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Systems Engineering		

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Systems Engineering

EIA/IS-632

DECEMBER 1994

**ELECTRONIC INDUSTRIES ASSOCIATION
ENGINEERING DEPARTMENT**



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FOREWORD

1. This standard integrates the entire technical effort. A systems approach to the engineering of a system, subsystem, or lower level item is defined.
2. This standard is for use by organizations accomplishing new system development, upgrades, modifications, technical efforts conducted to prepare responses to solicitations, and resolution of problems in fielded systems. The performing activity's responsibilities in accomplishing the systems engineering effort is emphasized.
3. The key aspects of industry's initiatives are captured to: better identify and integrate requirements; implement multi-disciplinary teamwork, including potential suppliers, early in establishing the requirements; establish clear measurements of system responsiveness; encourage innovation in products and practices; focus on process control rather than inspection; encourage risk management rather than risk avoidance; eliminate functional stove-pipes; reduce the time it takes to acquire products and services; increase teamwork and cooperation among tasking and performing activities; and encourage tailoring.
4. The intent of this standard is to assist in defining, performing, managing, and evaluating systems engineering efforts. The scope and requirements of systems engineering are defined in terms of what should be done, not how to do it. As a result, the systems engineering activities to manage are defined, not how to manage them.
5. This standard defines a disciplined systems engineering process which matures the system with each application. In doing this, it provides criteria to: apply systems engineering throughout the system life cycle; provide a comprehensive, iterative technical process as the basis for integration of all technical efforts; and meet cost, schedule, and performance objectives with an optimal system solution encompassing people, products, and processes. The process is applicable in any phase of an effort and for any size or complexity of a system.
6. The technical foundation for integrating product and process development is provided. This standard requires: the simultaneous development of system products and life-cycle processes to satisfy user needs; multidisciplinary teamwork; and a systems engineering approach. A Systems Engineering Management Plan (SEMP) describes the application of this standard for a particular technical effort. The intended use of the SEMP is to coordinate and integrate all applicable plans and planning, by developing and formalizing the SEMP prior to system engineering process execution, using the SEMP in executing the effort, and updating the SEMP as needed for the duration of the effort. The SEMP is structured to facilitate its application contractually in lieu of this standard.
7. The process to leverage development techniques, including streamlined management approaches and leveraging options, is provided. These approaches are enabled by emphasizing a performance-based approach to system requirements and then identifying/ defining/designing candidate solution alternatives that best satisfy those requirements. Preferred solutions are identified based on cost, schedule, performance, and risk.
8. This standard provides guidance for the conduct of a systems engineering effort, not the organizational entity or method of implementation. The organization of resources to implement this standard is expected to vary from one program to another.
9. This standard should be tailored to ensure that only necessary and appropriate requirements are cited in associated tasking documents, solicitations, or contracts. Tailoring guidance can be found in paragraph 5.1 of this document.
10. Send comments and pertinent data for improving this standard to Electronic Industries Association, 2500 Wilson Blvd., Arlington, VA 22201.

EIA STANDARD
IS-632

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1. SCOPE

This standard defines a total system approach for the development of systems. The standard requires: establishing and implementing a structured, disciplined, and documented systems engineering effort incorporating the systems engineering process; multidisciplinary teamwork; and the simultaneous development of the products and processes needed to satisfy user needs. The systems engineering process is defined generically to facilitate broad application. This standard defines the requirements for technical reviews. The tasks in this standard provide a methodology for evaluating progress in achieving system objectives.

This standard provides a comprehensive, structured, and disciplined approach for all life-cycle phases, including new system product and process developments, upgrades, modifications, and engineering efforts conducted to resolve problems in fielded systems. This standard is applicable to technical efforts in support of advancement and development of new technologies and their application. It applies to large and small scale systems; to single or multiple procurements; and to the replacement of current products and processes. The standard is applicable to systems irrespective of composition including those that are integrated from diverse elements, hardware dominant, and software dominant. This document should be tailored for effective and efficient program implementation.

Systems engineering involves design and management of a total system which includes hardware and software, as well as other system elements. All system elements should be considered in analyses, trade-offs, and engineering methodology.

