the next AMS Acquisition phase.

Contract level. The SRR at the contract level is a formal, system-level review conducted to ensure that system requirements have been completely and properly identified and that a mutual understanding between the government and contractor exists. It assesses the contractor's readiness to begin development.

C3.4.1 Timing and Relationship to AMS

The program SRR is conducted just before the Investment Decision (AMS Investment Milestone 4). The contract SRR is conducted shortly after both AMS Milestone 4 and contract award (prior to the beginning of functional allocation activities) to assess the contractor's readiness to begin development.

C3.4.2 Entrance Criteria and Inputs

Access to the IMS and LCE cost estimate(s) are a prerequisite for conducting a successful SRR. Previously completed products that are required before proceeding to SRR include:

- pPR/fPR
- List of allocated TPPs and associated critical performance limits and target values
- Constraints
- IRDs (draft)
- Risk identification and mitigation plans
- Any proposed changes to the above items as a result of the work leading up to the SRR

Products that are to be submitted for review as part of the SRR include:

- System Requirements Document/Type A Specification (draft)
- System Functional Architecture (draft)

- A report on the results of the TPM analyses
- System specification, SOW, and the contract WBS (included at the contract level SRR).

C3.4.3 Tasks

The following tasks are required to successfully accomplish the SRR (independent of level):

- Define SRR objectives and scope
    - Establish success criteria, prerequisites (entry criteria), and approach to be used
    - Set the date for the SRR and activities leading up to the review
    - Create an agenda for the review
    - Identify and notify participants and stakeholders of their roles and responsibilities
- Identify the item(s) to be reviewed and the extent of review of each
- Compile the SRR-related data package. This package contains the SRR presentation material and all of the pertinent backup material.
- Distribute the SRR documentation to the stakeholder representatives and request timely review responses
- Obtain readiness approval for SRR and comments to the data package made via Review Item Discrepancy submissions
- Incorporate changes in the data package as needed
- Develop a summary of all concerns submitted and their respective answers
- Update risk management plans based on review
- Conduct SRR with the incorporated changes
- Document and publish SRR minutes
- Compile action-item and issues lists
- Track action items and issues
- Document closed action items and distribute to the SRR stakeholders

C3.4.4 Exit Criteria and Outputs

These include the following:

- Approved System Requirements Document/Type A Specification
- Approved System Functional Architecture
- Approved changes to the fPR
- Approved changes to the IRDs
- Approved changes to the TPPs
- Approved TPM report
- Updated Risk Management Plan(s)

- System Specification (includes obtaining contractor agreement at contract SRR)
- Risks for recommended alternative
- LCE cost estimate for recommended alternative
- Draft In-Service Review (ISR) Checklist
- Interface documents
- Contractor SOW

C3.4.5 Metrics

The metrics for this review consist primarily of the following:

- Customer Acclimation
- Number of system requirements that surface at later reviews compared to the original number of requirements
- Errata

If prototyping has been done to assist in finalizing the system requirements, then it would be possible to measure changes in the status of the TPPs. Otherwise, Technical Performance Measurement (TPM) would not be part of the metrics for this review.

C3.4.6 Tools

The primary tools used for this review are:

- Requirements Database
- Risk Database
- Action Item Database
- Issues Database
- TPM Database (if used as a metric)
- SRR Risk Reduction Checklist (see file TBD)

C3.5 Preliminary Design Review (PDR)

The PDR is a formal review that assesses the preliminary design against the Allocated baseline and confirms that the preliminary design logically follows the SRR findings and meets the requirements. It normally results in approval to begin detailed design. Many organizations see it as the last viable point for effective technology insertion.

The preliminary design describes the system functions allocated to the subsystem and configuration item level. The solution design definition lacks considerable detail and is represented by the functional, performance, and interface requirements included in the Type B and Type C Specifications, and the draft Interface Control Documents (ICD). The PDR demonstrates that the preliminary design meets system and program requirements as specified in the Type A Specification previously approved. As part of the process of determining whether the design meets requirements, values for all TPPs allocated to the design are projected and compared with the target values and critical limits set during investment analysis. The results of the TPM analysis become part of the output of the PDR. Additional TPPs might be added depending on design or requirement changes approved at the PDR. Critical performance limits might also be adjusted based on approved requirement changes.

C3.5.1 Timing and Relationship to AMS

The PDR is conducted at completion of functional allocation activities by the contractor and prior to the beginning of detailed design. (See Figure 3.3-1, Product Planning and Development Process, in Chapter 3.)

C3.5.2 Entrance Criteria and Inputs

The completed Allocated baseline as documented in design specifications for each hardware and software configuration item is the basis for conducting the review. Products previously completed by the contractor or provided as part of the contract that are required before proceeding to PDR include:

- List of allocated TPPs and associated critical performance limits and target values
- Constraints
- Type A Specification
- Functional Architecture
- IRDs
- Risk identification and mitigation plans
- Any proposed changes to the above items as a result of the work leading up to the PDR

Products that are to be submitted for review as part of the PDR include:

- Type B Specification (draft)
- Type C Specification, if needed (draft)
- Requirements Allocation Matrix (draft)

- ICDs (draft)
- Report on the results of the TPM analyses
- Preliminary design documentation (conceptual layouts, etc.)

C3.5.3 Tasks

The following tasks are required to successfully accomplish the PDR:

- Define PDR objectives and scope
  - Establish success criteria and prerequisites (entry criteria, and approach to be used)
  - Set the date for the PDR and activities leading up to the review
  - Create an agenda for the review
  - Identify and notify participants and stakeholders of their roles and responsibilities.
- Identify the item(s) to be reviewed and the extent of review of each
- Compile the PDR-related data package. This package contains the PDR presentation material and all of the pertinent backup material.
- Distribute the PDR documentation to the stakeholder representatives and request timely review responses
- Obtain readiness approval for PDR and comments to the data package made via Review Item Discrepancy submissions
- Incorporate changes in the data package as needed
- Develop a summary of all concerns submitted and their respective answers
- Update risk mitigation plans based on review
- Conduct PDR with the incorporated changes
- Document and publish PDR minutes
- Compile action item and issues lists
- Track action items and issues
- Document closed action items and distribute to the PDR stakeholders

C3.5.4 Exit Criteria and Outputs

Successful completion of PDR results in the approval to begin detail design and includes the following outputs:

- Updated Risk Mitigation plans to include risks identified during PDR
- RFA(s) with approved action plans
- Approved allocated baseline
  - Preliminary Type B Specification
  - Preliminary Type C Specification
  - Requirements Allocation Matrix

  - Preliminary ICDs
- Approved changes to the Type A Specification
- Approved changes to the functional architecture
- Approved changes to the IRDs
- Approved TPM report and approved changes to the TPPs
- Resolution of any contract scope issues revealed during the PDR process

C3.5.5 Metrics

The PDR metrics are:

- Customer Acclimation
- The number of new subsystem requirements that surfaces at later reviews or testing compared to the initial number of requirements
- The number of design features that changes, compared to the original number, as a result of inadequate analysis prior to the PDR
- The number of RFAs accepted with formal action plans

The status of the TPPs is also used as a metric to measure the progress of the program.

C3.5.6 Tools

The primary tools used for this review are:

- PDR Risk Reduction Checklist (see file TBD)
- Requirements Database
- Risk Database
- Action Item and Issues Database
- TPM Database

C3.6 Critical Design Review (CDR)

The CDR is a formal review conducted to evaluate the completeness of the design, its interfaces, and suitability to start initial manufacturing. The CDR evaluates the design of a system or Configuration Item (CI) down to the lowest design level. It assesses the preliminary system product design package against the Allocated baseline and is conducted during the design and development phase of a program when detail design is essentially complete. The review:

- Determines that the detail design of the system or CI under review satisfies the performance and engineering specialty requirements of the Preliminary Hardware Product Specifications or Hardware Configuration Item (HWCI) development specifications. This includes projecting values for all TPPs allocated to the design and comparing them to the target values and critical limits previously set. The results of the TPM analysis become part of the CDR output.
- Establishes the detail design compatibility between the configuration items and other items of equipment, facilities, computer software, and personnel.
- Assesses system or CI risk areas (on a technical, cost, and schedule basis).
- Assesses the results of the producibility analyses conducted on system hardware.
- Reviews the preliminary hardware and/or software product specifications. For Computer Software Configuration Items (CSCI), this review focuses on determining the acceptability of the detailed design, performance, and test characteristics of the design solution and on the adequacy of the operation and support documents.

C3.6.1 Timing and Relationship to AMS

Figure 3.3-1 (see Chapter 3) shows the CDR occurring during Solution Implementation at completion of CI detail design activities and prior to fabrication of hardware and/or coding of final software modules (typically the "90 percent" design point).

C3.6.2 Entrance Criteria and Inputs

Products previously completed by the contractor or provided as part of the contract that are required before proceeding to CDR include:

- Allocated Baseline (i.e., Type A Specification, IRDs, functional architecture, etc.)
- List of allocated TPPs and associated critical performance limits and target values
- Constraints
- CDR Planning documentation
- Master Verification Plan
- Risk identification and mitigation plans
- Previous review(s) RFAs and action items
- Any proposed changes to the above items as a result of the work leading up to the CDR

Products that are to be submitted for review as part of the CDR include:

- Detailed Type B and Type C Specifications
- Detailed Requirements Allocation Matrix
- Detailed ICDs
- Subsystem Functional Architecture
- Completed design package for each hardware and software CI (assembly layouts, etc.) with supporting design documentation
- Draft test plans
- Report on results of the TPM analyses
- Requirements Compliance Matrix for each CI

C3.6.3 Tasks

The following tasks are required to accomplish a successful CDR:

- Define CDR objectives and scope
    - Establish success criteria and prerequisites (entry criteria and approach to be used)
    - Set the date for the CDR and activities leading up to the review
    - Create an agenda for the review
    - Identify and notify participants and stakeholders of their roles and responsibilities
    - Identify the item(s) to be reviewed and the extent of review of each
- Compile the CDR-related data package. This package contains the CDR presentation material and all of the pertinent backup material.
- Distribute the CDR documentation to the stakeholders and request timely review responses
- Obtain readiness approval for CDR and comments to the data package made via Review Item Discrepancy submissions
- Incorporate changes in the data package as needed
- Develop a summary of all concerns submitted and their respective answers
- Update risk mitigation plans based on review
- Conduct CDR with the incorporated changes
- Document results of CDR and publish CDR minutes
- Compile action-item list
- Track approved action items
- Document closed action items and distribute to the CDR stakeholders

C3.6.4 Exit Criteria and Outputs

Successful completetion of the CDR results in customer concurrence that the detailed design satisfies the system functional and performance requirements and is ready to begin fabrication. The CDR outputs or exit criteria are:

- RFA(s) with approved action plans
- Approved changes to Allocated baseline elements
- Approved TPM report
- Updated Risk Mitigation Plans to include risks identified during CDR
- Resolution of any contract scope issues revealed during the CDR process

C3.6.5 Metrics

The CDR metrics are:

- Customer (Stakeholder) Acclimation, which is defined as the extent of satisfaction in the results of the CDR meeting the stated objectives. This can be measured through interviews and/or feedback forms for each presentation made during each review (incremental as well as final).
- The percentage of CDR-required data available on schedule. In the case of a technical review involving a supplier, this can be measured as the percent of review-related CDRLs submitted on schedule.
- The number of new subsystem requirements that surfaces at later reviews or testing compared with the initial number of requirements. A variation is to measure the number of scope issues that result in some contractual action.
- The number of RFAs accepted with formal action plans

The status of the TPPs is also used as a metric to measure the progress of the program.

C3.6.6 Tools

The primary tools used for this review are:

- CDR Risk Reduction Checklist (see file 060522 FAA CDR Checklist v3.1)
- Requirements Database
- Risk Database
- Action Item and Issues Database
- TPM Database

C3.7 Verification Readiness Review (VRR)

The Verification Readiness Review is a formal review of the contractors' readiness to begin product technical evaluation (i.e., verification including testing) on both hardware and software configuration items.

C3.7.1 Timing and Relationship to AMS

The VRR is conducted at completion of system fabrication and prior to initiation of formal verification activities (see Figure 3.3-1 Solution Implementation — Verification).

C3.7.2 Entrance Criteria and Inputs

These include the following:

- System definition is under formal configuration control
- All verification plans are approved.
- Draft verification procedures are available.
- Verification assets/resources are identified and available.

C3.7.3 Tasks

Please refer to subsection 4.12.2.5.2.2.6 (in Section 4.12, Validation and Verification) for task details.

C3.7.4 Exit Criteria and Outputs

Successful completion of the VRR results in approval to begin formal verification. The outputs include the following:

- Updated Risk Mitigation Plans to include risks identified during VRR
- Detailed verification procedures

C3.7.5 Metrics

(Reserved)

C3.7.6 Tools

- VRR Risk Reduction Checklist (see file TBD)

C3.8 Functional Configuration Audit (FCA)

FCA is a formal review to verify that the as-built system and all subsystems can perform all their required design functions in accordance with their functional and allocated configuration baselines. (Figure C-1 below describes the FCA process.) FCA supports completion of the PCA.

The FCA documents stakeholder approval of verification that a CI's actual performance fulfills the functional and performance requirements established in the system functional baseline. An FCA is held for each new configuration item or group of related configuration items. An FCA can also be held during the In-Service phase of a system's lifecycle to verify modifications and upgrades to a CI, or product and process improvements. The entry and exit criteria for this audit are to be included in the SEMP. An FCA is an incremental part of the system verification process. System changes that involve multiple CIs may require multiple audits. A final audit, or system verification review, is held to verify that all planned audits for a particular development have been successfully completed. Since the FCA relies on testing to determine if the CI meets all specified requirements, such testing is a prerequisite for the FCA. Figure C-1 contains the process-based management chart for FCA.

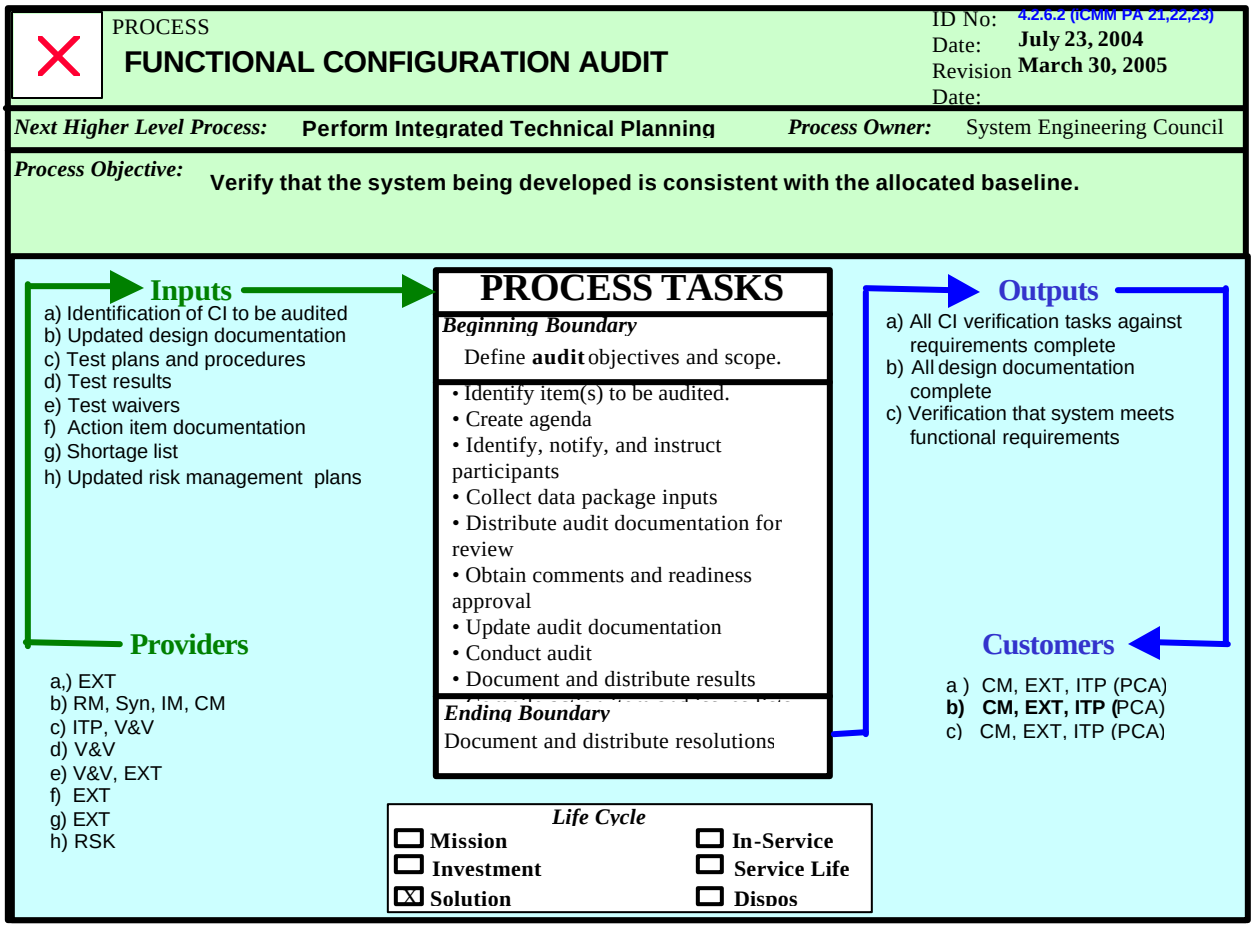

Figure C-1. Functional Configuration Audit Process

C3.8.1 Timing and Relationship to AMS

The FCA is conducted at completion of qualification and integration testing and prior to delivery of first production article.

C3.8.2 Entrance Criteria and Inputs

These include the following:

- Verification program is complete.
- Verification reports are approved.
- Verification article configuration compliance to design package is established.

Basic inputs to the FCA include:

- Identification of the CI to be audited
- Update of all specification and design documentation complete (Specification Types A, B, and C; Requirements Allocation Matrix; ICDs; System Concept of Operations (CONOPS); Subsystem Functional Architecture; Physical Architecture; and CI Description)
- All manufacturing process requirements and documentation finalized (Specification Types D and E)
- Test plans and procedures
- Test results
- A list of all deviations/waivers against the CI, either requested or customer approved
- A list of all action items for corrective action resulting from the test results
- Documentation of proposed corrective actions
- Complete shortage list
- Updated risk mitigation plans based on the test results

C3.8.3 Tasks

The following tasks are required to successfully accomplish an FCA:

- Define FCA objectives and scope
    - Establish success criteria and prerequisites (entry criteria, and approach to be used)
    - Set the date for the FCA and activities leading up to the audit
    - Create an agenda for the audit
    - Identify, notify, and instruct participants and stakeholders concerning their roles and responsibilities
    - Identify the CI(s) to be audited and the extent of review of each
- Collect data package inputs for FCA briefing and documentation

- Distribute FCA documentation to stakeholder representatives for review for completeness, correctness, clarity, and organization
- Obtain readiness approval for FCA and comments to the data package made via audit worksheets
- Update FCA documentation per the worksheets
- Conduct FCA
    - Report on verification status — requirements verified versus planned corrective actions
    - Report on completeness of all development and design documentation, including planned revisions associated with corrective actions
    - Report on key issues identified in the review of the FCA documentation
    - Report on risk assessments and mitigation plans
    - Assign responsibility for corrective actions and documentation revisions
    - Obtain stakeholder approval to proceed
- Document and distribute the results of the FCA
- Compile action-item and issues list
- Track action items and issues
- Document and distribute the resolutions of action items and issues

C3.8.4 Exit Criteria and Outputs

The key outcome of the FCA is to determine if there is any gap of required versus verified performance. The key FCA outputs are:

- Verification that the system meets functional requirements
    - Type A Specification verified
- Completion of all CI verification tasks against requirements
    - Type B Specification verified
    - Type C Specification verified
    - Requirements Allocation Matrix verified
    - ICDs verified
    - (Any) Gap of required versus verified performance documented
- Completion of all development and design documentation
    - Type A, B, and C Specifications
    - Requirements Allocation Matrix
    - ICDs
    - System Level CONOPS
    - OSED
    - Functional architecture
    - Physical architecture
    - CI Description, including a Configuration reconciliation list between the articles in the verification program and the configuration defined by the design package

C3.8.5 Metrics

The metric is customer approval of FCA and the number of open worksheets generated if the approval is conditional.

C3.8.6 Tools

The primary tools for this audit would be:

- FCA Risk Reduction Checklist (see file TBD)
- Requirements Database
- Action Item Database
- Issues Database

C3.9 Physical Configuration Audit (PCA)

The PCA is a formal audit that establishes the Product Baseline for formal configuration control of the CI for Production and later Lifecycle phases. It assesses the as-delivered system's compliance with the product design and manufacturing documentation. Successful completion of the PCA marks the complete transfer of formal configuration control from the developer to the product owner.

Tip The PCA is typically performed on an early production configuration item. The actual effectivity established for the PCA centers around the transfer of risk. Because formal configuration control occurs at this point, the issue of liability for changes becomes the issue. It is in the interest of the system owner to hold the audit as late as possible; the developer is looking to transfer the risk of changes to the owner as early as possible. Setting the actual effectivity often becomes a contractual or scope issue.

The PCA documents the agreement of the stakeholders that the CIs actual configuration as built by the specified manufacturing processes conforms to the Technical Data Package that describes the CI baseline. The audit also ensures that the proper processes and procedures are in place to confirm the following:

- The CI design definition and planning are current.
- Hardware/software conforms to the design package and requirements, and that differences have been reconciled.
- Nonconformities have been reconciled in accordance with applicable procedures.
- The manufacturer has accomplished specified production tests.
- Part numbers and nomenclature of the CI are consistent with drawings and parts lists, and item nomenclature agrees with the approved nomenclature.
- Any configuration differences between the PCA unit and formal verification units have been identified, documented, and properly authorized for incorporation.
- The initial product baseline includes all authorized changes, current complete design and production packages, ICDs, and Acceptance Test procedures.

A PCA is held for each new configuration item or group of related configuration items. A PCA can also be held during the in-service phase of a system's lifecycle to verify modifications and upgrades to a CI or product and process improvements. The entry and exit criteria for this audit and any other pertinent accomplishment and associated success criteria are to be included in the SEMP. System changes that involve multiple configuration items may require multiple audits. A final audit is held to verify that all planned audits for a particular development have been successfully completed.

C3.9.1 Timing and Relationship to AMS

The PCA is conducted after delivery of initial production unit and prior to Contractor Acceptance and Inspection.

C3.9.2 Entrance Criteria and Inputs

To conduct a successful PCA, two other control functions must have occurred: completion of the Independent Operational Test and Evaluation (IOT&E) and completion of the FCA.

Basic inputs to the PCA include:

- Identification of the CI to be audited
- Completion of the technical data package
  - Update of all specification and design documentation complete (Specification Types A, B, and C; Requirements Allocation Matrix; ICDs; System CONOPS; Subsystem Functional Architecture; Physical Architecture; and CI Description)
  - Incorporate all required changes identified through the IOT&E
- Manufacturing and quality control plans complete and quality control results available
  - Update of all manufacturing process requirements and documentation completed (including Specification Types D and E)
- Configuration differences between FCA and PCA units reconciled
  - A list of all deviations/waivers against the CI, either requested or customer approved
- Complete shortage list
- Updated risk mitigation plans based on the FCA results

C3.9.3 Tasks

The process-based management chart for the PCA (Figure C-2) and addresses the following tasks:

- Define the objectives and scope of the PCA
  - Establish success criteria and prerequisites (entry criteria, and approach to be used)
  - Set the date(s) for the PCA and activities leading up to the audit
  - Create an agenda for the audit
  - Identify and notify participants and stakeholders of their roles and responsibilities
  - Identify the CI(s) to be audited and the extent of review of each
- Review status of action items from the FCA to determine if they have been adequately resolved; identify any corrective action required
- Verify that all changes identified through the IOT&E have been incorporated; identify any corrective action required. Reconcile all proposed and actual configuration differences with the approved Product Baseline
- Conduct physical review of the CI and compare the configuration to the proposed baseline documentation; identify any corrective action required

Audits are typically performed at the facilities where the items or their selected subassemblies are produced. The producer shall ensure that suitable facilities and support are available. The PCA Plan should specify the items to be audited and their respective schedules.

Tip The most common approach is to conduct a product audit where the selected item(s) is physically compared with its documentation. This approach is usually accomplished incrementally for complex systems by conducting individual audits on selected subassemblies and components leading to a final review at the system level. The items audited should be designated by serial number before their induction into the manufacturing process to minimize the amount of potentially destructive teardown or disassembly.

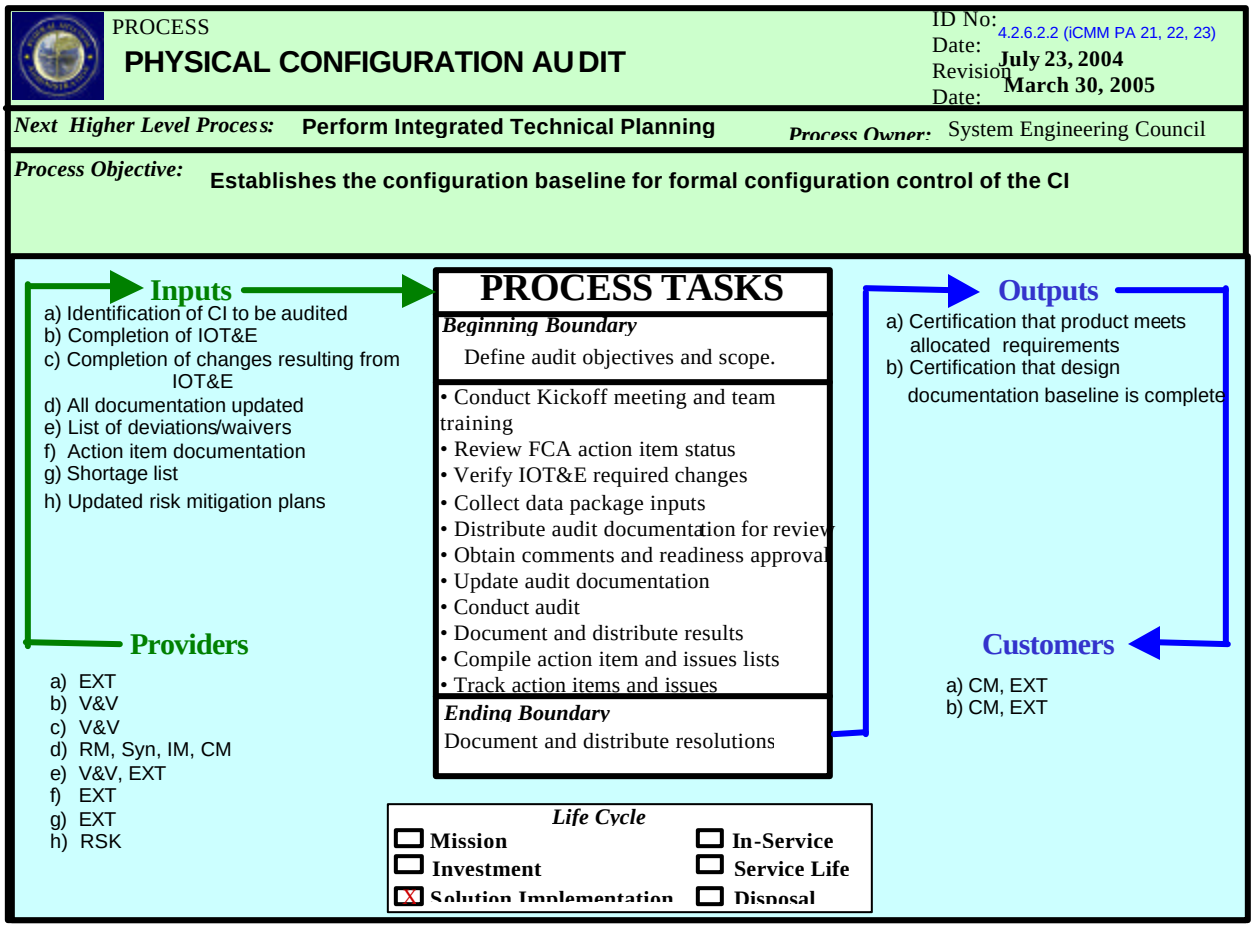

Figure C- 2. Physical Configuration Audit Process

Tip For organizations that are ISO compliant, a process audit approach can be considered. The approach builds on the ISO process of periodic compliance sampling by identifying and determining if key processes are in place and compliant with the organization's ISO certification. To confirm the integrity of this approach, it is recommended that a single item be selected, and a one-time verification of its major processes be accomplished. To be successful, this verification must conclude that the item physically conforms to its design documentation and that all of its documentation in the process flow is adequate to support production and configuration control of that item.