1.1 Background. The systems engineering process is applied iteratively throughout the system life cycle to translate stated problems into design requirements, providing an integrated system solution consisting of people, products, and processes with the capability to satisfy customer needs. See Figure 1 for key terms. Problems are normally expressed in terms of needs for new developments and modifications or, as deficiencies in operating, supporting, or providing training for already-fielded items. Performance-based requirements and alternative solutions to problems are iteratively defined and refined. Solutions may employ existing, limited development, or emerging technologies transitioned from the technology base to product and process applications. Where needed, a technology transition approach is established, implemented and controlled. Transition criteria and implementation methods (what, when, to whom, by whom) are defined cooperatively by the tasking and performing activities (see 1.2.2) and include definition of an acceptable level of maturity for all life cycle products and processes. Selection of preferred solutions is based on cost, schedule, performance, and risk. Technical risk management is integral to the process and includes the identification, quantification, impact assessment, and implementation of mitigation measures throughout the life cycle. A comprehensive, responsive verification effort is implemented to ensure that designs satisfy requirements. Progressive verification from individual pieces of the solution (system elements) up through the total system is required. This structured and

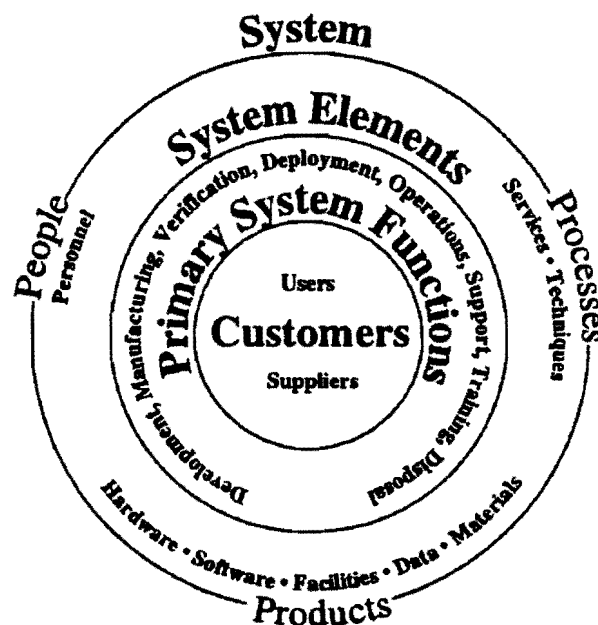


FIGURE 1. Key Terms

disciplined systems-engineering process is applied across the eight primary system functions (characteristic actions spanning life cycle requirements) to define and select optimal solutions that solve the problem from a life-cycle perspective, that is, life-cycle-balanced solutions (see Figure 2).

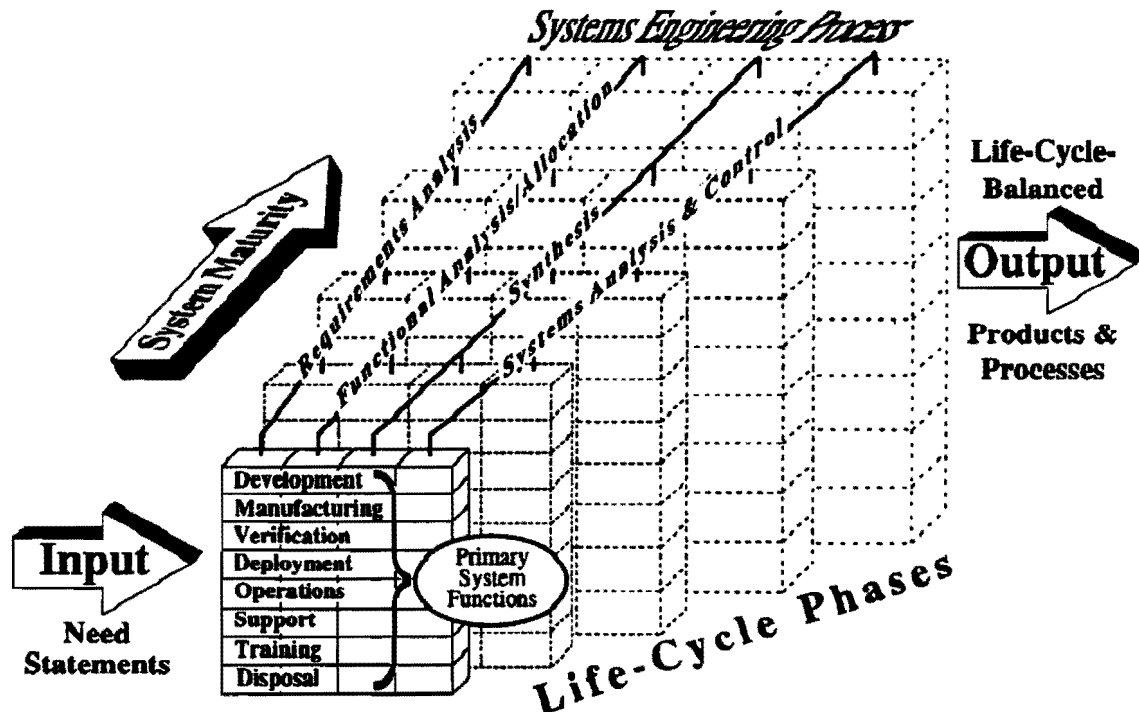


FIGURE 2. Systems Engineering Life-Cycle Application

1.2 Application Guidance. This standard applies to the entire product life cycle. This standard applies to all tasking and performing activities. It can be used by the tasking activity to assist in systems engineering planning (in terms of the required systems engineering efforts), as well as the performing activity's planning function (in terms of a responsive proposal and implementation plan). Documents pertaining to the design and management of a total system, hardware and software, as well as other system elements, are considered applicable to the provisions of this standard and subordinate thereto.

1.3 Tailoring Guidance. This standard is applied at the discretion of the tasking activity or performing activity. In each application, this standard should be tailored to the specific requirements of a particular program, program phase. Tasks which add unnecessary costs, data, and any factors which do not add value to the process or product should be eliminated. Tailoring takes the form of deletion (removal of tasks not applicable), alteration (modifying tasks to more explicitly reflect the application to a particular effort), or addition (adding tasks to satisfy program requirements).

1.3.1. Tailoring involves selection of the most appropriate, or preferred, documents to be applied, and the precedence of tasks to ensure that the complete task set is integrated, harmonized, and balanced to best achieve total system requirements. Harmonization must include provisions for resolving conflicts among task requirements. This can include procedures ranging from simple notification to notification with solution recommendations and justifications. Each task selected for application must contribute, in a cost-benefit sense, to the final objective.

Tasks are not viewed as an end in themselves. The total system approach embodied in this standard provides the process to effect this harmonization.

1.3.2. Tailoring specific tasks requires definition of the depth of detail, level of effort, and the data expected. Tailoring is performed to both breadth and depth based on the program and program phase. Tailoring in breadth of application deals with factors such as types and numbers of systems impacted by the development of a new general application subsystem, the numbers and types of assessments, numbers and types of reviews, and so forth. Tailoring in depth involves decisions concerning the level of detail needed to generate and substantiate the outputs required to satisfy program objectives. The depth of the systems engineering effort varies from program to program in relationship to complexity, uncertainty, urgency, and the willingness to accept risk.

1.4 Terms and Designators.

1.4.1 Usage of "Configuration Item" Designator. Throughout this standard, subsystems, components or other aggregates of hardware and software elements may be considered configuration items.

1.4.2 Usage of "Tasking and Performing Activities". Throughout this standard, the term "tasking activity" refers to the organization requiring the technical effort. The term "performing activity" refers to that organization doing the technical effort. In other documents the tasking activity is referred to as the "acquirer", "procuring agency", or "customer" and the performing activity is referred to as the "developer" or "supplier."

1.4.3 Usage of "Program". Throughout this standard, the term "program" is used generically to include programs or projects for which systems engineering is tasked or performed.

1.4.4 Usage of "Document" and "Documentation" Throughout this standard, the terms "document" or "documentation" are used to mean a collection of data regardless of its medium.

1.5 Order of Precedence. This standard is the top document for a total system approach for the development of products and processes. In the event of a conflict between the text of this standard and any other document, the text of this standard is superseding except for statutory and regulatory requirements.

Figures in this standard are for example only. If there is a conflict between the text and the figures, the text applies.

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2. INTRODUCTIONS AND ACKNOWLEDGMENTS

When it became evident in June 1994, that MIL-STD-499B (draft) would not be released by the government as a military standard, the EIA G-47 Committee on Systems Engineering agreed to undertake the task of “demilitarizing” 499B and releasing it as an industry standard. A working group was formed, made up of a single point of contact from each of the following organizations:

Aerospace Industries Associations (AIA)
Department of Defense (DoD)
National Council on Systems Engineering (NCOSE)
National Security Industry Association (NSIA)
Electronic Industries Association (EIA)

Each participant of the team agreed to act as the focal point for their individual organization.