The process audit approach includes the following tasks:

- Collect data package inputs for PCA briefing and documentation
- Distribute PCA documentation to stakeholder representatives for review for completeness, correctness, clarity, and organization
- Obtain readiness approval for the PCA and comments to the data package made via PCA worksheets
- Update PCA documentation per the worksheets
- Conduct the PCA
  - Report on change status — changes incorporated versus planned corrective actions
  - Report on completeness of all development and design documentation, including planned revisions associated with corrective actions
  - Report on verification of consistency between CI and documentation, including planned corrective actions
  - Report on key issues identified in the review of the PCA documentation
  - Report on risk assessments and mitigation plans
  - Assign responsibility for corrective actions and documentation revisions
  - Obtain stakeholder approval to proceed
- Document and distribute the results of the PCA
- Compile action item and issues lists
- Track action items and issues via PCA worksheets
- Document and distribute the resolutions of action items and issues

C3.9.4 Exit Criteria and Outputs

The result of a successful PCA is the issuance of a signed PCA Certificate. This signifies that the system has demonstrated compliance with its design package and that formal configuration control is ready to be transferred from the implementer to the owner of the item or system. The PCA is complete when the Certificate is "unconditional"; that is, issued without any open action items or noncompliances. If there are open action items or noncompliances (documented, tracked, and resolved via PCA worksheets), these are annotated on the PCA Certificate, and the certification is considered "Conditional." Its status is changed to "unconditional" after all worksheet action plans are completed and accepted by the certifying party. The key outputs of the PCA are the following:

- Certification that product meets allocated requirements
  - Types A, B, and C Specifications verified
  - Requirements Allocation Matrix verified
  - ICDs verified
- Completion of all development and design documentation
  - Type A, B, and C Specifications
  - Requirements Allocation Matrix
  - ICDs
  - System Level CONOPS

- OSED
- Functional architecture
- Physical architecture
- CI Description
- User manuals

C3.9.5 Metrics

The primary metric is the Customer's issuance of a PCA Certificate signifying unconditional completion of this milestone. Interim metrics include the number of worksheets generated/open (conditional completion) and/or the number of incremental PCAs completed (if an incremental approach is used).

C3.9.6 Tools

The primary tools used for this audit are:

- PCA Risk Reduction Checklist (see file TBD)
- Requirements Database
- Action Item Database
- Issues Database

C3.10 In-Service Performance Review (ISPR)

The ISPR is a formal technical review to characterize In-Service technical and operational health of the deployed system by providing an assessment of risk, readiness, technical status, and trends in a measurable form that will substantiate In-Service support and budget priorities. It is intended to evaluate performance against baseline values and customer expectations. Post-implementation review(s) at deployment sites help to determine whether performance and benefits in the Exhibit 300 Program Baseline are being achieved. When projections are not being realized, corrective action is planned and implemented. Periodic operational evaluations of fielded assets continue throughout In-Service Management to identify performance shortfalls, determine trends in the cost of ownership, and identify adverse support trends. These evaluations are the basis for revalidating the merit of sustaining investment assets or the need for other action. Findings are fed back into service analysis, where it is determined whether to continue to sustain existing assets or recommend new investments to solve systemic operational problems in the service environment.

C3.10.1 Timing and Relationship to AMS

The In-Service Management phase begins when the new system, software, facility, or service goes into operational use and continues for as long as the product is in use. This phase is characterized by a continuing partnership among the providing, operating, and support organizations. This review is typically held a minimum of 2 years after introduction of the new capability into the operational NAS environment.

C3.10.2 Entrance Criteria and Inputs

(Reserved)

C3.10.3 Tasks

(Reserved)

C3.10.4 Exit Criteria and Outputs

The outcome of this review is a decision on whether a configuration item (or system) has reached the end of its useful life or is no longer satisfying an identified need. The outcome may span a range of recommendations—from a strategy of continued support of the installed capability to a decision to obsolete the existing system and enter the Mission Analysis phase to address the resulting predicted need shortfall. (See Section 4.13, Lifecycle Engineering, for further discussion of this outcome.)

C3.10.5 Metrics

(Reserved)

C3.10.6 Tools

The primary tools used for this audit are:

- The PCA Risk Reduction Checklist (see file TBD)

C4.0 FAA System Engineering Inputs to Related Reviews

Each SE control gate or milestone fits within the AMS framework and supports various investment decisions as shown in Table 4.2-4 (SE Milestones as a Function of AMS Lifecycle Phases (based on Nov 2005 AMS)) in Section 4.2. The entry and exit criteria for both the SE milestones and AMS investment decision points are addressed to provide the reader visibility into the extent of overlap between the two needs.

C4.1 Investment Analysis Readiness Review (IARR)

(Reserved)

C4.2 Integrated Baseline Review (IBR)

(Reserved)

C4.3 In-Service Review (ISR)

(Reserved)

C5.0 Request for Action (RFA) Forms and Process

(Reserved)

APPENDIX D: CONCERNS AND ISSUES

While performing any System Engineering process, the specialist may encounter issues and concerns that surface. These issues and concerns may take many forms, but they usually consist of potential risks to the program. Risk Management (Section 4.10) addresses this topic and is consulted when problems arise. The issues and concerns are collected in a form to use during the Risk Management process to determine if they are a threat to program success. At a minimum, the following information concerning each issue or concern shall be derived or collected:

- Title of issue or concern
- Problem statement
- Causes
- Potential effect on the program
- Who is identifying the issue or concern
- Contact information, such as telephone number or e-mail address

Problem Statements

If a problem arises, a problem statement of one to two sentences shall be generated that succinctly identifies the problem and answers the following questions:

- What is the problem?
- What is the scope of the problem?

The following tips may be used as a guide to develop a problem statement:

- Avoid using jargon.
- Focus on the specific problem or the issue; problems are characterized by a need, a shortfall in capability, or a threat.
- Avoid confusing symptoms or causes with the problem. Focusing on symptoms or causes diverts resources from solving the real or entire issue.
- When possible, use data to support the existence of the problem or issue.
- Make a connection between the issue and the organization.
- Carefully read and analyze the problem statement. Discuss the problem within a peer group to enhance the overall understanding of the problem. A peer group effort is more effective in identifying the key factors in this type of problem-solving situation. The peer group actively searches for the information necessary to solve the problem.
- List what is known. Start a list to record everything known about the situation. Begin with the information contained in the problem statement and add the knowledge that the peer group brings.
- Record information that people think that they know but are unsure.
- List what is needed. Prepare a list of questions that need to be answered to solve the problem. Record them under a second list: “What do we need to know?” Several types of questions may be appropriate. Some may address concepts or principles that need to

be learned in order to address the situation. Other questions may be in the form of requests for more information. These questions guide future searches for information.

- List possible actions, such as recommendations, solutions, or hypotheses under the heading “What should be done?”

APPENDIX E: INTEGRATED TECHNICAL PLANNING DETAILS

E.1 Integrated Technical Planning

Planning provides the basis for effective action and the ability to anticipate and prepare for changes that inevitably affect program progress. Planning keeps all organization elements moving synchronously toward the same goal by establishing baseline expectations of future and current actions. By establishing these baselines, the organization is better equipped to adapt to the inevitable changes it faces. Planning specifies the tasks, products, responsibilities, and schedule for managing requirements throughout product development.

All System Engineering (SE) planning shall be included in the System Engineering Management Plan (SEMP) or in a separate standalone plan (e.g., risk mitigation plan), which ensures a more accurate costing of the program and significantly aids in successful program completion. The SEMP is the only implementing document that integrates all SE activities. It unambiguously ties together all elements of SE required to attain program/project cost, performance, and schedule objectives. The SEMP identifies and ensures control of the overall SE process and provides greater SE implementation detail than the Implementation Strategy and Planning (ISAP). Performing these planned activities will significantly reduce the percentage of requirements found in Operational Test and Evaluation. In the Acquisition Management System (AMS), the Exhibit 300, Attachment 3, ISAP, details the minimum planning required. The ISAP includes both programmatic and selected SE planning elements. These SE planning elements are summaries of the SEMP planning for same element. The NAS Modernization System Safety Management Plan (SSMP) governs system safety efforts conducted in the AMS and requires each program to develop, as part of the ISAP, an Integrated System Safety Program tailored to the program's safety needs. The AMS also requires the Concept and Requirements Definition plan that addresses a priority service need within the Service Level Mission Need and develops the information necessary for an Investment Analysis Readiness Decision (IARD).

E.2 SE Planning

For various programmatic reasons, SEMP elements may require a more detailed standalone plan (e.g., risk mitigation plan). A key function of any plan is to define the tasks and products of the process and to assign responsibilities to various subprocesses. Another key function is to describe the deliverables and portray the schedule for completion of each task and delivery of each product. The details for an individual standalone plan for any SE element are described below. Planning begins in Mission Analysis, with planning documents baselined at the Final Investment Analysis Decision and updated as necessary.

E.2.1 Introduction to the SEMP

As mentioned, the SEMP unambiguously ties together all SE elements required to attain program/project cost, performance, and schedule objectives. It identifies and ensures control of the overall SE process and provides greater SE implementation detail than the ISAP. SEMP development begins in Mission Analysis, with the preliminary issue of the SEMP typically occurring in the first phase of Investment Analysis, with a completed version released for Final Investment Decision (erstwhile JRC 2b). A scheduled update occurs in System Implementation, with additional updates issued as necessary to reflect changing input conditions throughout the program/project.

E.2.2 SE Plan Outputs

Each plan must describe the tasks that reflect the processes detailed in the appropriate SEM section relating to that SE element. This includes a definition of the products and responsibility for the various subprocesses of that element, as well as a task completion schedule. Also, the plan shall detail justification and deviations from the SE element process. Since a key function of the planning is to assign responsibilities to various tasks within the SE element process, one must ensure that each task (in Table E-1) is assigned to a specific individual. These assignments may vary greatly according to the product and the organization. The planning function shall provide a schedule of the SE element (e.g., Synthesis tasks). It is recommended that the schedule show the delivery dates of each product. The schedule presents the sequence of events, along with task start dates and end dates, and keys them to the events outlined in the ISAP template of Table 4.2-2 in Section 4.2, Integrated Technical Planning. Also, it is recommended that the plan reflect the principles in government and industry standards, such as MIL-STD-961 or MIL-STD-490 for specifications, and EIA 632 for the SE process.

The primary planning tool is a word-processing tool. While the primary metric of the planning process is publication of the plan on schedule, any other metrics selected will also be described in the plan.