Primary revisions to the MIL version of the standard consisted of revising the individual text and figures, in accordance with commercial practices, in order to broaden the suitability of the standard for other government agencies and commercial industry in general. Our intent was to build upon the good technical work, extensive review and consensus that had already been accomplished in preparing the draft military standard. The new standard, IS-632, is a performance-based standard with some guidance on “how-to” perform.

An interim standard approach was agreed upon which permits a quick track release of a bona fide standard that will be reviewed and revised on an annual basis. During this time, working with ANSI, IEEE and other interested organizations, it is planned to achieve a total industry agreement on a universal standard for Systems Engineering.

A very short schedule was developed for accomplishing the interim release by December 1994 (a four month schedule). The secret to its success has been the dedicated efforts of the small working group who were intimately familiar with MIL-STD-499 and the efforts to release Revision B to that standard.

Development of the IS-632 standard was a team effort by the participating organizations. At the time that the IS-632 standard was completed, the Working Group consisted of the following liaison members:

Marty Ross	GTE Government Systems	Chairman
William Jascomb	Lockheed	AIA
John Kordik	WPAFB ASC/ENSI	DoD
Jerome (Jerry) G. Lake	Systems Management international	NCOSE
Carol Tierney	General Dynamics	NSIA
Tom Shaw	Anderson Consulting	EIA

Other individuals who contributed to the development of IS-632 are:

James Martin	AT&T Bell Laboratories	EIA G-47
Vern Menker	HQ AFMC/ENP	DoD
Cho Shimizu	Boeing	EIA G-47
Carl Hershfield	Arthur D. Little	EIA G-Panel
Chris Denham		EIA
M. J. Malt Maltagliati		AIA

EIA also extends thanks to those individuals who provided review and comments on the IS-632 draft.

A special thanks goes to individuals who worked on the MIL-STD-499B (draft) over the last several years. Their prior contributions, which form a basis for our effort, are recognized and gratefully appreciated.

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3. GENERAL REQUIREMENTS

This section identifies and defines the systems engineering tasks that are generally applicable throughout the system life cycle for any program, new development, upgrade, modification, resolution of deficiencies, or development and exploitation of technology.

The performing activity shall evaluate the content of this standard for selection and application to a particular program and define that tailored content in a Systems Engineering Management Plan (SEMP). The SEM (4.1.1, Appendix B) shall integrate the technical execution and management effort, activities of the Systems Engineering Process (3.3, Figure 3), Systems Engineering Master Schedule (3.3.4.7, 4.1.2, Appendix C), Systems Engineering Detailed Schedule (4.1.3, Appendix D), and Work Breakdown Structures (4.1.4). The SEM shall be the governing document for the technical program.

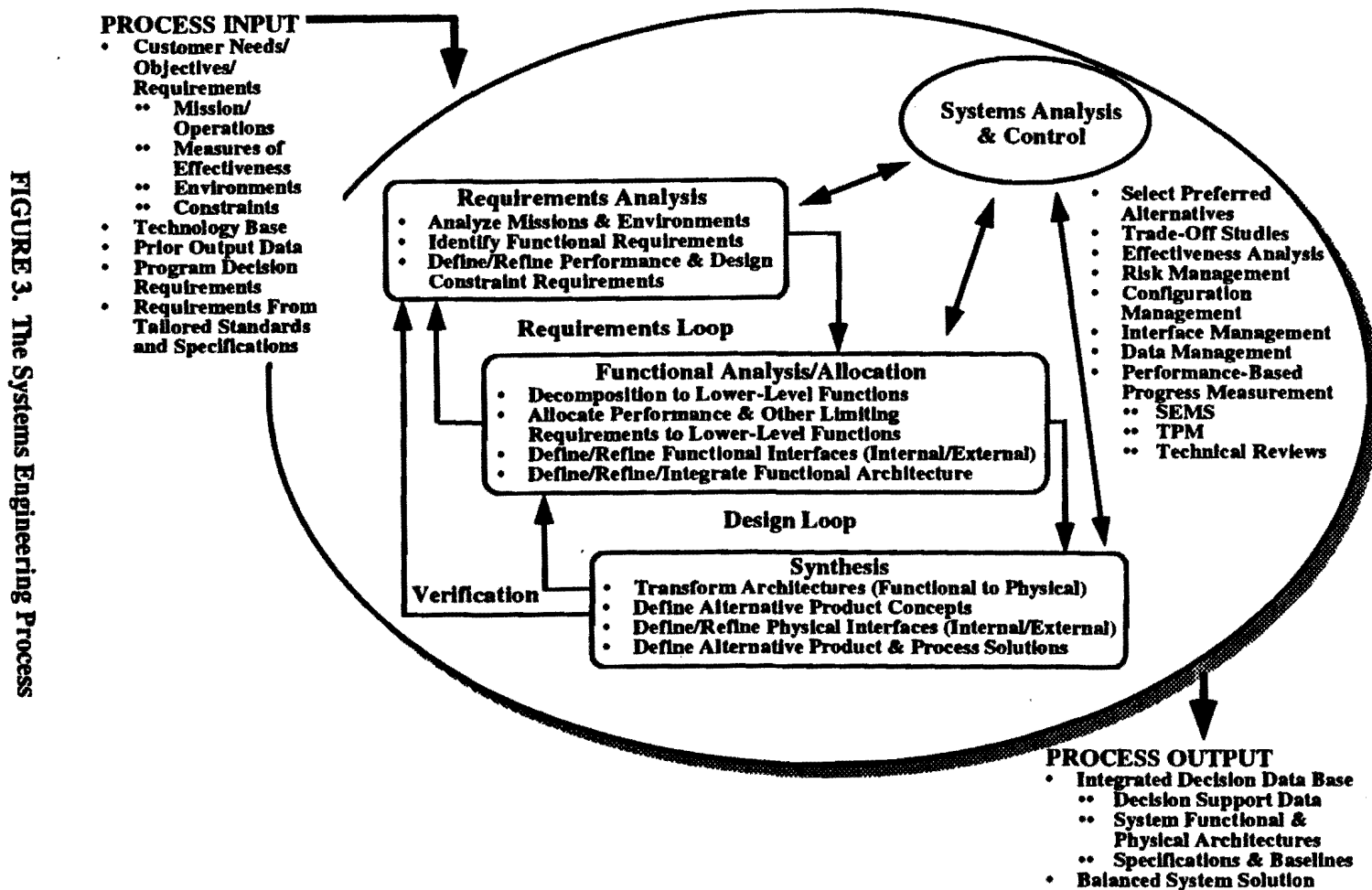
3.1 Systems Engineering Planning Implementation. For each application of this standard:

- a. All technical execution and management efforts are integrated in conformance with the systems engineering process as described in the Systems Engineering Management Plan (SEMP) prepared by the performing activity. Technical tasks, including task requirements of other standardization documents cited for contractual application, are integrated to yield a single and complete process that focuses all activities on the common objective. The planning and execution of required tasks needs to demonstrate multidisciplinary teamwork whereby all appropriate technical disciplines are applied to satisfy identified needs. The integrated technical effort is reflected in the Systems Engineering Management Plan (SEMP), the Systems Engineering Master Schedule (SEMS), and the Systems Engineering Detailed Schedule (SEDS).
- b. The SEM represents the tailoring of this standard; it describes the systems engineering process and the performing activity's plan to execute that process. The performing activity maintains and updates the SEM.
- c. The performing activity develops and maintains a SEMS.
- d. The performing activity develops and maintains a SEDS.
- e. The performing activity extends the Work Breakdown Structure (WBS), if provided by the tasking activity, to the level necessary to complete requirements for the applicable life-cycle phase. Otherwise, performing activity creates a WBS to reflect how the work is to be accomplished consistent with program risk and applicable life-cycle phase.
- f. Quality is an integral part of all technical elements and activities of the program in order to focus on preventing defects rather than detecting and correcting them.

3.2 Systems Engineering Process Input. The process input includes information necessary to support continued technical effort (includes results from technology validation and item verification) as well as initiation of a new phase of technical effort (includes new or updated customer needs/objectives/ requirements, technology base data, outputs from a previous phase, constraints based on program decision requirements, and requirements from tailored specifications and standards). The performing activity notifies the tasking activity of needed technical input information, why it is needed, and when it is needed. The tasking activity will inform the performing activity which information will not be provided, and must therefore be generated in the phase.