Table E-1. Contents of the Separate SE Element Plan

SE Element (SEM Section)	What the Standalone SE Plan Contains
Requirements Management Plan (4.3)	The plan details the total effort in managing requirements, which includes identifying and capturing requirements (subsection 4.3.3.1), analyzing and decomposing requirements (subsection 4.3.3.2), and allocating requirements (subsection 4.3.3.3). The other two subprocesses in the Requirements Management Process—Develop Verification Approach and Analyze Verification Data—are the subjects of the Verification process in Section 4.12.
Functional Analysis Plan (4.4)	This plan specifies the tasks, products, responsibilities, and schedule for functional analysis throughout development of the product. Because there is no program-level SEMP in the early phases of the program (i.e., phase 1 of Investment Analysis), the NAS-level SEMP guides the Functional Analysis in these phases. When the ISAP is developed, the program's tailored SEMP guides the Functional Analyses. The planning section is baselined at the Final Investment Decision and is updated as necessary at subsequent exit reviews. This planning section details the total effort for managing functional analysis. This work includes analyzing the concept of operations and environment, decomposing functions into subfunctions, decomposing and allocating requirements to functions, evaluating alternative decompositions, defining functional sequences and timelines, defining functional interfaces, and documenting the functional baseline. The outline (Table E-2) depicts the recommended contents of the Functional Analysis planning section. One must plan for the tasks necessary to develop each Functional Analysis product. The tasks include the following: • Define the operational mission, environment, and requirements

	• Develop the Concept of Operations (Use) • Define top-level functions and decompose to the lowest level • Define internal and external interfaces • Evaluate alternative decompositions • Develop sequences and timelines • Develop functional architecture
Synthesis Plan (4.5)	Synthesis planning includes all activities for transforming the needs into alternative solutions balanced to meet and provide needed capabilities while adhering to programmatic, operational, environmental, and technical constraints. One must plan for the tasks needed to develop each Synthesis product. These tasks include the following: • Review the requirements baseline and functional architecture: • Design the Solution Set • Identify alternatives for the Design Solution Set • – Perform Trade Study requests • – Initiate Requirements feedback loop • – Initiate design feedback loop • Allocate requirements to system elements • Define design and performance characteristics • Define physical architecture • Design alternative analysis and refinement • Check Requirements compliance • Select Preferred Design Solution
Trade Studies Plan (4.6)	The plan documents the formal management planning regarding how to assess in a fair and impartial manner alternative solutions to a problem or design issue associated with a program/project product development. Trade Studies planning shall include the following: • Formats for how trade study results and information are to be presented to management at design reviews • Identification of the organization or person designated to be the trade study leader • Identification of any tools that are to be used in performing the trade study (i.e., cost models, computer simulations, test articles and • fixtures, and analytical tools) • Criteria (including constraints) under which the trade study is to be conducted • Instructions on where trade study results and data are to be stored for future reference, and which organization is responsible for maintaining the data • Identification of resources
Interface Management	This plan documents the formal management system of interface controls that ensures physical and functional compatibility between interfacing

Plan (4.7)	hardware, software, and facilities. The plan provides the means for identifying and resolving interface incompatibilities and for determining the impact of interface design changes. It guides management, control, and documentation of all system functional and physical interfaces. The Interface Control planning section also contains interface requirements and templates for preparing, revising, and processing ICDs unique to the program. The Interface Control planning section addresses supplier participation in the interface process. The section: • Provides the means for identifying, defining, documenting, and controlling the interfaces at all system levels • Provides the means for changing the interfaces as required by the evolution of the design and for resolving interface incompatibilities • Guides management, control, and documentation of all system functional and physical interfaces • Establishes the Interface Working Group (IWG) and its policies and procedures • Appoints the IWG chairperson, who also functions as planning coordinator and is responsible for developing and establishing the policies and process for identifying, defining, documenting, auditing, and controlling interfaces • Contains requirements and templates for preparing, revising, and processing the interface documentation; identifies products • Establishes the participants of the interface management process and their responsibilities • Establishes the interface management schedule
Specialty Engineering Plans (4.8)	• Safety (Section 4.8.1) — Refer to the NAS Modernization SSMP (http://fast.faa.gov/). The Reliability, Maintainability and Availability (RMA) plan covers all aspects of RMA (see Section 4.8.2). • The Human Factors Engineering (HFE) plan covers all aspects of HFE (see Section 4.8.3 and FAA Acquisition System Toolsets). • The Electromagnetic Environmental Effects (E3) plan covers all aspects of E3 (see Section 4.8.4). • The Quality Engineering (QE) plan covers all aspects of QE (see Section 4.8.). This includes all the systematic activities implemented within the quality system that can be demonstrated to provide confidence that a product or service will fulfill requirements. • The Information System Security (ISS) plan covers all aspects of ISS (see Section 4.8.6). • The Hazardous Materials Management/Environmental Engineering (HMM/EE) plan covers all aspects of HMM/EE (see Section 4.8.7).
Analysis Management Plan (AMP) (4.9)	This plan defines the required levels of analysis and the data to perform an analysis; defines procedures for ensuring analyst competency; contains details on the subset of analysis methods and tools that may be used for a validated analysis; and defines the criteria to ensure integrity of the analysis results. The plan provides specific tailoring the project requires and is updated when a new tool is validated on the program or when a currently validated tool is updated to reflect a change in the product design and is subsequently revalidated. Because new methods and tools may be needed for product variants, and because multiple versions of a product may exist

	concurrently, the AMP may reference multiple validated versions of the same tool.
Risk Management Plan (4.10)	The plan describes the approach, methods, procedures, and criteria for risk management and its integration into the program decision process. It is continually updated throughout the program life.
Configuration Management Plan (4.11)	The plan documents the formal Configuration Management (CM) management system to ensure that the integrity and continuity of the design, engineering, and cost tradeoff decisions made among technical performance, producibility, operability, testability, and supportability are recorded, communicated, and controlled by program and functional managers. CM planning enables the following processes: • Configuration Identification process that identifies the functional and physical characteristics of selected system components, designated as configuration items (CI), during the system's acquisition lifecycle • Configuration Control process that controls the changes to CIs during the system's acquisition lifecycle • Configuration Status Accounting process that records/reports change processing and implementation status • Configuration Audits process that supplies current descriptions of developing hardware configuration items, computer software configuration items, and the system itself
Master Verification Plan (MVP) (4.12)	The plan describes the overall verification program and provides the content and depth of detail for full visibility of all verification activities. The plan describes and defines each major verification activity. The plan provides a general schedule and sequence of events for major verification activities. It also describes test software (including code and documentation), ground support equipment, and facilities to support verification activities. The systems engineer and verification engineer develop the plan with design and test organizations, with all having a thorough understanding of the verification program concept, program requirements at all levels, and the methods identified in the Verification Requirements Traceability Matrix (VRTM) for verification.

Lifecycle Plan (4.13)	The plan ensures that resources are available for all activities required for achievement of integrated lifecycle support. Integrated Lifecycle planning includes integrated logistics support, deployment and transition, real property management, sustainment and technology evolution, and disposal.
System Engineering Process Management Plan (4.14)	The plan ensures that the resources are available for all activities required to maintain and improve the SE process.

E.2.1 Inputs to SE Element Plan

Each SE element in Table E-2 below has different required inputs. The maturity of these inputs reflects the maturity of the program.

E.2.2 SE Planning Steps

The steps for an individual plan are the same as for the SEMP (see subsection 4.2.2.2 in the Integrated Technical Planning (Section 4.2)).

E.2.3 SE Plan Inputs

The table contains the inputs for standalone plans.

Table E-2. SE Element Plan Inputs

SE Element	SE Plan Inputs
Requirements Management Plan (4.3)	• Internal and external requirements as defined in subsection 4.3.1 • Component-specific program guidelines • Program-specific organizational constraints and assumptions to be used in the program • Program-specific schedule constraints and events • Top-level conceptual alternatives, functional analyses, design support alternatives, and initial system evaluations • Technology availability or constraints
Functional Analysis Plan (4.4)	• Service Level Mission Need (SLMN) and final Program Requirements (fPR), which detail the system's expected operational environments • Component-specific program guidelines • Program-specific constraints and assumptions, such as nature of the program's project teams • Program-specific schedule constraints and events • NAS SEMP, which provides the overall plan for conducting SE as part of NAS modernization
Synthesis Plan (4.5)	• SLMN and fPR, which detail the system's expected operational environments • Component-specific program guidelines • Program-specific constraints and assumptions, such as nature of the program's project teams

	• Program-specific schedule constraints and events • NAS SEMP, which provides the overall plan for conducting SE as part of NAS modernization
Trade Studies Plan (4.6)	• Definition of the problem to be studied • Program/project schedule • Program/project requirements • Document preparation tools
Interface Management Plan (4.7)	• ISAP. This is required to enable preparation of the interface management schedule and to ensure coherent, complete, consistent, and timely interface design at all levels of the system. • The SEMP. The IM planning section depends on products defined and scheduled by the SEMP. • System Requirements Documents. The documents define the system external interfaces and the (internal) interfaces between the system segments. • System Functional and Physical Architecture. These architectures determine where the system/segment interfaces exist and are the point of departure for the detailed identification and definition of the interfaces. • Design Review Plans. These plans are used as the bases for conducting reviews and audits of the interfaces (see Synthesis (Section 4.5)).
Specialty Engineering Plans (4.8)	• Detailed in subsections 4.8.1 through 4.8.7.
Analysis Management Plan (AMP) (4.9)	• Title and brief description of the analysis • Description of programmatic benefit to be gained from successful performance of the analysis (i.e., the role the analysis plays in the program) • Relative place in the project schedule: – Precursor tasks and dependencies – Successor tasks that directly depend on the analysis (i.e., the interfaces of the analysis to the program) • Resources: – Estimate of duration and resources required; resources may include labor hours, charged computer runtime, lab support charges, and similar programmatic cost and schedule burdens – System requirements – Unique analysis technology (as used in the system being analyzed and as used to perform or support a part of the analysis)

	– Data sets to be used in the analysis (e.g., configuration-controlled set of data (environmental factors (atmospheric models, extent of corrosion conditions, etc.)), trade study parameters (e.g., range penalty per pound of weight added), material properties, etc.) – Analytical tool(s) selected and basis/justification of selection – Process and plan for ensuring competence of the analyst (credentials, training, certification, testing, etc.) – Subtasks to be performed to begin, perform, and validate the analysis
Risk Management Plan (4.10)	• Program goals • Program constraints • ISAP/Integrated Master Schedule (IMS) • Rough Order Magnitude/Basis of Estimate
Configuration Management Plan (4.11)	• Concepts (initial, baseline). This data identifies the functional and physical characteristics of selected system components and CIs to be controlled and managed. • Data Management plan. • Implementation strategy and Planning Requirements. This data identifies contractual and noncontractual constraints, such as program deliverables, cost, and schedule.
Master Verification Plan (MVP) (4.12)	• System CONOPS • SEMP • Final Program Requirements • System Physical and Functional Architectures
Lifecycle Plan (4.13)	• Component-specific program guidelines • Program-specific organizational constraints and assumptions to be used in the program • Program-specific schedule constraints and events • Top-level conceptual alternatives, functional analyses, design support alternatives, and initial system evaluations • Technology availability or constraints • Operational concepts
SE Process Management Plan (4.14)	The process includes criteria to determine need to update SEM and SEMP, as well as schedules for SE course development and training. It also contains scheduled reviews of best practices documents for updated information.

E.2.4 SE Plan Metrics

The metrics for the standalone plans are in Table E-3.

Table E-3. SE Element Plan Metrics

SE Element	Recommended Planning Metrics
Requirements Management Plan (4.3)	• Number of requirements, including stakeholder-specified and project-derived requirements • Number of changed requirements, including stakeholder- or project-initiated requirements • Technology requirements, including proven, to be defined, and unknown technology requirements • Unclear, undefined, or ambiguous requirements • Cycle time from requirement change initiation to decision • Cycle time from change decision to baseline incorporation • Percent of validated requirements to total proposed requirements
Functional Analysis Plan (4.4)	• Percent of analysis studies completed (schedule/progress) • Depth of the functional hierarchy as a percentage versus the target depth • Percent of performance requirements allocated at the lowest level of the functional hierarchy
Synthesis Plan (4.5)	• For approved engineering change reports: – Quantity, by type of problem report – Cycle time from disposition to incorporation of change into released engineering documents, by type of report • Technical Performance Measurements: objective versus achieved values • Number of approved engineering changes by product, type, and stage • Documents/drawings submitted for engineering release: – Unacceptable submittals – Total submittals • Number of technical action items identified during reviews and audits • Design efficiency metrics, such as weight, required power, and envelope dimensions (volume) • Cost and schedule variance for completion of Synthesis steps • System requirements not met • Number or percent of system requirements verified by system analyses • Number of TBDs (to be determined) in system architecture or design • Number of interface issues not resolved • Percent of identified system elements that have been defined
Trade Studies Plan (4.6)	• Cost to produce and update the plan • Trade Study Satisfaction Assessment (see Trade Studies (Section 4.6))
Interface Management Plan (4.7)	• Time from pPR to Interface Requirements Document (IRD) approval • Time from IRD Approval to Interface Control document (ICD) Release • ICD/Interface Requirement Compliance with Interface Requirements (% "Yes")

Specialty Engineering Plans (4.8)	• Completion of plan • Schedule and Progress • Resources and Cost • Process Performance • Customer Satisfaction • Product Quality
Analysis Management Plan (AMP) (4.9)	• Time to completion of the planning • Readiness of the plan to support management/analyst/stakeholder negotiations • Cost of the first draft, release, and maintenance of the plan.
Risk Management Plan (4.10)	• Total risks identified over time; total high risks, total medium risks (to provide visibility into risk trends over time) • Percent of risks (medium and high) with approved mitigation plans (to measure effectiveness of handling the risks requiring action) • Percent of overdue mitigation activities (to measure the effectiveness of meeting mitigation plan schedules) • Aging of active risk records (to gain insight into the currentness of the risk database) • Number of risks past their realization date (to provide an indicator of the effectiveness to handle risks in a timely manner)
Configuration Management Plan (4.11)	Metrics criteria for CM should be associated with each CM process task. Example: CM planning: • CM plan development milestones • Quality completeness • Adherence to the plan
Master Verification Plan (4.12)	• Percent of requirements validated • Percent of requirements verified • Timeliness of developing and reviewing the verification plan • Quality of developing the verification plan • Cycle time to complete development and distribution of the verification plan regarding collecting and reviewing the inputs for verification plan development
Lifecycle Engineering (4.13)	Completion of the plan
SE Process Management (4.14)	Completion of the plan

E.3 Requirement Management Planning

Table E-4 shows the table of contents for a separate Requirements Management Plan if needed. However, this planning is almost always in the SEMP.