3.2.1 Technical Objectives. When lacking sufficient data to establish requirements, technical objectives are used to provide a basis for defining and trading off relationships among need, urgency, utility, costs, risks, and worth. Technical objectives identified should assist in converging on a system solution, focus on factors critical to success, and offer substantial capability payoffs for resources expended. The performing activity:

- a. identifies needed technical objectives, with rationale;
- b. develops metrics and success criteria to ensure that increases in system capabilities are cost effective when technical objectives are established for capabilities beyond requirements; and
- c. uses critical technical objectives in Technical Performance Measurement (TPM).



3.3 Systems Engineering Process Requirements. The performing activity employs the systems engineering process consisting of requirements analysis, functional analysis/allocation, synthesis, and systems analysis and control progressively throughout the effort to achieve program objectives and to define requirements, designs, and solutions for the system life cycle. The systems engineering process is applied as many times as needed to develop the physical solutions at the level of detail appropriate to the current life-cycle phase.

3.3.1 Requirements Analysis. The performing activity analyzes customer needs, objectives, and requirements in the context of customer missions/operations, utilization environments, and identified system characteristics to determine functional and performance requirements for each primary system function. Prior analyses are reviewed and updated, refining mission/operational and environment definitions to support system definition. Requirements analysis is conducted iteratively with functional analysis to develop requirements that depend on additional system definition (e.g., other system items, performance requirements for identified functions) and verify that people, product, and process solutions (from synthesis) can satisfy customer requirements. In conducting requirements analysis, the performing activity:

- a. assists in refining customer objectives and requirements;
- b. defines initial performance objectives and refines them into requirements;
- c. identifies and defines constraints that limit solutions (e.g., missions/operations, utilization environments or adverse impacts on natural and human environments, external interfaces); and
- d. defines functional and performance requirements based on customer provided measures of effectiveness. When measures of effectiveness are not provided at the level of detail needed, the performing activity develops and uses a set of measures of effectiveness relating to customer missions/operations; utilization environments; needs, requirements, and objectives; and design constraints.

3.3.1.1 Requirements. Functional requirements identified in requirements analysis and as process inputs are used as the top-level functions for functional analysis. Performance requirements are:

- a. interactively developed across all identified functions based on system life cycle factors; and
- b. characterized in terms of the degree of certainty in their estimate, the degree of criticality to system success, and their relationship to other requirements.

3.3.1.2 Requirements Validation. The performing activity establishes upward and downward traceability of requirements with system engineering process inputs. Each technical requirement is checked to establish that it comes from a higher-level set of input requirements. Likewise, each higher-level requirement is checked for consistency with the set of technical requirements resulting from requirements analysis.

3.3.2 Functional Analysis/Allocation. The performing activity defines and integrates a functional architecture to the depth needed to support synthesis of solutions for people, products, and processes and management of risk. Functional analysis/allocation is conducted iteratively:

- a. to define successively lower-level functions required to satisfy higher level functional requirements and to define alternative sets of functional requirements;
- b. with requirements analysis to define mission/operational and environment driven performance and to determine that higher level requirements are satisfied;
- c. to flowdown performance requirements and design constraints; and
- d. with synthesis to define and refine feasible solution alternatives which meet requirements and to place derived requirements into the functional architecture.

3.3.2.1 Functional Analysis. Identified functional requirements are analyzed to determine the lower level functions required to accomplish the parent requirement. All specified usage modes are included in the analysis. Functional requirements are arranged so that lower level functional requirements are recognized as part of higher level requirements. When time is critical to performance or sequencing of functions, a time-line analysis is conducted. Functional requirements need to be logically sequenced; with input, output, and functional interface (internal and external) requirements defined; and be traceable from beginning to end conditions, and across their interfaces.

3.3.2.2 Functional Allocation. The performing activity successively (highest to lowest level) establishes performance requirements for each functional requirement and interface. Time requirements that are prerequisite for a function or set of functions are determined and allocated. The resulting set of requirements needs to be defined in measurable terms, applicable go/no-go criteria, and in sufficient detail for use as design criteria.

3.3.2.3 Functional Verification. Functional and performance requirements need to be traceable upward and downward throughout the functional architecture from and to the higher-level requirement they are intended to fulfill.