Table E-4. Table of Contents for Requirements Management Plan

Requirements Management Plan Template		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	Contains a diagram showing the interrelationships among the various process elements, including the requirements management tool, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	Describes the tasks that are tied to the specific organizational and program requirements in accordance with Section 4.3.
3.1	Identify and Capture Requirements	
3.2	Analyze and Decompose Requirements	
3.3	Allocate Requirements	
3.4	Derive Requirements	
3.5	Manage Requirements Changes	
4	PRODUCTS	Describes the various program requirements documents. It also describes what organizational entity receives the product. For example, the product team, stakeholder, other project teams, management, or outside organizations, such as manufacturing, product support, test and evaluation, or supplier management.
4.1	Requirements Documents	Enumerates and describes the various program requirements documents to be produced.
4.2	Requirements Allocation Matrices	Describes the characteristics of the requirements allocation sheets to be produced on this program.
5	RESPONSIBILITIES	Details responsibilities of the various organizational entities to accomplish the tasks of Section 3 above. The responsibilities are to be tied to the tasks of Section 3.
6	SCHEDULE	Contains schedule that is tied to the milestones of the ISAP.
7	AUTOMATED	Describes the planned use of the requirements

Requirements Management Plan Template		
	REQUIREMENTS TOOL	management tool, if available.
8	NOTES	
	APPENDICES	

E.4 Functional Analysis Planning

Table E-5 presents the table of contents used if it is determined a separate Functional Analysis Plan is needed. However, this planning is almost always in the SEMP.

Table E-5. Table of Contents for Functional Analysis Plan

Functional Analysis Plan Template		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	Contains a diagram showing the interrelationship among the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	Describes the tasks that are tied to the specific organizational and program requirements in accordance with Section 4.4.
4	PRODUCTS	Describes the various Functional Analysis outputs. Also describes what organizational entity receives the product. For example, the product team, stakeholder, other project teams, management, or outside organizations, such as manufacturing, product support, test and evaluation, or supplier management.
5	RESPONSIBILITIES	Details responsibilities of the various organizational entities to accomplish the tasks of Section 3. The responsibilities are to be tied to the tasks of Section 3.
6	SCHEDULE	Contains the schedule that is to be tied to the milestones of the ISAP.
7	AUTOMATED REQUIREMENTS TOOL	Describes the planned use of the requirements management tool, if any.
8	NOTES	
	APPENDICES	

E.5 Synthesis Planning

Table E-6 provides the table of contents used if it is determined a separate Synthesis Plan is needed. However, this planning is almost always in the SEMP.

Table E-6. Table of Contents of for Synthesis Plan

Synthesis Planning Section Template		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	Contains a diagram showing the interrelationships among the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	Describes the tasks that are tied to the specific organizational and program requirements in accordance with Section 4.5.
4	PRODUCTS	Describes the various Synthesis outputs in accordance with Section 4.5 as well as what SE element receives the product.
5	RESPONSIBILITIES	Details responsibilities of the various organizational entities to accomplish the tasks of Section 3. The responsibilities are to be tied to the tasks of Section 4.5.
6	SCHEDULE	Contains the schedule that is to be tied to the milestones of the ISAP.
7	AUTOMATED REQUIREMENTS TOOL	Describes the planned use of the requirements management tool, if any.
8	NOTES	
	APPENDICES	

E.6 Trade Studies Planning

Table E-7 features the table of contents used if it is determined a separate Trade Studies Plan is needed. However, this planning is nearly always in the SEMP.

Table E-7. Table of Contents for Trade Studies Plan

Trade Studies Plan Template		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	Contains a diagram showing the interrelationships among the various process elements, including tools, if any.
2	APPLICABLE	

Trade Studies Plan Template		
	DOCUMENTS	
3	TASKS	Describes the tasks that are tied to the specific organizational and program requirements in accordance with Section 4.6.
4	PRODUCTS	Describes the output of trade studies activities.
5	RESPONSIBILITIES	Details responsibilities of the various organizational entities to accomplish the tasks of associated with trade studies.
6	SCHEDULE	Contains the schedule that is to be tied to SEMP milestones.
7	AUTOMATED REQUIREMENTS TOOL	Describes the planned use of tools.
8	NOTES	
	APPENDICES	

E.7 Interface Management Planning

Table E-8 lists the table of contents for a separate Interface Management Plan if needed. Interface Management is frequently a separate plan.

Table E-8. Interface Management Plan Outline

Interface Management Plan Outline	
1	SCOPE
1.1	Overview
1.2	System Overview
2	APPLICABLE DOCUMENTS
3	INTERFACE WORKING GROUP
3.1	IWG Policy and Procedures
3.2	IWG Membership and Responsibilities
3.2.1	IWG Chair
3.2.2	Interface Custodian
3.2.3	Interface Participant
4	INTERFACE CONTROL PROCESS
4.1	Establishing Interfaces
4.1.1	Identifying Interfaces
4.1.1.1	Scope Sheet
4.1.1.2	Documenting ICDs

Interface Management Plan Outline	
4.1.1.3	Coordinating Interfaces
4.1.1.4	Auditing, Statusing, and Controlling ICDs
4.1.1.4.1	Authorized ICD List
4.1.1.4.2	Review at SRR
4.1.1.4.3	Review at SDR
4.1.1.4.4	Review at Preliminary Design Review (PDR)
4.1.1.4.5	Review at CDR
4.1.1.4.6	Review at FCA/PCA
5	REVISING INTERFACES
5.1	Change Request Preparation
5.1.1	Review/Coordinate Change Request
5.1.2	Change Approval and Documentation
6	INTERFACE MANAGEMENT SCHEDULE
7	NOTES
Appendices	

E.8 Integrity of Analyses Planning

E.8.1 Analysis Management Planning

Compilation of the Analysis Management Plan follows the Investment Analysis Readiness Decision approval. It supports the objective of that process: "to create high likelihood that the program's analyses are credible, useful, and sufficient." Analysis Management planning defines the analyses to be performed throughout the program and the operational criteria for the analytic tools to be used, as well as the users and the requirements for verifying that the results are correct and sufficient. As a part of the SEMP, this section is reviewed with any other plans at the Final Investment Decision. The template (Table E-9) depicts the recommended contents of the Analysis Management Plan.

Table E-9. Table of Contents for Analysis Management Plan

Analysis Management Plan Template		
1	SCOPE	Covers scope and purpose. It is recommended that this section include any analysis that involves separate task management and control, or which has stakeholders from the analyst's sub-organization, or which is deemed to have a significant influence on the program product. On the other hand, minor analyses that merely fill in details of work within a single sub-organization and are small in scope are not intended to be formally controlled by this planning section (although the precepts of the process "Integrity of Analyses" always apply as a best practice).

Analysis Management Plan Template		
1.1	Overview	
1.2	Process Overview	Contains a diagram showing the interrelationships among the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	Describes tasks described that are tied to the specific organizational and program requirements in accordance with Section 4.9.
3.1	Configuration Management	Contains specific comments on the role of Configuration Management (CM) as it applies to Analysis Management**.** It is recommended that approved analytic tools (including special or proprietary procedures, computer programs, networks, and workstations; and physical, computational, and hybrid models) be under CM, as well as rosters of analysts with expertise annotated. It is recommended that data sets especially be under CM, and the Analysis Management Plan requires use of configured data in managed analyses. (Several analyses using conflicting data lead to faulty conclusions that confuse a program.) Within the planning section, it is also recommended that some special notation (like {CM}) be appended to any reference of name, tool, or data that is configuration controlled.
3.2	Programmatic Approach	Contains an abstract of the programmatic approach(es) to ensure the competence of the analysts. This may range from merely listing credentials within each analysis to a rigorous testing and validation program of analysts doing certain work. With the various options chosen by the program, the reference in any one of the analysis coverage will be simplified.
3.3	Tailoring	Provides tailoring of specific documentation requirements where applicable. Coordination with the procuring authorities is recommended so that agreement is reached on what tailoring needs to be done to minimize any delay in getting the planning approved.
3.4	Organization	Discusses the organizational aspects of analysis management, which is typically a product of SE. The analyses may be performed in any sub-organization or by contractors; if so, a separate contracting plan will supplement the Analysis Management planning section. When there is more than one stakeholder for an analysis, the analysis coverage shall deal with possibly conflicting needs. Thus, a hierarchical ranking of precision, scope, timing, and quality of the analysis product will be established, and a single set of requirements levied on the

Analysis Management Plan Template		
		analysis. Analysis Management planning development, deployment, and maintenance are the responsibility of SE within the program. The data to be presented (see the "Inputs to Software/Development Planning" (subsection 4.2.4.4.3.1)) for each analysis is the responsibility of an analyst assigned to that analysis. This responsibility covers acquisition, interpretation, analysis, and transmittal of the data to the Analysis Management planning section author.
4	SPECIFIC ANALYSES	Describes each of the various analyses that qualify for inclusion in the Analysis Management planning. The format follows and addresses the items identified in subsection 4.2.4.4.3.1. The final subsection for each analysis will be the connectivity (precursor and successor tasks) of the analysis and the duration and level of effort required.
5	RESPONSIBILITIES	Describes the detailed responsibilities of the various organizational entities to accomplish the tasks of Section 4.9.
6	SCHEDULE	Contains the schedule that is to be tied to the milestones of the ISAP.
7	AUTOMATED REQUIREMENTS TOOL	Describes the planned use of the requirements management tool, if any.
8	NOTES	
	APPENDICES	

E.9 Risk Management Planning

Risk is inherent in every program. Stakeholders know this and expect contractors to address risks in program plans. SE addresses three facets of risk: technical, schedule, and cost. Technical risks include all events that may prevent the program from satisfying contractual requirements, including performance, supportability, maintainability, and regulatory requirements. Schedule risks are events that may prevent timely execution of tasks identified in the ISAP. Cost risks are events that may cause actual expenditures to exceed estimated costs.

Risk management is a key process within SE. The program and functional managers implement it by ensuring that appropriate resources are applied to reduce risk to acceptable levels. Risk management consists of five essential components: identify risks, analyze risks, identify mitigation options, implement the risk-reduction plan, and monitor risks.

The Risk Management planning section describes the approach, methods, procedures, and criteria for risk management and its integration into the program decision process. It is continually updated throughout the program life with the SEMP.

E.9.1 Risk Management Planning Outputs

Table E-10 is the template to be used for the Risk Management Plan.

Table E-10. Table of Contents for Risk Management Plan

Risk Management Planning Section Outline	
1	SCOPE
1.1	Overview
1.2	System Overview
2	RISK REVIEW TEAM
3	RISK MANAGEMENT PROCESS
3.1	Process
3.2	Risk Assessment Criteria and Mitigation Requirements
3.3	Key Decision Points
3.4	Documentation Requirements
4	RISK MONITORING PROCEDURE
5	RISK MANAGEMENT SCHEDULE
6	NOTES AND REFERENCES
7	APPENDICES
7.1	Documentation Forms
7.2	Risk Management Tools

E.10 Configuration Management Planning

The Configuration Management Organization typically owns this planning section. Inputs from the SE process may initiate the planning section as early as the Investment Analysis, phase one, but the section formally starts at Investment Analysis, phase two, and continues throughout the program lifecycle as the system develops and is modified.

E.10.1. Outputs of Configuration Management Planning

The output shall be the Configuration Management planning section of the SEMP that outlines all the tasks with corresponding completion dates and personnel responsible for task completion or a standalone plan containing the same information as the Table E-11 template.

Table E-11. Table of Contents for Configuration Management Plan

Configuration Management Plan Outline	
1	SCOPE
1.1	Overview
1.2	System Overview
2	CONFIGURATION MANAGEMENT REVIEW TEAM
3	CONFIGURATION MANAGEMENT PROCESS
3.1	Process
3.2	CONFIGURATION MANAGEMENT Assessment Criteria and Mitigation

Configuration Management Plan Outline	
	Requirements
3.3	Key Decision Points
3.4	Documentation Requirements
4	CONFIGURATION MANAGEMENT MONITORING PROCEDURE
5	CONFIGURATION MANAGEMENT SCHEDULE
6	Data Management Planning
7	NOTES AND REFERENCES
8	APPENDICES
8.1	Documentation Forms
8.2	CONFIGURATION Management Tools

E.11 Concept and Requirements Planning

The Concept and Requirements Plan (see Table E-12 template) specifies the scope, assumptions, constraints, methods, data sources, resources, control strategy, team composition, roles and responsibilities, schedule, and deliverables for a proposed concept and requirements definition (CRD) activity. The CRD addresses a priority service need within the Service Level Mission Need Statement and develops the information for an investment analysis readiness decision (IARD).

Table E-12. Table of Contents for Concept and Requirements Plan

Concept and Requirements Plan Template		
1	SCOPE	
1.1	Service Level Mission Need	Identifies the specific capabilities or components of the Service Level Mission Need Statement that will be examined.
1.2	Service Delivery Strategy	Defines how these capabilities or components fit into the overall service delivery strategy of your service organization.
1.3	Assumptions, Constraints, and Guidance	States the key assumptions, constraints, and guidance that will govern the CRD Team as it conducts CRD activities. These *may* include: • The quantified capability shortfall that will be addressed • The remaining service life of the existing capability • The required operational date of any needed new or replacement capability • Any component of the proposed new capability that has a higher priority for early delivery than the entire capability

Concept and Requirements Plan Template		
		• The required mission life or economic service life of the proposed new capability • The proposed date for the IARD—date by which all CRD activity must be complete with findings and recommendations presented to the appropriate decision board (Executive Council (EC) for Air Traffic Organization (ATO); Information Technology Executive Board (ITEB), which reviews and recommends investments related to FAA administrative and some mission support services; and the lines of business (LOB) review boards that review and recommend investments within a LOB • Any design cost, unit acquisition cost, Operations cost, or any other economic goal that must be satisfied by the new or replacement capability (e.g., "Unit initial acquisition cost must be less than $2 Million.") • Any ATO/LOB performance goal that must be satisfied by the new or replacement capability (e.g., "Reduce cost per flight by 1%.") • Any milestone constraint (i.e., external influences) that must be satisfied by the new or replacement capability • Any constraints on the choice of an alternative (e.g., "No alternative may be developed that will require the mandatory carriage of new avionics by the airlines and other National Airspace System (NAS) users.") • Any policy guidance that influences, constrains, or dictates the choice of a new or replacement capability or operational requirement • Any interdependencies with other new, existing, or proposed Federal Aviation Administration assets that must be satisfied (e.g., "Delivery of new digital Airport Surveillance Radar-11 radars must be completed prior to installation of new digital Standard Terminal Automation Replacement Systems.") • Any NAS safety issues that influence, constrain, or dictate the choice of a new or replacement capability • Any required safety risk acceptance and safety risk management documentation.
1.	Methodology	Defines the methodologies and techniques to be used in

Concept and Requirements Plan Template		
		each CRD activity and task.
2	APPLICABLE DOCUMENTS	
3	TASKS	Define tasks necessary to ensure a program is ready for investment analysis.
3.1	Identify Required Resources	Identifies the resources and respective costs needed to complete CRD activities. For example, what team members are needed? What are the required skill levels? What level of effort must they provide (weekly time commitment)? What level of contract support is needed? Are any consultants needed? What travel, training, or technology (software or hardware) is required?
3.1.1	Personnel	Identifies required team member skill. Identify time commitment (level of effort).
3.1.2	Contract Support	Determines what level of contract support is need.
3.1.3	Training	Determines is any unique training is required.
3.1.4	Travel	Determines what, if any, travel is required.
3.1.5	Technology Needs	Determines if any technology (hardware and/or software) is needed to perform CRD process.
3.16	Costs	Determines costs for 3.1.1 through 3.1.5.
3.2	Specify Team Composition	Specifies the CRD Team composition alphabetically by name and affiliated FAA organization. Acquisition Management System policy designates ATO Operations Planning (ATO-P) Systems Engineering as lead.
3.3	Define Data Requirements	Defines the data sources that will be used for each CRD activity.
3.4	Control Strategy	Describes the control strategy that will be used by the CRD Team Lead to ensure timely delivery of quality CRD products to the EC/LOB/ITEB. Discuss how commitment to these activities will be obtained.
3.4.1	Commitment	Establishes a methodology to ensure that personnel are available to meet team commitments. This may be accomplished through a request for participation, memorandum for action or memorandum of understanding, letter of agreement, bargaining negotiations, or management coordination.
4	Deliverables	Lists and describes all CRD deliverables and provides the required completion date for each. At a minimum, CRD deliverables shall include a Preliminary Program Requirements attachment to the OMB Exhibit 300 Program Baseline, including Preliminary Program Requirements, a

Concept and Requirements Plan Template		
		Concept of Use, Functional Architecture, and Technical Description; identification of the alternatives that will be evaluated during initial investment analysis, along with a rough estimate of lifecycle cost for each alternative; an assessment of the alternatives against the Enterprise and Security Architectures; an Operational Safety Assessment; Safety Risk Management Decision Memo; and Initial Investment Analysis Plan.
4.1	System Engineering	Enumerates and describes the various system engineering analyses and documents to be produced.
4.2	Cost	Enumerates and describes the various cost analyses and documents to be produced.
4.3	Briefings	Discusses the briefings as well as the associated content, format, and scheduling criteria.
5	RESPONSIBILITIES	Defines the roles and responsibilities of each team member for each CRD activity and deliverable; also defines who will prepare CRD briefing and who will be responsible for briefing the EC.
	Develop WBS	Develops a work breakdown structure and matched organizational breakdown structure for all CRD activities and deliverables.
6	SCHEDULE	Provides schedules and an integrated network for conducting all CRD activities and completing required deliverables. The schedule should show start, duration, and completion of all major CRD activities. The integrated schedule should, at a minimum, identify such things as activity dependencies and interdependencies, slack times, and the critical path for project completion.
7	AUTOMATED REQUIREMENTS TOOL	Describes the planned use of the requirements management tool, if any.
8	NOTES	
	APPENDICES	

E.12 Verification Planning

E.12.1 Master Verification Plan (MVP)

The MVP describes the overall verification program. It provides the content and depth of detail for full visibility of all verification activities and fully describes each major verification activity. The plan provides a general schedule and sequence of events for major verification activities. It also describes test software (including code and documentation), Ground Support Equipment, and facilities to support verification activities. The systems engineer and verification engineer develop the plan with design and test organizations, with all having a thorough understanding of

the verification program concept, program requirements at all levels, and the methods in the Verification Requirements Traceability Matrix (VRTM) for verification.

E.12.2 Verification Requirements Traceability Matrix

The VRTM is that portion of a requirements document that defines how each requirement is to be verified. It includes the plan that describes the verification activity as well as the results, including traceability to testing (in the verification report). The VRTM is based on the Validation Table documented in the Validation Report. The design, test, SE, and verification team members jointly develop the VRTM. The VRTM establishes the basis for the verification program.

E.12.3 Requirements Verification Compliance Document (RVCD)

The RVCD provides the evidence of compliance for each requirement at all levels and to each VRTM requirement. The flow down from the requirements documents to the VRTM completes the full requirements traceability. Compliance with all requirements ensures that the system-level requirements have been met.

The RVCD defines for each requirement the methods of verification and corresponding compliance information. The results of the verification activity, including evidence of completion, are recorded and documented in the RVCD. It is recommended that the RVCD contain information regarding the results of each verification activity and a description and disposition of conformance, nonconformance, conclusions, and recommendations. The compliance information provides either the actual data or a reference to the location of the actual data that shows compliance with the requirement. The document also includes a section that details any noncompliances; it is recommended that this section also specify appropriate reverification procedures. The RVCD is an input into the Requirements Management process (Section 4.3). Decisions regarding what to do with noncompliant requirements are made in Requirements Management.

E.12.4 Master Verification Plan Metrics

The MVP provides the content and depth of detail for understanding the Verification activities, detailing each major activity. It contains the schedule and sequence of events. Table E.13 is a template for the plan.

Table E-13. Table of Contents for Master Verification Plan

Master Verification Plan Template		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	Contains a diagram showing the interrelationships among the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	Describes tasks that are tied to the specific organizational and program requirements in accordance with Section 4.12. Includes qualification, acceptance, predevelopment,

Master Verification Plan Template		
		operational, and disposal Verification activities for hardware, software, and procedures.
4	PRODUCTS	Describes all associated products (e.g., VRTM and RVCD).
5	RESPONSIBILITIES	Details responsibilities of the various organizational entities to accomplish the Validation and Verification tasks.
6	SCHEDULE	Contains the schedule that is to be tied to the milestones of the SEMP.
7	Validation and Test	Describes the planned test hardware and software, support equipment, and facilities required to support Verification activities.
8	NOTES	
	APPENDICES	

E.13 Lifecycle Plan (LCP)

The LCP ensures that resources are available for all activities required to integrate lifecycle support. Lifecycle planning includes integrated logistics support, deployment and transition, real property management, sustainment and technology evolution, and disposal. The planning steps for all elements are the same and are listed below. The only differences are the inputs, which appear in Section 4.13, Lifecycle Engineering.

E.13.1 Outputs of Lifecycle Planning

The output of this process is the LCP. Table E.14 is the LCP template.

Table E.14. Lifecycle Plan Template

Lifecycle Outline	
SECTION 1	INTRODUCTION
1.1	Scope
1.2	Purpose of the Lifecycle Plan
1.3	Organization of the Lifecycle Plan
1.4	ICP Overview
1.5	Program/Project Name and System Description
1.6	Program Organization
1.7	Lifecycle Responsibility Assignments
1.8	Lifecycle Environment and Tools
1.9	Lifecycle Metrics
SECTION 2	Lifecycle Engineering
2.1	ILS

Lifecycle Outline	
2.1.1	Real Property Management
2.1.2	Deployment and Transition
2.1.3	Integrated Logistics Support
2.1.3.1	Maintenance Planning
2.1.3.2	Maintenance Support Facility
2.1.3.3	Direct-Work Maintenance Staffing
2.1.3.4	Supply Support
2.1.3.5	Support Equipment
2.1.3.6	Training, Training Support, and Personnel Skills
2.1.3.7	Technical Data
2.1.3.8	Packaging, Handling, Storage, and Transportation (PHS&T)
2.1.3.9	Computer Resources Support
2.1.4	Sustainment/Technology Evolution
2.1.5	Disposal
SECTION 3	
3.1	Integrated Master Schedule for Lifecycle
3.2	Tailored ISR

E.14 Maintain System Engineering

All resources required to maintain SE are in the SEMP.

E.15 Integrated Human Factors Planning

Table E-15 shows the table of contents for a separate integrated human factors plan, if considered necessary by the program.

Table E. 15. Integrated Human Factors Plan Content and Format[g1]

Headings		Content
Background	Program Summary	• Briefly describe the program • Describe concept of operation and maintenance
	Program Schedule	• Provide overview of system acquisition schedule

Headings		Content
	Target Population	Identify: • Operator and maintainer • Demographics • Biographical data • Previous training • Aptitudes • Task-related experience • Anthropometric data • Physical qualifications • Organizational relationships • Workspace requirements
	Guidance	• Summarize any guidance received
	Constraints	• State if additional staffing is required by the new system • State whether an existing job series is to be used or a new one created • Post limits on the amount of time that may be afforded for training • Establish standards on the working conditions that are to be acceptable when the new system is fielded • Describe limitations imposed by maintenance policy • Develop requirements as a result of union agreements
Issues and Enhancements	Issue Description	• Describe the issue or problem background, importance, and consequences or task to be done to support the acquisition

Headings		Content
	Objectives	• Identify Human Factors Program objectives • Provide performance measures and criteria in terms of time and accuracy to perform tasks to evaluate resolution of issue • When human performance thresholds are known, identify tasks for the developer to be done early enough in the acquisition to influence requirements and system engineering • Identify the actions to be taken to resolve each issue • Show the current status of each issue
	Actions	• Identify actions to be taken to resolve issues • Show current status of each action
Activities	Activity Description	• Identify any tasks, studies, or analyses that shall be performed to resolve the issues (e.g., contractor's Human Engineering Program Plan per MIL-HDBK-46855, Functional Analysis to support equipment versus people allocation of functions, Task Analysis to produce a specific operator, and maintainer task list)
	Activity Schedule	• By acquisition phase, describe the human factors tasks in terms of who, what, when, and how (resources) • Identify feeds to and dependencies on ILS, training, and test and evaluation programs
Strategy	Goals and Requirements	• Derive Strategy from the major concerns, issues, schedule, tasks, guidance, constraints, objectives, and approach for the Human Factors Program • Answer the question, "What objectives does the government wish to achieve?" • Answer the question, "How is the government to accomplish these objectives?"

Headings		Content
	Approach	• Identify who is to be responsible for the Human Factors Program • Set out the extent of contractor support required • Define how human factors resources are to be organized and managed to support the system acquisition
	References	• Identify relevant references needed for a full understanding of the Human Factors Program
Review	Review	• Identify administrative handling procedures • Identify update schedule and procedure • Identify review procedures

APPENDIX F

(RESERVED)

Appendix G: Requirements Management Resources

Performing Requirements Management (Section 4. 3) Step 1, Identify and Capture Requirements (subsection 4.3.3.1), requires the practitioner to gather data from many sources. Subsection 4.3.2, Inputs to Requirements Management, lists many types of data and suggests some sources that contain the required data. This appendix lists additional sources of data that may be consulted during the Identify and Capture Requirements process step. While this is not a complete list of sources, it identifies the major sources of data, guidance, and direction that are specific to FAA requirements identification.

This appendix lists FAA, Department of Defense, international and industry standards, handbooks, and specifications that may be invoked by a requirement. It also lists FAA orders that state FAA policy that may result in specific requirements being mandated.

G.1 Sources of Documents

G.1.1 FAA Specifications and Standards

All current FAA specifications and standards under FAA configuration management are listed in NAS-MD-001, National Airspace System Master Configuration Index, which is available on the FAA Configuration Management Web site (http://www.faa.gov/cm/cmdox.htm).

G.1.1.1 Documentation Control Center

FAA specifications may be obtained from the NAS Documentation Control Facility. The facility is located at 600 Maryland Avenue, SW., Washington, DC 20024. The telephone number is (202) 548-5502. The specifications are all available as hard copies, and many are available as soft copies.

G.1.1.2 FAA World Wide Web Site Sources

G.1.1.2.1 Department of Transportation Library

Many FAA orders, standards, specifications, and reports are available on the library's Web site (http://isddc.dot.gov).

G.1.1.2.2 Documentation Control Center

The NAS Documentation Control Center maintains a Web site (http://nasdocs.faa.gov) that includes most FAA standards, the FAA-G-2100 specification, and the complete set of NAS Requirements documents, including NAS-SR-1000, NAS-DD-1000, and NAS-SS-1000.

G.1.1.2.3 Air Traffic Organization (ATO) Standards

The ATO, System Engineering and Architecture directorate maintains a Web site with many FAA standards (http://wwwlfaa.gov/asd/standards).

G.1.2 Department of Defense (DoD) Specifications and Standards

All current DoD specifications and standards are available through a Defense Standardization Program that supplies electronic copies of many specifications, standards, handbooks, and other materials (http://www.dsp.dla.mil).

G.1.3 FAA Directives

FAA Order WA 0000.5E describes the Washington Headquarters Directive Checklist implemented by the FAA Directives Management Information System (DMIS). Hard copies of FAA orders may be obtained by mail or fax only. Submit FAA Form 1720-11, Publications Request, to:

U.S. Department of Transportation
Subsequent Distribution Office, SVC-121.23
Ardmore East Business Center
3341Q 75th Avenue
Landover, MD 20785
Fax (301) 386-5394

FAA Form 1720-11 is available at the FAA Electronic Document Systems Web site (http://feds.faa.gov).

Although there is no single source of soft copies, many FAA orders are available on specific FAA Web sites, as described in the following subsections.

G.1.3.1 Directives Management Information System

DMIS, a centralized database and repository, is the official source for FAA regional and national directives. Many FAA orders are available for download at the DMIS Web site (http://dmis.faa.gov).

G.1.3.2 Technical Operations Orders

FAA orders that pertain to operating and maintaining NAS systems are available at the FAA Technical Operations Services Web site (http://atowdirectives.faa.gov).

G.1.3.3 Systems Operations Orders

FAA orders that pertain to air traffic operations are available at the Air Traffic publications Web site (http://faa.gov/atpubs).

G.1.4 Industry Specifications and Standards

Many industry specifications and standards are available as both hard and soft copies from industry associations; most are available for purchase. Industry standards and many government and military standards are available at Global Engineering Documents (http://www.global.ihs.com).

Standards are also available from the following sources:

- RTCA Minimum Operational Performance Standards and Minimum Aviation System Performance Standards (http://www.rtca.org)
- Institute of Electrical and Electronic Engineers (IEEE) (http://ieee.org)
- National Fire Protection Association (NFPA) (http://nfpa.org)
- Electronic Industries Association (EIA) (http://www.eia.org)
- Telecommunications Industries Association (TIA) (http://www.tiaonline.org)

G.1.5 Government Regulations and Statues

Government regulations and statues that apply to FAA requirements are available at the FAA Acquisition System Toolset (FAST) Web site (http://fast.faa.gov) under the "External Authorities" tab.

G.1.6 International Standards

International Standards and Recommended Practices (SARPS) are available from the International Civil Aviation Organization (ICAO) (http://www.icaodsu.openface.ca/mainpage.ch2).

G.2 Document Listing Description

This section describes each column on the Document Listing Description (Table G-1).

G.2.1 Document Type

The "Document Type" field may include the following document types:

- Standard
- Specification
- FAA Order
- Handbook
- Manual
- Executive Order
- SARP

G.2.2 Document Number

The "Document Number" is the complete number that the issuing entity uses to identify the document.

G.2.3 Revision

The "Revision" indicates the revision level of the document, which is normally the most recent version.

G.2.4 Date

The "Date" is the date of issuance of the document. For FAA documents, it is the date that the document was approved by the approving authority.

G.2.5 Title

The "Title" is the complete title of the document.

G.2.6 Description

The "Description" briefly summarizes the document.

G.2.7 OPI

The "OPI" field describes the "Office of Primary Interest." For FAA documents, this is the FAA organizational element that issued the document and is responsible for maintaining and updating it. NAS-MD-001 lists the OPI for documents under configuration management.

G.2.8 Notes

The “Notes” field explains why this document is important in the requirements management process. It may give examples of what areas of the document may be used in the “Identify and Capture” requirements step in the Requirements Management process (Section 4.3).

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Executive Order	12088	Org	10/13/1978	Federal Compliance with Pollution Control Standards	Ensures that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency.	Executive Office of the President	All FAA systems must comply with the requirements in this EO.
Executive Order	12196	Org	2/26/1980	Occupational Safety and Health Program for Federal Employees	Executes the provisions of the "Occupational Safety and Health Act" for Federal employees.	Executive Office of the President	All FAA systems must comply with the requirements in this EO.
Executive Order	12873	Org	10/20/1993	Federal Acquisition, Recycing, and Waste Prevention	Consistent with the demands of efficiency and cost effectiveness, the head of each Executive agency shall incorporate waste prevention and recycling in the agency's daily operations and work...	Executive Office of the President	All FAA systems must comply with the requirements in this EO.
Executive Order	12902	Org	3/8/1994	Energy Efficiency and conservation at Federal Facilities, and the Energy Policy Act of 1992	Each agency shall develop and implement a program with the intent of reducing energy consumption by 30 percent by the year 2005 …	Executive Office of the President	All FAA systems must comply with the requirements in this EO.

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Executive Order	13123	Org	6/8/1999	Greening the Government Through Efficient Energy Management	The Federal Government, as the Nation's largest energy consumer, shall significantly improve its energy management in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change.	Executive Office of the President	All FAA systems must comply with the requirements in this EO.
Handbook	DO-278	Org	3/5/2002	RTCA DO-278, Guidelines for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems Software Integrity Assurance	Provides guidelines for the assurance of software contained in non-airborne CNS/ATM systems.	RTCA	
Handbook	FAA-HDBK-001	Org	9/30/1997	Design Handbook for Energy Efficiency and Water Conservation in NAS Facilities	Describes definitive energy efficiency and water conservation design criteria for the design of NAS facilities. It provides implementation strategies and tools to comply with E.O. 12902, Energy and Water Conservation at Federal Facilities, which was issued on March 8, 1994.		
Handbook	FAA-HDBK-002	Org	6/27/1997	System Management	Provides guidance for the uniform implementation of the systems and network management architectures recommended for use within the FAA.		

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Handbook	FAA-HDBK-003	Org	6/27/1997	NAS Open System Environment (OSE) Application Services	Provides the FAA with information necessary for developing and establishing an organizational Open System Environment (OSE).	ATO-P	
Handbook	FAA-HDBK-004	Org	9/4/1997	NAS Internet Protocol Suite	Recommends the protocols, features, and services that should be supported in a FAA IPS environment within the NAS.	ATO-P	
Handbook	FAA-HDBK-006	Org	5/1/2006	RMA Handbook	Describes a methodology for allocating NAS service level RMA requiremnts as defined in NAS-SR-1000 to the system level.	ATO-P	Helps determine how the .99999 availability requirement is applied to FAA systems.
Handbook	N/A	Org	6/1/2006	Acquisition Management System (AMS) Test & Evaluation Process Guidelines	Provides a sound foundation for planning and executing Test and Evaluation activities appropriate to each individual investment program.	FAST	Used in planning a Test and Evaluation program.
Handbook	VNSTC-FAA-95-3	Org	6/17/1905	Human Factors in the Design and Evaluation of Air Traffic Control Systems	Provides background material on the capbilities and limitations of humans as information processors and the evaluation of displays and controls.	DOT VNSTC	Useful human factors information.
Manual	NA	1.1	5/26/2004	FAA Safety Management System Manual	Provides high-level structure, procedures, and responsibilities regarding the functioning of the SMS.		
Order	0000.5	E	5/31/2001	Washington Headquarters Directives Checklist	This is an index of all current and cancelled FAA Orders		

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Order	1010.51	A	3/8/1971	Selection Order: U.S. National Aviation Standard for the Mark X ATCRBS Characteristics	Describes the signal in space characteristics of the ATCBRS system.	AND-450	
Order	1050.10	B	9/13/2004	Prevention Control and Abatement of FAA Environmental Pollution	Establishes FAA policy, roles, and responsibilities for prevention, control, and abatement of environmental pollution at or from FAA facilites.	AEE-200	
Order	1050.17	Org	1/5/1994	Airway Facilities Environmental and Safety Compliance Program	Establishes an Environmental and Safety Compliance Program to assure that all projects, programs, and activities for which FAA is responsible are performed in accordance with applicable laws and regulations.	AJW-23	Implements Order 1050.10.
Order	1100.145	B		Program Technical Report (PTR) Procedures	Describes the FAA procedures for managing ATC operational software problems.	ATR-320	When contractor-developed software is turned over to the FAA for maintenance, this procedure will be used to track PTRs.
Order	1100.157	A	6/1/2001	National Systems Engineering Divisions Maintenance Program Procedures, Operational Support	Implements maintenance engineering support for the National Airspace System (NAS).	AOS-1	
Order	1200.22	C	2/6/2002	Use of National Airspace System (NAS) Computer and Radar Data or Equipment by Outside Interests	Describes procedures for making radar and automation system data available to non-FAA users.	AJW-163	

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Order	1320.1	D	12/1/2001	FAA Directives System	Describes the procedures for producing FAA orders.	APF-100	
Order	1370.66	B	5/1/1992	Aviation Safety Analysis System: Location Identifier Codes	Lists of all FAA Location ID's.	APR-300	A handy reference.
Order	1370.82	A	9/11/2006	Information Systems Security Program	Describes the FAA policy on information systems security.	AIS-500	Any information system must follow the policies described in the order. This newly issued version contains significant changes.
Order	1370.83	Org	2/8/2001	Internet Access Points	Serves as an implementation directive to Order 1370.82, Information Systems Security Program prescribing responsibilities and identifying procedures for establishing and operating an agency Internet Access Point.	AIS-200	This order also applies to all systems, NAS, devices, networks, and applications that establish a connection to the Internet or use Internet resources.
Order	1370.84	Org	3/4/2002	Internet Services	Assigns organizational and management responsibilities for Internet services to conform to security and privacy considerations.	AIS-200	
Order	1375.1	D		Data Management	Establishes an agencywide FAA policy on information/data management and establishes the FAA Data Governance Board.	AIO-300	
Order	1380.40	C	12/1/1992	Airway Facilities Sector Level Staffing Standard System	Provides the basis for human resource allocation in the Airway Facilites.	AFZ-200	

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Order	1600.1	D Chg 3	9/6/2000	Personnel Security Program	Describes personnel security policy under the Department of Transportation (DOT) Order DOT 1630.2, Personnel Security Management, and establishes related standards, criteria, and procedures for the FAA.	ACP-300	
Order	1600.6	E	3/11/2004	Facility Security Policy	Establishes the FAA Facility Security Management Program to protect FAA employees, assets, property, owned or leased facilities, contractors and the public.	ASH-2	Implements FAA Order 1600.69.
Order	1600.69	B	10/1/2003	FAA Facility Security Management Program		AIN-1	
Order	1600.72	Org	4/4/2001	Contractor and Idustrial Security Program	Establishes the FAA's Contractor and Industrial Security Program and prescribes related policy, standards, criteria, and guidelines for security screening of contractor employees.	ACP-300	
Order	1600.73	Org	11/30/2001	Contractor and Idustrial Security Proram Operating Procedures	Describes procedures for implementing the directives and policies governing the FAA contractor and industrial security program.	ACP-300	These procedures are to be used as a supplement to FAA Order 1600.1D, Personnel Security Program.
Order	1600.75	Org	2/1/2005	Protecting Sensitive Unclassified Information	Provides guidance for identifying and protecting sensitive unclassified information.	ASH-1	

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Order	1800.66	Org	11/29/1999	Configuration Management Policy	Directs use of CM policy contained in the AMS and FAA Order 1800.8F.	AJW-272	
Order	1830.3	A	9/21/1992	Telecommunications Management and Operations Policy	Establishes FAA policy on telecommuincations management and operations.	AJW-531	
Order	1830.6	B	8/20/1998	Telecommunications Asset Management	Provides guidance regarding assignment, implementation, and engineering of FAA telecommuications assets.	AJW-531	
Order	3000.22	Org	5/1/1998	Air Traffic Service Training		ATS-7	
Order	3900.19	B	4/29/1999	Occupational Safety and Health Program	Establishes the policy framework and assigns responsibility for an effective agencywide employee safety and health program.	AEE-200	Updated 3/8/2006 without changing revision number.
Order	4140.1	A	2/4/1998	Integrated Material Management Program	Establishes the FAA as a primary inventory control activity and as a secondary inventory control activity in its supply support relationship with other Federal Government organizations.	AJW-161	
Order	4250.9	B	1/24/1992	Field Material Management and Control	Establishes agency principles and direction in the area of field materiel management and control.	AJW-161	
Order	4453.1	B	1/17/1992	QualityAssurance of Material Procured by FAA		ASU-400	

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Order	4500.3	D	1/12/1998	Federal Catalog and Standardization Program	Prescribes responsibilities and procedures for FAA participation in the Federal Catalog and Standardization Program.	AJW-161	
Order	4560.1	B	3/10/1989	Policies and Procedures Covering the Provisioning Process During the Acqusistion of FAA Material		AFR-100	
Order	4630.1	C	11/12/86	Management of Depot Inventories of Operating Material	Defines FAA depot inventory management system and provides instructions for maintaining inventories of operating material.	AJW-161	
Order	4630.2	A	7/9/1987	Standard Allowance of Supplies and Working Equipment for NAS Facilities		ARS-1	
Order	4630.3	C	3/17/1993	Survey of Lost, Damaged, or Destroyed Personal Government Personal Property	Provides procedures for lost, damanged, or destroyed personal property.	AJW-161	
Order	4633.1	Chg 11	8/7/1990	Physical Inventory	Provides standards and assigns responsibillity for conducting physical inventories of FAA-owned accountable personal property.	AJW-161	
Order	4650.30	Org	5/4/1993	Management and Control of NAS F&E Project Material	Prescribes procedures to implement the policies managing and controlling NAS F&E projects contained in the latest edition of Order 4650.7, Management of NAS F&E Project Materiel.	AJW-161	

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Order	4630.8	Org	10/27/1977	Quality Assurance Policy	Provides policy for quality assurance programs associated with the acquisition of NAS systems, equipment, and material.	ASU-150	This order still applies as the FAA switches to the ISO standards for quality assurance. See FAST.
Order	4650.7	A	5/22/1991	Management of NAS F&E Project Material	Describes policy for NAS F&E Project Materiel Management for accomplishment of each stage and major event within a NAS F&E project cycle.	AJW-161	
Order	4650.16	B	7/1/1987	Nationally Furnished Project Materiel Procured by the Washington Headquarters		AAD-50	
Order	4650.20	A	12/4/1974	Reporting and Replacement of Items Failing Under Warranty		ASU-130	
Order	4650.30	Org	5/4/1993	Management and Control of NAS F&E Projects/Materiel	Prescribes the procedures for implementing the policies managing and controlling NAS F&E projects.	AJW-161	Implements Order 4650.7, Management of NAS F&E Project Materiel.
Order	4650.31	Org	6/29/1993	Vendor Shipments of National Furnished Operations-Funded Material	Establishes procedures for providing proper shipping documentation for nationally furnished materiel.	AJW-161	
Order	4770.3	A	1/14/1993	Transportation and Traffic Management of Government Property	Sets guidelines for the shipment of all government-owned and personal property shipped a government expense	AJW-161	

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Order	4800.2	C Chg 2	5/31/1996 12/21/2004	Utilization and Disposal of Excess and Surplus Personal Property	Provides guidance on how to acquire, manage, control and dispose of unrequired, excess, and surplus government personal property.	AJW-161	Implements DOT Order H 4410.4.
Order	6000.10	Org	6/1/1982	Airways Facilities Service Maintenance Program	Identifies design and operational characteristics of equipment required to support the maintenance program for Airway Facilities Service; used in all phases of new and replacement system acquisitions, maintenance, and operational life.	AJW-163	
Order	6000.25	Org	6/1/1977	Design and Construction of FAA Facilities		ATB-300	
Order	6000.30	C	1/25/2001	National Airspace System Maintenance Policy	Establishes maintenance policy for the NAS. It defines roles in integrating, managing, maintaining, and operating the NAS infrastructure, as well as determining outsourcing requirements.	AJW-163	
Order	6000.36	A	11/14/1995	Communications Diversity	Establishes guidance to reduce vulnerability of critical NAS telecom services to single points of failure.	AJW-531	This order has an impact on communications costs.
Order	6000.41	B	8/5/2005	Contractor Assisted Maintenance for the NAS	Establishes guidance and policy to allow contractors to assist with maintenance of FAA systems.	AJW-163	

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Order	6010.7	Org	5/14/2004	Joint Acceptance Inspection	Establishes policy and provides guidance for conducting and documenting the JAI.	AJW-163	This order transfers custody and maintenance responsibility from the acquiring office to the responsible maintainer.
Order	6030.20	F	11/2/2004	Electrical Power Policy	Establishes policies, defines electical power service categories, provides implementation guidelines, and assigns responsibilities for power systems supporting the NAS.	AJW-221	
Order	6030.45	B	8/4/2004	Facility Reference Data File	Establishes requirements and provides guidance for the FRDF maintained for FAA-maintained and -owned facilities and documents technical reference data.	AJW-163	
Order	6040.15	D	11/20/1999	National Airspace Performance Reporting System	Establishes requirements and procedures for reporting NAS facilities and services interruptions.	AJW-162	NAPRS system definitions used to establish RMA requirements as described in FAA-HDBK-006.
Order	6050.19	F	9/5/2005	Radio Spectrum Planning	Establishes FAA policy to ensure FAA communications, navigation, and surveillance systems and supporting systems are capable of receiving FAA spectrum support.	AJW-64	Must be done prior to funding the project.

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Order	6090.1	B	3/20/2000	National Airspace System Managed Subsystems Development and Implementation	Defines responsibilities of the NMS implementation offices assigned engineering responsibility for F&E projects, and the responsibilities of NIMS as related to development and implementation of NMS-to-NIMS communications interfaces.	AUA-700	Systems required to provide RMM must follow these guidelines.
Order	6630.4	A	7/9/1999	En Route Communications Installation Standards Handbook		AJW-53	
Order	6950.2	D	10/1/1998	Electrical Power Policy Implementation at National Airspace System Facilities	Provides guidance for electrical power policy implementation at NAS facilities IAW 6030.20.	AJW-221	Identifies standard electrical power configurations to ensure NAS facility availability.
Order	6950.22	Chg 3	2/8/1978 11/30/1984	Maintenance of Electrical Power and Control Cables	Provides guidance and prescribes technical standards, tolerances, and procedures for maintenance and inspection of electical power and control cables.	AJW-223	Reprinted 10/2003. This order is current.
Order	6950.27	Org	10/3/1994	Short Circuit Analysis and Protective Device Coordination Study	Directs short circuit analysis and protective device coordination studies for facility power systems.	AJW-22	
Order	6980.24	A	7/12/1988	Battery Theory and Selection Guidelines	Provides battery theory and selection procedures for new and replacement secondary (rechargeable) batteries for application in FAA equipment and facilities.	AJW-22	

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Order	7110.65	R	2/16/2006	Air Traffic Control	Establishes all FAA air traffic control procedures. All FAA systems support the procedures in this order and can be a rich source of requirements.	ATO-R	
Order	8040.4	Org	6/26/1998	Safety Risk Management.	Establishes the safety risk management policy and procedures for implementing safety risk management as a decision.	ASY-300	
Order	8150.1	A	9/21/1987	Technical Standard Order Procedures		AIR-120	
Specification	FAA-C-1217	F	2/26/1996	FAA Specification Electrical Work, Interior	Specifies all interior electrical work in FAA facilities that must be followed.		
Specification	FAA-C-1244	B		Installation of Engine Generators and Fuel Tanks			
Specification	FAA-C-2812	Org		Fuel Storage Tanks, Underground			
Specification	FAA-D-2494	B	3/14/1984	Technical Instruction Book Manuscript: Electronic, Electrical and Mechanical Equipment, Requirements for Preparation of Manuscript and Production of Books	Defines the form and format of Technical Instuction books.		
Specification	FAA-E-2003	A		Cable Control, Shielded Pairs, Interior			

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Specification	FAA-G-2100	H	5/9/2005	Electronic Equipment, General Requirements	Defines the design and construction requirements for FAA equipment, including requirements for electrical, mechanical, safety, seismic, power, and so on.	ATO-P	This is current and being updated continually. The requirements apply to Development Items, Non-Development Items (NDI), and commercial-off-the-shelf (COTS) equipment to be used in FAA facilities. Its use is mandatory in some areas and highly recommended in others.
Specification	NAS-SR-1000	16		System Requirements Specification	Defines the operational requirements and is the approved document for operational requirements for the NAS. This document serves as a source document for system specification preparation.	ATO-P	All FAA requirements trace to this document. If they don't, it will be hard to justify the system.
Specification	NAS-DD-1000			Level 1 Design Document	Defines the functional architecture, including basic NAS elements, sub-elements, subsystems, and their interrelationships.	ATO-P	
Specification	NAS-SS-1000			NAS System Specification", Volume 1 through 5	The FAA document that defines functional, performance, design, construction, logistics, personnel and training, documentation, verification and interface requirements for the NAS.	ATO-P	

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Standard	FAA-STD-001	B	3/4/1976	Color and Texture of Finishes for NAS Equipment	Describes standards for finishes for NAS equipment.		This standard is invoked when procuring NAS equipment that is a new design. It would not normally be used in COTS or NDI procurements.
Standard	FAA-STD-002	E	9/21/1999	Engineering Drawing Preparation and Support	Sets standards for preparing and revising all FAA facility architectural and engineering drawings. Describes computed-aided design requirements, etc.	AFZ-700	If you are doing any facility modifications, then you will need to reference this standard.
Standard	FAA-STD-005	E	8/1/1996	Preparation of Specifications, Standards and Handbooks	Describes required content and format of FAA specifications, standards, and handbooks.	ATO-P	This standard describes the form and format for FAA specifications and standards.It references MIL-STD-961d and MIL-STD-962c.
Standard	FAA-STD-012	A	6/16/1969	Paint System for Equipment	Describes preparation standards for painting and finishing NAS equipment.		This standard is used in conjunction with FAA-STD-001b.
Standard	FAA-STD-013	D	6/15/1994	Quality Control Program Requirements	Establishes the minimum requirements for a quality control program to be established and maintained by FAA contractors for furnishing supplies and services.	ASU-430	This standard is current but is being replaced by ISO-9000 procedures and documentation. Check with ASU-430 before using.

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Standard	FAA-STD-016	A	9/21/1987	Quality Control System Requirements	Establishes the minimum requirements for a quality-control system to be established and maintained by FAA contractors for furnishing supplies and services.	ASU-430	This standard is current but is being replaced by ISO-9000 procedures and documentation. Check with ASU-430 before using.
Standard	FAA-STD-018	A	9/30/1987	Computer Program Quality Program Requirements	Sets the minimum requirements for a computer software quality program to be established and maintained by an FAA contractor for furnishing computer software and related documentation.	ASU-430	This standard is current but is being replaced by ISO-9000 procedures and documentation. Check with ASU-430 before using.
Standard	FAA-STD-019	D	8/9/2002	Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment	Defines standard configuration and procedures for lightning and surge protection, grounding, bonding, and sheilding practices for FAA facilities housing electronic equipment and FAA electronic equipment.	AOS-100	This standard now combines the older versions of FAA-STD-19 and FAA-STD-20 into one document. It now describes lightning and surge protection and grounding bonding and sheilding requirements for both facilities and equipment. Older versions of these standards are still in use on current contracts. New contracts will use FAA-STD-19d.

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Standard	FAA-STD-020	B	5/11/1992	Transient Protection Grounding, Bonding and Shielding for Electronic Equipment	Defines requirements for the application of transient protection, grounding, bonding, shielding, and personnel protection practices of electronic equipment. Also defines electromagnetic interference requirements.		This standard has been superceded by FAA-STD-19d. Older versions of this standard are still in use on current contracts. New contracts will use FAA-STD-19d.
Standard	FAA-STD-024	B	8/22/1994	Content and Format Requirements for the Preparation of Test and Evaluation Documents	Defines the minimum content and format requirements for preparing all required test and evaluation documentation.	ATO-P	This standard is still current but is being superceded by AMS templates.
Standard	FAA-STD-025	E	8/9/2002	Preparation of Interface Documentation	Defines the format and content of Interface Requirements Documents, Interface Control Documents, and Interface Revisions.	ATO-P	If the government or a vendor is producing an IRD or ICD, this standard shall be followed.
Standard	FAA-STD-026	A	6/1/2001	Software Development for the National Airspace System	Defines and establishes NAS software development requirements.	ASU-250	Software developed under FAA contract shall adhere to the requirements in this standard.
Standard	FAA-STD-028	C	11/16/2000	Contract Training Programs	Defines and establishes requirements for contractor-developed and -delivered training.		Training developed under FAA contract shall adhere to the requirements in this standard.

Document Type	Document Number	Revision	Date	Title	Description	OPI	Notes
Standard	FAA-STD-029	D	12/22/1995	Selection and Implementation of Telecommunications Standards	Defines telecommunications standards for the FAAto use in preparing specifications and related procurement documents that are used when leasing or purchasing telecommunications systems, services, or equipment.		Although this standard has not been updated recently, it still contains useful data.
Standard	FAA-STD-032	Org	4/29/1986	Design Standards for National Airspace System Facilities	Defines design requirements for new and modified NAS physical facilities.	ATO-W	This standard is used primarily for national standard facility designs.
Standard	FAA-STD-033	Org		Desing Standards for Energy Management in NAS Physical Facilities			Use FAA-HDBK-001, Design Handbook for Energy Efficient and Water Conservation in NAS Facilities.
Standard	FAA-STD-36	B	5/10/1994	Preparation of Project Implementation Plans	Specifies the organization and content of Project Implementation Plans.	ATO-P	
Standard	FAA-STD-039	B	5/1/1996	National Airspace System (NAS) Open System Architecture and Protocols	Specifies a minimal set of protocol and service requirements for use by FAA to develop interface requirements for data communications in the NAS.	ATO-P	
Standard	FAA-STD-42	Org	5/5/1994	National Airspace System (NAS) Open Systems Interconnection (OSI) Naming and Addressing	Defines requirements for OSI names and addresses within the NAS.	ATO-P	Currently being updated.

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Standard	FAA-STD-043	A	5/10/1994	National Airspace System (NAS) Open System Interconnection (OSI) Priority	Defines and establishes the required priority indicators to be used when using the priority option of the OSI protocols while exchanging messages between NAS open-end systems.	ATO-P	
Standard	FAA-STD-045	Org	11/21/1994	Open Systems Interconnection Security Architecture, Protocols and Mechanisms	Defines approved protocols and mechanisms for ensuring secure data communication within the NAS.	ATO-P	Currently being updated.
Standard	FAA-STD-047	Org	12/29/1993	National Airspace System (NAS) Open System Interconnection (OSI) Conformance Testing	Defines requirements for ensuring that vendor-supplied OSI products conform to the NAS OSI requirements specified in FAA-STD-039.	ATO-P	
Standard	FAA-STD-048	Org	7/7/1995	National Airspace System (NAS) Open System Interconnection (OSI) Interoperability	Defines requirements for ensuring that peer vendor OSI products conforming to FAA-STD-039 and FAA-STD-047 are able to interoperate correctly with each other.	ATO-P	
Standard	NFPA 70		6/27/1905	National Electrical Code	Defines the National Electrical Code (NEC) requirements that must be followed in FAA equipment and installations.	NFPA	Most applicable equipment requirements from the NEC are specified in FAA-G-2100.

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Standard	MIL-STD-464	A	12/19/2002	Electromagnetic Environmental Effects Requirements for Systems	Establishes electromagnetic environmental effects (E3) interface requirements and verification criteria for airborne, sea, space, and ground systems, including associated ordnance.	DOD	
Standard	MIL-STD-1472	F	12/5/2003	Design Criteria Standard Human Engineering	This standard establishes general human engineering design criteria for military systems, subsystems, equipment and facilities.	DoD	
Standard	MIL-STD-1686	C	10/25/1995	Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment	Establishes comprehensive requirements for an electrostatic discharge (ESD) control program to minimize the effects of ESD on parts, assemblies, and equipment.	DoD	