3.3.3 Synthesis. The performing activity defines and designs solutions for each logical set of functional and performance requirements in the functional architecture and integrates them as a physical architecture. The performing activity conducts synthesis iteratively with functional analysis/ allocation to define a complete set of functional and performance requirements necessary for the level of design output required. Requirements analysis is used to verify that solution outputs can satisfy customer input requirements. The performing activity:

- a. determines the completeness of functional and performance requirements for the design and identifies derived requirements needed for completeness in terms of function and performance;
- b. defines logical sets of functions and allocates them to portions of the system
- c. defines internal and external physical interfaces including required functions and performance and ensures that requirements are integrated and verifiable across interfaces;
- d. identifies critical parameters, analyzes their variability and solution sensitivity to the variability;
- e. defines people, product, and process alternatives interactively (including the concepts, techniques, and procedural data applicable to each of the primary system functions) as well as required allowances for tolerances and variabilities for those alternatives;
- f. defines system, subsystem, and system element solutions to a level of detail that enables verification that required accomplishments have been met; and
- g. translates the architecture into a specification tree, a work breakdown structure, specifications, and configuration baselines.

3.3.3.1 Design. The outputs from synthesis need to describe the complete system, including the interfaces and relationships between internal and external items. The performing activity:

- a. develops (1) the information for establishing and updating applicable functional, allocated, and product baselines; (2) system, lower-level item, process, and material specifications including commercial item descriptions; (3) drawings and lists; (4) interface control documentation; (5) technical plans; (6) life cycle resource requirements; (7) procedural handbooks and instructional materials; and (8) documentation of personnel task loading;
- b. applies design simplicity concepts, evaluating alternatives with respect to factors such as ease of access, ready disassembly, common and non-complex tools, decreased parts counts, modularity, producibility (e.g., ready assembly), standardization, and less demanding cognitive skills;
- c. demonstrates design consistency with results from risk reduction efforts; and
- d. establishes and controls correlation among interdependent and functionally related elements.

3.3.3.2 Design Verification. The performing activity progressively verifies that product and process designs satisfy their requirements (including interfaces), from the lowest level of the current physical architecture up to the total system, and can be implemented.

3.3.4 Systems Analysis and Control. The performing activity measures progress, evaluates alternatives, selects preferred alternatives, and documents data and decisions used and generated. Systems analyses are conducted including trade-off studies, effectiveness analyses and assessments, and design analyses to determine progress in satisfying technical requirements and program objectives, and to provide a rigorous quantitative basis for performance, functional, and design requirements. Control mechanisms include risk management, configuration management, data management, and performance-based progress measurement including the SEMS, TPM, and technical reviews. The performing activity implements systems analysis and control to ensure that:

- a. decisions on solution alternatives are made only after evaluating their impact on system effectiveness, life cycle resources, risk, and customer requirements. The performing activity identifies those alternatives which would provide improved system effectiveness or costs when compared with those based on contract or program requirements, as applicable;
- b. technical decisions and system-unique specification requirements are based on systems engineering outputs and results of decisions documented;
- c. traceability from process inputs to outputs is maintained, including changes in requirements;
- d. schedules for the development and delivery of products and processes are mutually supportive;
- e. technical disciplines and disciplinary efforts are integrated into the systems engineering effort;
- f. impacts of customer requirements on resulting functional and performance requirements are examined for validity, consistency, desirability, and attainability with respect to technology availability, physical and human resources, human performance capabilities, life cycle costs, schedule, risk, applicable statutes, applicable hazardous material lists, and other identified constraints. This examination needs to either confirm existing requirements or require the determination of more appropriate requirements for the system;
- g. requirements of the product and process designs (e.g., build-to, code-to, buy-to) are directly traceable to the functional and performance requirements they were designed to fulfill, and vice versa;
- h. total program impact of identified changes to technical requirements with respect to cost, schedule, performance, and risk are defined and reported; technical, cost, and schedule problems are diagnosed and their impacts determined; and the impacts of collateral effects induced by solutions and solution alternatives on the technical program, including interfaces are determined; and
- i. changes in cost, schedule, performance, and risk that impact the executability (on time, within budget, meets requirements) of the program are reported to the tasking activity.

3.3.4.1 Trade-off Studies. Desirable and practical trade-offs among requirements, technical objectives, design, program schedule, functional and performance requirements, and life cycle costs are identified and conducted. Trade-off studies are defined, conducted, and documented at the various levels of the functional or physical architecture in enough detail to support decision making and lead to a balanced system solution. The level of detail of each study needs to be commensurate with cost, schedule, performance, and risk impacts.

3.3.4.1.1 Requirements Analysis Trade-off Studies. The performing activity needs to conduct requirements analysis trade-off studies to establish alternative performance and functional requirements to both resolve conflicts with and satisfy customer requirements.

3.3.4.1.2 Functional Analysis/Allocation Trade-off Studies. The performing activity needs to conduct trade-off studies within and across functions to:

- a. support functional analyses and allocation of performance requirements and design constraints;
- b. define a preferred set of performance requirements satisfying identified functional interfaces;
- c. determine performance requirements for lower-level functions when higher level performance and functional requirements can not be readily resolved to the lower-level; and
- d. evaluate alternative functional architectures.

3.3.4.1.3 Synthesis Trade-off Studies. The performing activity needs to conduct synthesis trade-off studies to:

- a. support decisions for new product and process developments versus non-developmental products and processes (see 4.3);
- b. establish system, subsystem, and component configuration(s);
- c. assist in selecting system concepts, designs, and solutions (include people, parts, and materials availability);
- d. support materials selection and make-or-buy, process, rate, and location decisions;
- e. examine proposed changes;
- f. examine alternative technologies to satisfy functional/design requirements including alternatives for moderate to high risk technologies;

- g. evaluate environmental and cost impacts of materials and processes;
- h. evaluate alternative physical architectures to select preferred products and processes; and
- i. select standard components, techniques, services, and facilities that reduce system life-cycle cost and meet system effectiveness requirements. Available data bases are utilized to provide historical information used in evaluation decisions.

3.3.4.2 System and Cost Effectiveness Analysis. The performing activity plans and implements a systems analysis effort as an integral part of the systems engineering process. The performing activity develops, documents, implements, controls, and maintains a method to control analytic relationships and measures of effectiveness. Critical measures of effectiveness used for decision making should be identified for technical performance measurement. System and cost effectiveness assessments are used to support risk impact assessments. The performing activity analyzes each primary system function to:

- a. support the identification and definition of performance and functional requirements for the primary system functions to which system solutions must be responsive; and
- b. support the selection of preferred product and process design requirements that satisfy those performance and functional requirements.

3.3.4.3 Risk Management. The performing activity establishes and implements a technical risk management program. Risks are assessed for products, processes (e.g. process variability), and their interrelationships. Risk is also assessed for contractually and performing activity identified variations, uncertainties, and evolutions in system environments. Risks are managed to an established acceptable level of risk for the effort. For example, the acceptable level of risk can be established by the tasking activity, performing activity policy, or other source. The risk management program is conducted to:

- a. identify potential sources of technical risk including critical parameters that can be risk drivers;
- b. quantify risks, including risk levels, and their impacts on cost (including life cycle costs), schedule, and performance. Include design, cost, and schedule uncertainties and sensitivity to program, product, and process assumptions;
- c. determine sensitivity of interrelated risks;
- d. determine alternative approaches to handle moderate and high risks;
- e. take actions to avoid, control, or assume each risk and adjust the SEMP as necessary; and
- f. ensure risk factors are evaluated as a part of decision making including the selection of specification requirements, and design and solution alternatives.

3.3.4.4 Configuration Management. The performing activity manages the configuration of identified system products and processes. This effort includes configuration:

- a. identification of documents comprising the configuration baselines for the system and lower level items, and identifiers for items and documents;
- b. control of all proposed changes to the established configuration documentation;
- c. status accounting of the information needed to manage the system elements;
- d. audits, including verification that the system elements conform to the current approved configuration documentation.

3.3.4.5 Interface Management. The performing activity manages the internal interfaces within their responsibility. The performing activity supports activities established to ensure that external interfaces are managed and controlled. The performing activity delineates the design compatibility of external and internal engineering interfaces as interface requirements in their specifications. Interface controls are established, coordinated, and maintained for interface requirements, documents, and drawings, and include all applicable performing activity, subcontractor/ supplier items and tasking activity furnished equipment, computer programs, facilities, and data. Interfaces are controlled to ensure accountability and timely dissemination of changes.

3.3.4.6 Data Management. The performing activity establishes and maintains an integrated data management system for the integrated decision data base to: