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LOGISTIC SUPPORT ANALYSIS

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DEPARTMENT OF DEFENSE
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Logistic Support Analysis

MIL-STD-1388-1A

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army DARCOM Materiel Readiness Support Activity, ATTN: DRXMD-EL, Lexington, KY 40511, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

This standard implements the Logistic Support Analysis (LSA) guidelines and requirements established by Department of Defense (DOD) Instruction 5000.2, Major System Acquisition Procedures, and DOD Directive 5000.39, Acquisition and Management of Integrated Logistic Support for Systems and Equipment. The requirements of this standard are applicable to major and less-than-major system/equipment acquisition programs, major modification programs, and applicable research and development projects. The goal of this standard is a single, uniform approach by the Military Services for conducting those activities necessary to (a) cause supportability requirements to be an integral part of system requirements and design, (b) define support requirements that are optimally related to the design and to each other, (c) define the required support during the operational phase, and (d) prepare attendant data products. LSA is the selective application of scientific and engineering efforts undertaken during the acquisition process, as part of the system engineering and design process, to assist in complying with supportability and other Integrated Logistic Support (ILS) objectives through the use of an iterative process of definition, synthesis, tradeoff, test, and evaluation.

This standard provides general requirements and descriptions of tasks which, when performed in a logical and iterative nature, comprise the LSA process. The tasks are structured for maximum flexibility in their application. In addition to the general requirements and task description sections, this standard contains an application guidance appendix which provides rationale for the selection and tailoring of the tasks to meet program objectives in a cost effective manner. This document is intentionally structured to discourage indiscriminate blanket applications. Tailoring is forced by requiring that specific tasks be selected and that certain essential information relative to implementation of the selected tasks be provided by the requiring authority. Additionally, the user must be aware that when the LSA process, or a portion thereof, is implemented contractually, more than the LSA statement of work and LSA deliverable data requirements must be considered. Readiness and supportability requirements and objectives must be appropriately integrated and embodied in specifications, general and special contract provisions, evaluation factors for award, instructions to offerors, and other sections of the solicitation document.

Defense system acquisitions are directed toward achieving the best balance between cost, schedule, performance, and supportability. Increasing awareness that supportability factors, such as manpower and personnel skills, are a critical element in system effectiveness has necessitated early support analyses, the establishment of system constraints, design goals, thresholds and criteria in these areas, and the pursuit of design, operational, and support approaches which optimize life cycle costs and the resources required to operate and maintain systems. This standard was prepared to identify these early analysis requirements and foster their cost effective application during system acquisitions.

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APPENDIX A - APPLICATION GUIDANCE FOR IMPLEMENTATION OF LOGISTIC SUPPORT ANALYSIS PROGRAM REQUIREMENTS

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1. SCOPE

1.1 Purpose. This standard provides general requirements and task descriptions governing performance of Logistic Support Analysis (LSA) during the life cycle of systems and equipment.

1.2 Application of Standard. This standard applies to all system/equipment acquisition programs, major modification programs, and applicable research and development projects through all phases of the system/equipment life cycle. This standard is for use by both contractor and Government activities performing LSA on systems/equipment to which this standard applies. As used in this standard, the "requiring authority" is generally a Government activity but may be a contractor when LSA requirements are levied on subcontractors. The "performing activity" may be either a contractor or Government activity. The use of the term "contract" in this standard includes any document of agreement between organizations to include between a Government activity and another Government activity, between a Government activity and a contractor, or between a contractor and another contractor.

1.2.1 Tailoring of Task Descriptions. Individual tasks contained in this standard shall be selected and the selected task descriptions tailored to specific acquisition program characteristics and life cycle phase. Application guidance and rationale for selecting tasks and tailoring task descriptions to fit the needs of a particular program are included in Appendix A. This appendix is not contractual and does not establish requirements.

1.3 Method of Reference. This standard, the specific task description number(s), applicable task input to be specified by the requiring authority, and applicable task outputs shall be included or referenced in the Statement of Work (SOW).

1.4 Scope of Performance. The performing activity shall comply with the general requirements section and specific task requirements only to the degree specified in the contract.

1.5 Parts. MIL-STD-1388-1A is Part 1 of two parts.

2. REFERENCED DOCUMENTS

2.1 General. Unless otherwise specified, the following standards and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

Military Standards.

MIL-STD-1366	Materiel Transportation System Dimensional and Weight Constraints, Definition of.

MIL-STD-1388-2	Logistic Support Analysis Data Element Definitions.
MIL-STD-1629	Procedures for Performing a Failure Mode, Effects, and Criticality Analysis.

(Copies of specifications, standards, drawings, and publications required by contractors in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 General. Key terms used in this standard are defined in the Glossary, Appendix B.

4. GENERAL REQUIREMENTS

4.1 LSA Program. An effective LSA program shall be established and maintained as part of the ILS program. It shall be planned, integrated, developed, and conducted in conjunction with other design, development, production, and deployment functions to cost effectively achieve overall program objectives. The LSA program shall be established consistent with the type and phase of the acquisition program, and procedures shall be established to assure that the LSA program is an integral part of the system engineering process. Interfaces between the LSA program and other system engineering programs shall be identified. The LSA program shall include the management and technical resources, plans, procedures, schedules, and controls for the performance of LSA requirements.

4.1.1 Program Interfaces and Coordination. Maximum use shall be made of analyses and data resulting from requirements of other system engineering programs to satisfy LSA input requirements. Tasks and data required by this standard, which are also required by other standards and specifications, shall be coordinated and combined to the maximum extent possible. LSA data shall be based upon, and traceable to, other system engineering data and activities where applicable. Design and performance information shall be captured, disseminated, and formally controlled from the beginning of the design effort to serve as the design audit trail for logistic support resource planning, design tradeoff study inputs, and LSA documentation preparation.

4.1.2 LSA Process. A systematic and comprehensive analysis shall be conducted on an iterative basis through all phases of the system/equipment life cycle to satisfy supportability objectives. The level of detail of the analyses and the timing of task performance shall be tailored to each system/equipment and shall be responsive to program schedules and milestones. Figure 1 depicts the major LSA process objectives by program phase. Figures 2 and 3

provide an overview of the LSA process and a detailed flow chart of the LSA process. Task and subtask applicability guidance by program phase is provided in Appendix A, Table III.

4.2 Quantitative Requirements. Quantitative supportability and supportability related design requirements for the system/equipment shall be included in appropriate sections of the system or end item specifications, other requirements documents, or contracts, as appropriate. Subtier values not established by the requiring authority shall be established by the performing activity. Requirements shall be defined in terms related to operational readiness, demand for logistic support resources, and operating and support (O&S) costs, as applicable to the type of system/equipment.

4.3 Management, Surveillance, and Control. Management procedures shall be established to assure continuing assessment of analysis results and to allow for system/equipment design and LSA program adjustments as required. Feedback and corrective action procedures shall be established which include controls to assure that deficiencies are corrected and documented. Assessments, validations, and verifications shall be conducted throughout the system/equipment life cycle to demonstrate, within stated confidence levels, the validity of the analyses performed and the products developed from the analyses, and to adjust the analysis results and products as applicable.

4.4 LSA Documentation. LSA documentation shall consist of all data resulting from analysis tasks conducted under this standard and shall be the primary source of validated, integrated design related supportability data pertaining to an acquisition program. LSA documentation shall be developed and maintained commensurate with design, support, and operational concept development, and shall be updated to reflect changes or availability of better information based on testing, configuration changes, operational concept changes, and support concept changes during the acquisition process. Accumulated LSA documentation shall provide an audit trail of supportability and supportability related design analyses and decisions, and shall be the basis for actions and documents related to manpower and personnel requirements, training programs, provisioning, maintenance planning, resources allocation, funding decisions, and other logistic support resource requirements. Configuration control procedures shall be established over LSA documentation updates to assure proper coordination among other system engineering programs, the LSA program, and the development of ILS documents using LSA data. Deliverable documentation shall be as specified in applicable data item descriptions cited on the contract data requirements list (CDRL), DD Form 1423. When the requiring authority desires delivery of the task outputs, as described in paragraph 5 of this standard, for LSA tasks or subtasks cited in the SOW, then appropriate data item descriptions and delivery information must be included in the CDRL.

4.4.1 Logistic Support Analysis Record Format. The logistic support analysis record (LSAR) is a subset of LSA documentation and LSAR data elements shall conform to the requirements of MIL-STD-1388-2. Deliverable LSAR data shall be as specified in data item descriptions cited on the CDRL.

5. TASK DESCRIPTIONS

5.1 General. The LSA tasks are divided into five general sections: Section 100, Program Planning and Control; Section 200, Mission and Support Systems Definition; Section 300, Preparation and Evaluation of Alternatives; Section 400, Determination of Logistic Support Resource Requirements; and Section 500, Supportability Assessment. Table I identifies the general purpose of each section, the individual tasks contained in each section, and the general purpose of each task and subtask.

5.1.1 Task Structure. Each individual task is divided into four parts; purpose, task description, task input, and task output. The purpose provides the general reason for performing the task. The task description provides the detailed subtasks which comprise the overall task. It is not intended that all tasks and or subtasks be accomplished in the sequence presented. The sequence of tasks and subtask accomplishment should be tailored to the individual acquisition program. Where applicable, the subtasks are organized to correspond with relative timing of performance during the acquisition process. Consequently, for some tasks, all subtasks may not be required to be performed for a given contract period. In these cases, the SOW shall specify the applicable subtask requirements. (See Appendix A for guidance.) The task input identifies the general information required to define the scope of and perform each task. That input information which shall be specified by the requiring authority in the SOW is annotated by an asterisk (*). The task output identifies the expected results from performance of the task. When an element of the task input or task output is only applicable to certain subtasks, the applicable subtask numbers are identified in parentheses following the element. Where subtask numbers are not listed, that element is applicable to all subtasks listed under the task description.

TABLE I. Index of Logistic Support Analysis Tasks.

TASK SECTION	PURPOSE OF TASK SECTION	TASK/SUBTASK	INFLUENCE *		
			SYS/EQUIP DESIGN	SUPPT SYS DESIGN	LOG REQMTS DETER-MINATION
100 - PROGRAM PLANNING & CONTROL	TO PROVIDE FOR FORMAL PROGRAM PLANNING AND REVIEW ACTIONS	101 - DEVELOPMENT OF AN EARLY LOGISTIC SUPPORT ANALYSIS STRATEGY 101.2.1 - LSA STRATEGY 101.2.2 - UPDATES	PRIMARY PURPOSE OF 100 SERIES TASKS IS THE MANAGEMENT AND CONTROL OF THE LSA PROGRAM		
		102 - LOGISTIC SUPPORT ANALYSIS PLAN 102.2.1 - LSA PLAN 102.2.2 - UPDATES			
		103 - PROGRAM AND DESIGN REVIEWS 103.2.1 - ESTABLISH REVIEW PROCEDURES 103.2.2 - DESIGN REVIEWS 103.2.3 - PROGRAM REVIEWS 103.2.4 - LSA REVIEW			
200 - MISSION & SUPPORT SYSTEMS DEFINITION	TO ESTABLISH SUPPORTABILITY OBJECTIVES AND SUPPORTABILITY RELATED DESIGN GOALS, THRESHOLDS, AND CONSTRAINTS THROUGH COMPARISON WITH EXISTING SYSTEMS AND ANALYSES OF SUPPORTABILITY, COST, AND READINESS DRIVERS	201 - USE STUDY			
		201.2.1 - SUPPORTABILITY FACTORS	X	X	
		201.2.2 - QUANTITATIVE FACTORS	X	X	
		201.2.3 - FIELD VISITS	X	X	
		201.2.4 - USE STUDY REPORT AND UPDATES	X	X	
		202 - MISSION HARDWARE, SOFTWARE, AND SUPPORT SYSTEM STANDARDIZATION			
		202.2.1 - SUPPORTABILITY CONSTRAINTS	X	X	X
		202.2.2 - SUPPORTABILITY CHARACTERISTICS	X		
		202.2.3 - RECOMMENDED APPROACHES	X	X	
		202.2.4 - RISKS	X	X	X

* X INDICATES THAT THE SUBTASK IS ORIENTED TOWARD INFLUENCING THE INDICATED FACTOR(S).

TABLE I. Index of Logistic Support Analysis Tasks. - Continued

TASK SECTION	PURPOSE OF TASK SECTION	TASK/SUBTASK	INFLUENCE *		
			SYS/EQUIP DESIGN	SUPPT SYS DESIGN	LOG REQMTS DETER-MINATION
		203 - COMPARATIVE ANALYSIS			
		203.2.1 - IDENTIFY COMPARATIVE SYSTEMS	X	X	
		203.2.2 - BASELINE COMPARISION SYSTEM	X	X	
		203.2.3 - COMPARATIVE SYSTEM CHARACTERISTICS	X	X	
		203.2.4 - QUALITATIVE SUPPORTABILITY PROBLEMS	X	X	
		203.2.5 - SUPPORTABILITY, COST, AND READINESS DRIVERS	X	X	
		203.2.6 - UNIQUE SYSTEM DRIVERS	X	X	
		203.2.7 - UPDATES	X	X	
		203.2.8 - RISKS AND ASSUMPTIONS	X	X	
		204 - TECHNOLOGICAL OPPORTUNITIES			
		204.2.1 - RECOMMENDED DESIGN OBJECTIVES	X	X	
		204.2.2 - UPDATES	X	X	
		204.2.3 - RISKS	X	X	
		205 - SUPPORTABILITY AND SUPPORTABILITY RELATED DESIGN FACTORS			
		205.2.1 - SUPPORTABILITY CHARACTERISTICS		X	
		205.2.2 - SUPPORTABILITY OBJECTIVES & ASSOCIATED RISKS	X	X	
		205.2.3 - SPECIFICATION REQUIREMENTS	X	X	
		205.2.4 - NATO CONSTRAINTS	X	X	
		205.2.5 - SUPPORTABILITY GOALS AND THRESHOLDS	X	X	

TABLE I. Index of Logistic Support Analysis Tasks. - Continued

TASK SECTION	PURPOSE OF TASK SECTION	TASK/SUBTASK	INFLUENCE *		
			SYS/EQUIP DESIGN	SUPPT SYS DESIGN	LOG REQMTS DETER-MINATION
300 - PREPARATION AND EVALUATION OF ALTERNATIVES	TO OPTIMIZE THE SUPPORT SYSTEM FOR THE NEW ITEM AND TO DEVELOP A SYSTEM WHICH ACHIEVES THE BEST BALANCE BETWEEN COST, SCHEDULE, PERFORMANCE, AND SUPPORTABILITY	301 - FUNCTIONAL REQUIREMENTS IDENTIFICATION			
		301.2.1 FUNCTIONAL REQUIREMENTS		X	
		301.2.2 UNIQUE FUNCTIONAL REQUIREMENTS		X	
		301.2.3 RISKS		X	
		301.2.4 OPERATIONS AND MAINTENANCE TASKS		X	X
		301.2.5 DESIGN ALTERNATIVES	X		
		301.2.6 UPDATES		X	X
		302 - SUPPORT SYSTEM ALTERNATIVES			
		302.2.1 ALTERNATIVE SUPPORT CONCEPTS		X	
		302.2.2 SUPPORT CONCEPT UPDATES		X	
		302.2.3 ALTERNATIVE SUPPORT PLANS		X	
		302.2.4 SUPPORT PLAN UPDATES		X	
		302.2.5 RISKS		X	
		303 - EVALUATION OF ALTERNATIVES AND TRADEOFF ANALYSIS			
		303.2.1 TRADEOFF CRITERIA	X	X	X
		303.2.2 SUPPORT SYSTEM TRADEOFFS		X	
		303.2.3 SYSTEM TRADEOFFS	X	X	
		303.2.4 READINESS SENSITIVITIES	X	X	
		303.2.5 MANPOWER AND PERSONNEL TRADEOFFS	X	X	X
		303.2.6 TRAINING TRADEOFFS	X	X	X
		303.2.7 REPAIR LEVEL ANALYSES		X	X
		303.2.8 DIAGNOSTIC TRADEOFFS	X	X	
		303.2.9 COMPARATIVE EVALUATIONS		X	
		303.2.10 ENERGY TRADEOFFS	X	X	X
		303.2.11 SURVIVABILITY TRADEOFFS	X	X	
		303.2.12 TRANSPORTABILITY TRADEOFFS	X	X	

TABLE I. Index of Logistic Support Analysis Tasks. - Continued

TASK SECTION	PURPOSE OF TASK SECTION	TASK/SUBTASK	INFLUENCE *		
			SYS/EQUIP DESIGN	SUPPT SYS DESIGN	LOG REQMTS DETER-MINATION
400 - DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS	TO IDENTIFY THE LOGISTIC SUPPORT RESOURCE REQUIREMENTS OF THE NEW SYSTEM IN ITS OPERATIONAL ENVIRONMENT(S) AND TO DEVELOP PLANS FOR POST PRODUCTION SUPPORT	401 - TASK ANALYSIS			
		401.2.1 TASK ANALYSIS			X
		401.2.2 ANALYSIS DOCUMENTATION			X
		401.2.3 NEW/CRITICAL SUPPORT RESOURCES			X
		401.2.4 TRAINING REQUIREMENTS AND RECOMMENDATIONS			X
		401.2.5 DESIGN IMPROVEMENTS	X	X	
		401.2.6 MANAGEMENT PLANS			X
		401.2.7 TRANSPORTABILITY ANALYSIS	X	X	
		401.2.8 PROVISIONING REQUIREMENTS			X
		401.2.9 VALIDATION	X	X	X
		401.2.10 ILS OUTPUT PRODUCTS			X
		401.2.11 LSAR UPDATES	X	X	X
		402 - EARLY FIELDING ANALYSIS			
		402.2.1 NEW SYSTEM IMPACT			X
		402.2.2 SOURCES OF MANPOWER AND PERSONNEL SKILLS			X
		402.2.3 IMPACT OF RESOURCE SHORTFALLS			X
		402.2.4 COMBAT RESOURCE REQUIREMENTS			X
		402.2.5 PLANS FOR PROBLEM RESOLUTION			X
		403 - POST PRODUCTION SUPPORT ANALYSIS			
		403.2 POST PRODUCTION SUPPORT PLAN		X	X
500 - SUPPORTABILITY ASSESSMENT	TO ASSURE THAT SPECIFIED REQUIREMENTS ARE ACHIEVED AND DEFICIENCIES CORRECTED	501 - SUPPORTABILITY TEST, EVALUATION, AND VERIFICATION			
		501.2.1 TEST AND EVALUATION STRATEGY	X	X	X
		501.2.2 OBJECTIVES AND CRITERIA	X	X	X
		501.2.3 UPDATES AND CORRECTIVE ACTIONS	X	X	X
		501.2.4 SUPPORTABILITY ASSESSMENT PLAN (POST DEPLOYMENT)	X	X	X
		501.2.5 SUPPORTABILITY ASSESSMENT (POST DEPLOYMENT)	X	X	X

TASK SECTION 100

PROGRAM PLANNING AND CONTROL

TASK 101

DEVELOPMENT OF AN EARLY LOGISTIC SUPPORT ANALYSIS STRATEGY

101.1 PURPOSE. To develop a proposed LSA program strategy for use early in an acquisition program, and to identify the LSA tasks and subtasks which provide the best return on investment.

101.2 TASK DESCRIPTION.

101.2.1 Prepare potential supportability objectives for the new system/equipment and identify proposed LSA tasks and subtasks to be performed early in the acquisition program. Estimate the cost to perform each subtask and identify proposed organizations to perform each task and subtask. The proposed supportability objectives and analysis tasks and subtasks shall be based on the following factors:

a. The probable design, maintenance concept, and operational approaches for the new system/equipment and gross estimates of the reliability and maintainability (R&M), O&S costs, logistic support resources, and readiness characteristics of each design and operational approach.

b. The availability, accuracy, and relevance of readiness, O&S cost, and logistic support resource data required to perform the proposed LSA tasks and subtasks.

c. The potential design impact of performing the LSA tasks and subtasks.

d. The cost effectiveness of each task and subtask given projected cost and schedule constraints.

101.2.2 Update the LSA strategy as required based on analysis results, program schedule modifications, and program decisions.

101.3 TASK INPUT

101.3.1 Expected mission and functional requirements for the new system/equipment.*

101.3.2 Expected program funding and schedule constraints and other known key resource constraints that would impact support of the system/equipment such as projected deficits in numbers or skills of available personnel, limited priorities on strategic materiel, etc.*

101.3.3 Data bases available from the requiring authority for use in LSA tasks.*

101.3.4 Delivery identification of any data item required.*

101.3.5 Previously conducted DOD or Service mission area and system/equipment analyses which are pertinent to the new system/equipment.*

101.4 TASK OUTPUT.

101.4.1 An LSA strategy outlining proposed supportability objectives for the new system/equipment and proposed LSA tasks and subtasks to be performed early in the acquisition program which provide the best return on investment. (101.2.1)

101.4.2 LSA strategy updates as applicable. (101.2.2)

TASK 102

LOGISTIC SUPPORT ANALYSIS PLAN

102.1 PURPOSE. To develop a Logistic Support Analysis Plan (LSAP) which identifies and integrates all LSA tasks, identifies management responsibilities and activities, and outlines the approach toward accomplishing analysis tasks.

102.2 TASK DESCRIPTION

102.2.1 Prepare an LSAP which describes how the LSA program will be conducted to meet program requirements. The LSAP may be included as part of the Integrated Support Plan (ISP) when an ISP is required. The LSAP shall include the following elements of information, with the range and depth of information for each element tailored to the acquisition phase:

a. A description of how the LSA program will be conducted to meet program requirements.

b. A description of the management structure and authorities applicable to LSA. This includes the interrelationship between line, service, staff, and policy organizations.

c. Identification of each LSA task that will be accomplished and how each will be performed. Identification of the major tradeoffs to be performed under Subtask 303.2.3, when applicable.

d. A schedule with estimated start and completion points for each LSA program activity or task. Schedule relationships with other ILS program requirements and associated system engineering activities shall be identified.

e. A description of how LSA tasks and data will interface with other ILS and system oriented tasks and data. This description will include analysis and data interfaces with the following programs, as applicable:

(1) System/Equipment Design Program.

(2) System/Equipment Reliability Program.

(3) System/Equipment Maintainabiltiy Program.

(4) Human Engineering Program.

(5) Standardization Program.

(6) Parts Control Program.

(7) System Safety Program.

(8) Packaging, Handling, Storage, and Transportability Program.

(9) Initial Provisioning Program.

(10) System/Equipment Testability Program.

(11) Survivability Program.

(12) Technical Publications Program.

(13) Training and Training Equipment Program.

(14) Facilities Program.

(15) Support Equipment Program.

(16) Test and Evaluation Program.

f. Work Breakdown Structure (WBS) identification of items upon which LSA will be performed and documented.

g. Explanation of the LSA control numbering system to be used.

h. The method by which supportability and supportability related design requirements are disseminated to designers and associated personnel.

i. The method by which supportability and supportability related design requirements are disseminated to subcontactors and the controls levied under such circumstances.

j. Government data to be furnished to the contractor.

k. Procedures for updating and validating of LSA data to include configuration control procedures for LSA data.

l. LSA requirements on Government furnished equipment/materiel (GFE/GFM) and subcontractor/vendor furnished materiel including end items of support equipment.

m. The procedures (wherever existing procedures are applicable) to evaluate the status and control of each task, and identification of the organizational unit with the authority and responsibility for executing each task.

n. The procedures, methods, and controls for identifying and recording design problems or deficiencies affecting supportability, corrective actions required, and the status of actions taken to resolve the problems.

o. Description of the data collection system to be used by the performing activity to document, disseminate, and control LSA and related design data.

102.2.2 Update the LSAP as required, subject to requiring authority approval, based on analysis results, program schedule modifications, and program decisions.

102.3 TASK INPUT

102.3.1 Identification of each LSA task required under this standard and any additional tasks to be performed as part of the LSA program.*

102.3.2 Identification of the contractual status of the LSAP and approval procedures for updates.*

102.3.3 Identification of any specific indoctrination or LSA training to be provided.*

102.3.4 Duration of the LSAP to be developed.*

102.3.5 Delivery identification of any data item required.*

102.3.6 System/equipment requirements and development schedule.*

102.3.7 Task and subtask requirements specified in the LSA strategy from Task 101.

102.4 TASK OUTPUT.

102.4.1 Logistic Support Analysis Plan. (102.2.1)

102.4.2 Logistic Support Analysis Plan updates as applicable. (102.2.2)

TASK 103

PROGRAM AND DESIGN REVIEWS

103.1 PURPOSE. To establish a requirement for the performing activity to plan and provide for official review and control of released design information with LSA program participation in a timely and controlled manner, and to assure that the LSA program is proceeding in accordance with the contractual milestones so that the supportability and supportability related design requirements will be achieved.

103.2 TASK DESCRIPTION

103.2.1 Establish and document design review procedures (where procedures do not already exist) which provide for official review and control of released design information with LSA program participation in a timely and controlled manner. These procedures shall define accept/reject criteria pertaining to supportability requirements, the method of documenting reviews, the types of design documentation subject to review, and the degree of authority of each reviewing activity.

103.2.2 Formal review and assessment of supportability and supportability related design contract requirements shall be an integral part of each system/equipment design review (e.g., system design review (SDR), preliminary design review (PDR), critical design review (CDR), etc.) specified by the contract. The performing activity shall schedule reviews with subcontractors and suppliers, as appropriate, and inform the requiring authority in advance of each review. Results of each system/equipment design review shall be documented. Design reviews shall identify and discuss all pertinent aspects of the LSA program. Agendas shall be developed and coordinated to address at least the following topics as they apply to the program phase activity and the review being conducted.

a. LSA conducted by task and WBS element.

b. Supportability assessment of proposed design features including supportability, cost, and readiness drivers and new or critical logistic support resource requirements.

c. Corrective actions considered, proposed, or taken, such as:

(1) Support alternatives under consideration.

(2) System/equipment alternatives under consideration.

(3) Evaluation and tradeoff analysis results.

(4) Comparative analysis with existing systems/equipment.

(5) Design or redesign actions proposed or taken.

d. Review of supportability and supportability related design requirements (with review of specifications as developed).

e. Progress toward establishing or achieving supportability goals.

f. LSA documentation required, completed, and scheduled.

g. Design, schedule, or analysis problems affecting supportability.

h. Status of previous action items and actions required.

i. Other topics and issues as appropriate.

103.2.3 Formal review and assessment of supportability and supportability related design contract requirements shall be an integral part of each system/equipment program review specified by the contract. The performing activity shall schedule program reviews with subcontractors and suppliers, as appropriate, and inform the requiring authority in advance of each review. Results of each system/equipment program review shall be documented. Program reviews shall identify and discuss all pertinent aspects of the LSA program. Agendas shall be developed and coordinated to address at least the topics listed under 103.2.2 as they apply to the program phase activity and the review being conducted.

103.2.4 The LSA program shall be planned and scheduled to permit the performing activity and the requiring authority to review program status. The status of the LSA program shall be assessed at LSA reviews specified by the contract. The performing activity shall schedule LSA reviews with subcontractors and suppliers, as appropriate, and inform the requiring authority in advance of each review. Results of each LSA review shall be documented. LSA reviews shall identify and discuss all pertinent aspects of the LSA program to a more detailed level than that covered at design and program reviews. Agendas shall be developed and coordinated to address at least the topics listed under 103.2.2 as they apply to the program phase activity and the review being conducted.

103.3 TASK INPUT

103.3.1 Identification and location of design, program, and LSA reviews required.*

103.3.2 Advance notification requirements to the requiring authority of all scheduled reviews.*

103.3.3 Recording procedures for the results of the reviews.*

103.3.4 Identification of requiring authority and performing activity follow-up methods on review of open items.*

103.3.5 Delivery identification of any data item required.*

103.4 TASK OUTPUT

103.4.1 Design review procedures which provide for official review and control of released design information with LSA program participation in a timely and controlled manner. (103.2.1)

103.4.2 Agendas for and documented results of each system/equipment design review. (103.2.2)

103.4.3 Agendas for and documented results of each system/equipment program review. (103.2.3)

103.4.4 Agendas for and documented results of each LSA review. (103.2.4)

TASK SECTION 200

MISSION AND SUPPORT SYSTEMS DEFINITION

TASK 201

USE STUDY

201.1 PURPOSE. To identify and document the pertinent supportabiltiy factors related to the intended use of the new system/equipment.

201.2 TASK DESCRIPTION

201.2.1 Identify and document the pertinent supportability factors related to the intended use of the new system/equipment. Factors to be considered include mobility requirements, deployment scenarios, mission frequency and duration, basing concepts, anticipated service life, interactions with other systems/end items, operational environment, and human capabilities and limitations. Both peacetime and wartime employment shall be considered in identifying the supportability factors. Previously conducted mission area and weapon system analyses which quantified relationships between hardware, mission, and supportability parameters and which are pertinent to the new system/equipment shall be identified and documented.

201.2.2 Document quantitative data resulting from 201.2.1 which must be considered in developing support alternatives and conducting support analyses. This data would include but not be limited to the following:

a. Operating requirements, consisting of the number of missions per unit of time, mission duration, and number of operating days, miles, hours, firings, flights, or cycles per unit of time.

b. Number of systems supported.

c. Transportation factors (e.g., mode, type, quantity to be transported, destinations, transport time and schedule).

d. Allowable maintenance periods.

e. Environmental requirements.

201.2.3 Conduct field visits to operational units and support activities which most closely represent the planned operational and support environment for the new system/equipment.

201.2.4 Prepare a use study report documenting the information developed during performance of 201.2.1, 201.2.2, and 201.2.3. Update the use study report as more detailed information on the intended use of the new system/equipment becomes available.

201.3 TASK INPUT

201.3.1 Intended mission and use information on the new system/equipment including locations, type of units, depot locations, etc.*

201.3.2 Locations for field visits when required.* (201.2.3)

201.3.3 Delivery identification of any data item required.*

201.3.4 Source documentation available related to the intended use of the new system.

201.3.5 Previously conducted mission area and weapon system analyses which quantified relationships between hardware, mission, and supportability parameters and which are pertinent to the new system/equipment.

201.4 TASK OUTPUT

201.4.1 Pertinent supportability factors related to the intended use of the new system. (201.2.1)

201.4.2 Quantitative data resulting from 201.2.1 which must be considered in conducting support analyses and developing support alternatives. (201.2.2)

201.4.3 Field visit reports. (201.2.3)

201.4.4 Use study report and updates to the report as better information becomes available. (201.2.4)

TASK 202

MISSION HARDWARE, SOFTWARE, AND SUPPORT SYSTEM STANDARDIZATION

202.1 PURPOSE. To define supportability and supportability related design constraints for the new system/equipment based on existing and planned logistic support resources which have benefits due to cost, manpower, personnel, readiness, or support policy considerations, and to provide supportability input into mission hardware and software standardization efforts.

202.2 TASK DESCRIPTION

202.2.1 Identify existing and planned logistic support resources which have potential benefits for use on each system/equipment concept under consideration. All elements of ILS shall be considered. Define in quantitative terms supportability and supportability related design constraints for those items which should become program constraints due to cost, manpower, personnel, readiness, or support policy considerations and benefits.

202.2.2 Provide supportability, cost, and readiness related information into mission hardware and software standardization efforts. This input shall be provided to a level commensurate with the level of mission hardware and software standardization being pursued.

202.2.3 Identify recommended mission hardware and software standardization approaches which have utility due to cost, readiness, or supportability considerations and participate in the system/equipment standardization effort. This task shall be performed to a level of indenture commensurate with the design development.

202.2.4 Identify any risks associated with each constraint established. For example, known or projected scarcities, and developmental logistic support resources would represent possible risk areas when establishing standardization constraints.

202.3 TASK INPUT

202.3.1 Mandatory supportability and supportability related design constraints for the new system/equipment due to standardization requirements. These would include any standardization and interoperability (S&I) constraints.*

202.3.2 Information available from the requiring authority relative to existing and planned logistic support resources.*

202.3.3 Mandatory mission hardware and software standardization requirements.*

202.3.4 Delivery identification of any data item required.*

202.3.5 Alternative system concepts under consideration.

202.3.6 Use study results from Task 201.

202.4 TASK OUTPUT

202.4.1 Quantitative supportability and supportability related design constraints for the new system/equipment based upon support standardization considerations. (202.2.1)

202.4.2 Supportability, cost, and readiness characteristics of mission hardware and software standardization approaches under consideration. (202.2.2)

202.4.3 Recommended mission hardware and software standardization approaches which have utility due to cost, readiness, or supportability considerations. (202.2.3)

202.4.4 Documented risks associated with each constraint established. (202.2.4)

TASK 203

COMPARATIVE ANALYSIS

203.1 PURPOSE. To select or develop a Baseline Comparison System (BCS) representing characteristics of the new system/equipment for (1) projecting supportability related parameters, making judgments concerning the feasibility of the new system/equipment supportability parameters, and identifying targets for improvement, and (2) determining the supportability, cost, and readiness drivers of the new system/equipment.

203.2 TASK DESCRIPTION

203.2.1 Identify existing systems and subsystems (hardware, operational, and support) useful for comparative purposes with new system/equipment alternatives. Different existing systems shall be identified when new system/equipment alternatives vary significantly in design, operation, or support concepts, or where different existing systems are required to adequately compare all parameters of interest.

203.2.2 Select or develop a BCS for use in comparative analyses and identifying supportability, cost, and readiness drivers of each significantly different new system/equipment alternative. A BCS may be developed using a composite of elements from different existing systems when a composite most closely represents the design, operation, and support characteristics of a new system/equipment alternative. Different BCS's or composites may be useful for comparing different parameters of interest. Previously developed BCS's shall be assessed to determine the extent to which they can fill the need for the new system/equipment.

203.2.3 Determine the O&S costs, logistic support resource requirements, reliability and maintainability (R&M) values, and readiness values of the comparative systems identified. Identify these values at the system and subsystem level for each BCS established. Values shall be adjusted to account for differences between the comparative system's use profile and the new system/equipment's use profile where appropriate.

203.2.4 Identify qualitative supportability problems on comparative systems which should be prevented on the new system/equipment.

203.2.5 Determine the supportability, cost, and readiness drivers of each comparative system or BCS. These drivers may come from the design, operating, or support characteristics of the comparative systems and represent drivers for the new system/equipment. For example, repair cycle time may be the prime readiness driver, a particular hardware subsystem may be the prime manpower driver, or energy cost may be the prime cost driver.

203.2.6 Identify and document any supportability, cost, or readiness drivers for the new system/equipment resulting from subsystems or equipment in the new system for which there are no comparable subsystems or equipment in comparative systems.

203.2.7 Update the comparative systems, their associated parameters, and the supportability, cost, and readiness drivers as the new system/equipment alternatives become better defined or as better data is obtained on the comparative systems and subsystems.

203.2.8 Identify and document any risks and assumptions associated with the comparative systems, and their associated parameters and drivers, such as a low degree of similarity between the new system/equipment and existing systems or the lack of accurate data on existing systems.

203.3 TASK INPUT

203.3.1 Information available from the requiring authority relative to current operational systems.*

203.3.2 Delivery identification of any data item required.*

203.3.3 Level of detail required for comparative system descriptions.* (203.2.1, 203.2.2)

203.3.4 Description of new system alternatives under consideration.

203.3.5 Use study results from Task 201.

203.3.6 Previously developed BCS's which are relevant to the new system/equipment.

203.4 TASK OUTPUT

203.4.1 Identification of existing systems and subsystems useful for comparative analysis with new system/equipment alternatives. (203.2.1, 203.2.2)

203.4.2 O&S costs, logistic support resource requirements, R&M, and readiness values of the comparative systems and subsystems. (203.2.3)

203.4.3 Identification of qualitative supportability problems on comparative systems which should be prevented on the new system/equipment. (203.2.4)

203.4.4 Supportability, cost, and readiness drivers of the new system/equipment based on comparative systems/equipment. (203.2.5)

203.4.5 Supportability, cost, and readiness drivers for the new system/equipment resulting from subsystems or equipment in the new

system for which there are no comparable subsystems or equipment in comparative systems. (203.2.6)

203.4.6 Updates to comparative system descriptions and their associated parameters. (203.2.7)

203.4.7 Risks and assumptions associated with the use of the comparative systems and subsystems and the parameters established for them. (203.2.8)

TASK 204

TECHNOLOGICAL OPPORTUNITIES

204.1 PURPOSE. To identify and evaluate design opportunities for improvement of supportability characteristics and requirements in the new system/equipment.

204.2 TASK DESCRIPTION

204.2.1 Establish design technology approaches to achieve supportability improvements on the new system/equipment over existing systems and subsystems. These design approaches shall be established through the following:

a. Identifying technological advancements and other design improvements which can be exploited in the new system/equipment's development and which have the potential for reducing logistic support resource requirements, reducing costs, or enhancing system readiness.

b. Estimating the resultant improvements that would be achieved in the supportability, cost, and readiness values.

c. Identifying design improvements to logistic elements (such as support equipment and training devices) that can be applied during the new system/equipment's development to increase the effectiveness of the support system or enhance readiness.

204.2.2 Update the design objectives as new system/equipment alternatives become better defined.

204.2.3 Identify any risks associated with the design objectives established, any development and evaluation approaches needed to verify the improvement potential, and any cost or schedule impacts to implement the potential improvements.

204.3 TASK INPUT

204.3.1 Delivery identification of any data item required.*

204.3.2 Information available from the requiring authority relative to technology evaluations and improvements.*

204.3.3 Current reliability, maintainability, and support system design approaches for state-of-the-art systems and equipment.

204.3.4 Supportability, cost, and readiness values and drivers for comparative systems from Task 203.

204.3.5 Qualitative supportability problems on existing systems/equipment from Task 203.

204.4 TASK OUTPUT

204.4.1 Recommended design specifications to achieve improvements on the new system/equipment. (204.2.1)

204.4.2 Updates to the design ojectives established as new system/equipment alternatives become better defined. (204.2.2)

204.4.3 Any additional funding requirements, risks associated with the design objectives established, any development and evaluation approaches needed to verify the improvement potential, and any cost or schedule impacts to implement potential improvements. (204.2.3)

TASK 205

SUPPORTABILITY AND SUPPORTABILITY RELATED DESIGN FACTORS

205.1 PURPOSE. To establish (1) quantitative supportability characteristics resulting from alternative design and operational concepts, and (2) supportability and supportability related design objectives, goals and thresholds, and constraints for the new system/equipment for inclusion in program approval documents, system/equipment specifications, other requirements documents, or contracts as appropriate.

205.2 TASK DESCRIPTION

205.2.1 Identify the quantitative supportability characteristics resulting from alternative design and operational concepts for the new system/equipment. Supportability characteristics shall be expressed in terms of feasible support concepts, R&M parameters, system readiness, O&S cost, and logistic support resource requirements. Both peacetime and wartime conditions shall be included. Conduct sensitivity analyses on the variables associated with the supportability, cost, and readiness drivers for the new system/equipment. Identify any hardware or software for which the Government will not or may not have full design rights due to constraints imposed by regulations or laws limiting the information the contractor must furnish because of proprietary or other source control considerations. Include alternatives and cost, schedule, and function impacts.

205.2.2 Establish supportability, cost, and readiness objectives for the new system. Identify the risks and uncertainties involved in achieving the objectives established. Identify any supportability risks associated with new technology planned for the new system/equipment.

205.2.3 Establish supportability and supportability related design constraints for the new system/equipment for inclusion in specifications, other requirements documents, or contracts as appropriate. These constraints shall include both quantitative and qualitative constraints. Document the quantitative constraints in the LSAR or equivalent format approved by the requiring authority.

205.2.4 Identify any constraints that preclude adoption of a NATO system/equipment to satisfy the mission need.

205.2.5 Update the supportability, cost, and readiness objectives and establish supportability, cost, and readiness goals and thresholds as new system/equipment alternatives become better defined.

205.3 TASK INPUT

205.3.1 Applicable program documentation.*

205.3.2 Delivery identification of any data item required.*

205.3.3 Identification of supportability and supportability related design factors associated with GFE/GFM.*

205.3.4 Description of new system/equipment alternatives under consideration including new technology planned for the new system/equipment.

205.3.5 Supportability, cost, and readiness values and drivers for comparative systems from Task 203.

205.3.6 Technological opportunities for the new system/equipment from Task 204.

205.3.7 Supportability and supportability related design constraints for the new system/equipment based upon support system, mission hardware, or mission software standardization considerations from Task 202.

205.4 TASK OUTPUT

205.4.1 Supportability characteristics resulting from alternative system/equipment design and operational concepts including efforts to eliminate design rights limitations. (205.2.1)

205.4.2 Supportability, cost, and readiness objectives for the new system/equipment and associated risks. Supportability risks associated with new technology planned for the new system/equipment. (205.2.2)

205.4.3 Qualitative and quantitative supportability and supportability related design constraints for the new system. LSAR data documenting the quantitative supportability and supportability related design constraints. (205.2.3)

205.4.4 Identification of any constraints that preclude adoption of a NATO system/equipment to satisfy the mission need. (205.2.4)

205.4.5 Updated supportability, cost, and readiness objectives. Supportability, cost, and readiness goals and thresholds for the new system/equipment. (205.2.5)

TASK SECTION 300

PREPARATION AND EVALUATION OF ALTERNATIVES

TASK 301

FUNCTIONAL REQUIREMENTS IDENTIFICATION

301.1 PURPOSE. To identify the operations and support functions that must be performed for each system/equipment alternative under consideration and then identify the tasks that must be performed in order to operate and maintain the new system/equipment in its intended environment.

301.2 TASK DESCRIPTION

301.2.1 Identify and document the functions that must be performed for the new system/equipment to be operated and maintained in its intended operational environment for each alternative under consideration. These functions shall be identified to a level commensurate with design and operational scenario development, and shall include both peacetime and wartime functions.

301.2.2 Identify those functional requirements which are unique to the new system/equipment due to new design technology or operational concepts, or which are supportability, cost, or readiness drivers.

301.2.3 Identify any risks involved in satisfying the functional requirements of the new system/equipment.

301.2.4 Identify the operations and maintenance tasks for the new system/equipment based on the identified functional requirements. Tasks shall be identified to a level commensurate with design and operational scenario development and shall cover all functions which require logistic support resources. Preventive maintenance, corrective maintenance, and operations and other support tasks such as preparation for operation, operation, post operation, calibration, and transportation shall be identified by the following methods:

301.2.4.1 The results of the failure modes, effects, and criticality analysis (FMECA), or equivalent analysis, shall be analyzed to identify and document corrective maintenance task requirements. The FMECA, or equivalent, shall be documented on system/equipment hardware and software and to the indenture level consistent with the design progression and as specified by the requiring authority. The LSAR, or equivalent format approved by the requiring authority, shall be used for the FMECA documentation.

301.2.4.2 Preventive maintenance task requirements shall be identified by conducting a reliability centered maintenance (RCM) analysis in accordance with the detailed guidelines provided by the requiring authority. The RCM analysis shall be based on the FMECA data and documented in the LSAR or equivalent format approved by the requiring authority.

301.2.4.3 Operations and other support tasks not identified by the FMECA or RCM analysis shall be identified through analysis of the functional requirements and intended operation of the new system/equipment. The LSAR or equivalent format approved by the requiring authority shall be used to document these tasks.

301.2.5 Participate in formulating design alternatives to correct design deficiencies uncovered during the identification of functional requirements or operations and maintenance task requirements. Design alternatives which reduce or simplify functions requiring logistic support resources shall be analyzed.

301.2.6 Update the functional requirements and operations and maintenance task requirements as the new system/equipment becomes better defined and better data becomes available.

301.3 TASK INPUT

301.3.1 Delivery identification of any data item required.*

301.3.2 Detailed RCM procedures and logic to be used in conducting the RCM analysis.* (301.2.4)

301.3.3 Identification of system/equipment hardware and software on which this task will be performed and the indenture levels to which this analysis will be carried.*

301.3.4 Identification of the levels of maintenance which will be analyzed during performance of this task to identify functions and tasks.*

301.3.5 Any documentation requirements over and above LSAR data such as functional flow diagrams or design recommendation data resulting from the task identification process.* (301.2.4, 301.2.5)

301.3.6 Requirement for a FMECA in accordance with MIL-STD-1629.* (301.2.4, 301.2.6)

301.3.7 Description of system/equipment concepts under consideration.

301.3.8 Supportability, cost, and readiness drivers from Task 203. (301.2.2)

301.3.9 FMECA results. (301.2.4, 301.2.6)

301.3.10 Use study results from Task 201.

301.4 TASK OUTPUT

301.4.1 Documented functional requirements for new system/equipment alternatives in both peacetime and wartime environments. (301.2.1)

301.4.2 Identification of those functional requirements which are unique to the new system/equipment or which are supportability, cost, or readiness drivers. (301.2.2)

301.4.3 Identification of any risks involved in satisfying the functional requirements of the new system/equipment. (301.2.3)

301.4.4 Completed LSAR data, or equivalent format approved by the requiring authority, identifying operations and maintenance task requirements on system hardware and software and to the indenture levels specified by the requiring authority. (301.2.4)

301.4.5 Identification of design deficiencies requiring redesign as a result of the functional requirements and operations and maintenance task identification process. (301.2.5)

301.4.6 Updates to the identified functional requirements and operations and maintenance task requirements as the new system/equipment becomes better defined and better data becomes available. (301.2.6)

TASK 302

SUPPORT SYSTEM ALTERNATIVES

302.1 PURPOSE. To establish viable support system alternatives for the new system/equipment for evaluation, tradeoff analysis, and determination of the best system for development.

302.2 TASK DESCRIPTION

302.2.1 Develop and document viable alternative system level support concepts for the new system/equipment alternatives which satisfy the functional requirements of the new system/equipment within the established supportability and supportability related design constraints. Each alternative support concept shall be developed to a level of detail commensurate with the hardware, software, and operational concept development, and shall address all elements of ILS. The same support concept may be applicable to multiple new system/equipment design and operational alternatives. Support concept alternatives shall be prepared to equivalent levels of detail to the degree possible for use in the evaluation and tradeoff of the alternatives. The range of support alternatives considered shall not be restricted to existing standard support concepts but shall include identification of innovative concepts which could improve system readiness, optimize manpower and personnel requirements, or reduce O&S costs. Contractor logistic support (total, in part, or on an interim basis) shall be considered in formulating alternative support concepts.

302.2.2 Update the alternative support concepts as system tradeoffs are conducted and new system/equipment alternatives become better defined. Alternative support concepts shall be documented at the system and subsystem level, and shall address the supportability, cost, and readiness drivers and the unique functional requirements of the new system/equipment.

302.2.3 Develop and document viable alternative support plans for the new system/equipment to a level of detail commensurate with the hardware, software, and operational scenario development.

302.2.4 Update and refine the alternative support plans as tradeoffs are conducted and the new system/equipment's design and operational scenario become better defined.

302.2.5 Identify risks associated with each support system alternative formulated.

302.3 TASK INPUT

302.3.1 Delivery identification of any data item required.*

302.3.2 Functional requirements for system/equipment alternatives under consideration from Task 301.

302.3.3 Supportability and supportability related design constraints for the new system/equipment from Task 205.

302.3.4 *Description of new system/equipment alternatives under consideration.*

302.4 TASK OUTPUT

302.4.1 Alternative system level support concepts for new system/equipment alternatives. (302.2.1)

302.4.2 Updated alternative support concepts as system tradeoffs are conducted and new system/equipment alternatives become better defined. (302.2.2)

302.4.3 Alternative support plans for the new system/equipment commensurate with the hardware, software, and operational scenario development. (302.2.3)

302.4.4 Updated alternative support plans as tradeoffs are conducted and the new system/equipment becomes better defined. (302.2.4)

302.4.5 Risks associated with each support system alternative formulated. (302.2.5)

TASK 303

EVALUATION OF ALTERNATIVES AND TRADEOFF ANALYSIS

303.1 PURPOSE. To determine the preferred support system alternative(s) for each system/equipment alternative and to participate in alternative system tradeoffs to determine the best approach (support, design, and operation) which satisfies the need with the best balance between cost, schedule, performance, readiness, and supportability.

303.2 TASK DESCRIPTION

303.2.1 For each evaluation and tradeoff to be conducted under this task:

a. Identify the qualitative and quantitative criteria which will be used to determine the best results. These criteria shall be related to the supportability, cost, and readiness requirements for the system/equipment.

b. Select or construct analytical relationships or models between supportability, design, and operational parameters and those parameters identified for the evaluation criteria. In many cases, the same model or relationship may be appropriate to perform a number of evalutions and tradeoffs. Parametric and cost estimating relationships (PER/CER) may be appropriate for use in formulating analytical relationships.

c. Conduct the tradeoff or evaluation using the established relationships and models and select the best alternative(s) based upon the established criteria.

d. Conduct appropriate sensitivity analyses on those variables which have a high degree of risk involved or which drive supportability, cost, or readiness for the new system.

e. Document the evaluation and tradeoff results including any risks and assumptions involved.

f. Update the evaluations and tradeoffs as the system/equipment becomes better defined and more accurate data becomes available.

g. Include both peacetime and wartime considerations in the analyses.

h. Assess the impact on existing or planned weapon, supply, maintenance, and transportation systems based on the tradeoff decision.

i. Assess life cycle support considerations to include post production support.

303.2.2 Conduct evaluations and tradeoffs between the support system alternatives identified for each system/equipment alternative (Task 302). For the selected support system alternative(s), identify and document any new or critical logistic support resource requirements. Any restructured personnel job classification shall be identified as a new resource.

303.2.3 Conduct evaluations and tradeoffs between design, operations, and support concepts under consideration.

303.2.4 Evaluate the sensitivity of system readiness parameters to variations in key design and support parameters such as R&M, spares budgets, resupply time, and manpower and personnel skill availability.

303.2.5 Estimate and evaluate the manpower and personnel implications of alternative system/equipment concepts in terms of total numbers of personnel required, job classifications, skill levels, and experience required. This analysis shall include organizational overhead requirements, error rates, and training requirements.

303.2.6 Conduct evaluations and tradeoffs between design, operations, training, and personnel job design to determine the optimum solution for attaining and maintaining the required proficiency of operating and support personnel. Training evaluations and trades shall be conducted and shall consider shifting of job duties between job classifications, alternative technical publications concepts, and alternative mixes of formal training, on-the-job training, unit training, and use of training simulators.

303.2.7 Conduct repair level analyses (RLA) commensurate with the level of design, operation, and support data available.

303.2.8 Evaluate alternative diagnostic concepts to include varying degrees of built-in-test (BIT), off-line-test, manual testing, automatic testing, diagnostic connecting points for testing, and identify the optimum diagnostic concept for each system/equipment alternative under consideration.

303.2.9 Conduct comparative evaluations between the supportability, cost, and readiness parameters of the new system/equipment and existing comparative systems/equipment. Assess the risks involved in achieving the supportability, cost, and readiness objectives for the new system/equipment based upon the degree of growth over existing systems/equipment.

303.2.10 Conduct evaluations and tradeoffs between system/equipment alternatives and energy requirements. Identify the petroleum, oil, and lubricant (POL) requirements for each system/equipment alternative under consideration and conduct sensitivity analyses on POL costs.

303.2.11 Conduct evaluations and tradeoffs between system/equipment alternatives and survivability and battle damage repair characteristics in a combat environment.

303.2.12 Conduct evaluations and tradeoffs between system/equipment alternatives and transportability requirements. Identify the transportability requirements for each alternative under consideration and the limiting constraints, characteristics, and environments on each of the modes of transportation.

303.3 TASK INPUT

303.3.1 Delivery identification of any data item required.*

303.3.2 Method of review and approval of identified evaluations and tradeoffs to be performed, evaluation criteria, analytical relationships and models to be used, analysis results, and the sensitivity analyses to be performed.*

303.3.3 Specific evaluations, tradeoffs, or sensitivity analyses to be performed, if applicable.*

303.3.4 Specific analytical relationships or models to be used, if applicable*

303.3.5 Any limits (numbers or skills) to operator or support personnel for the new system/equipment.*

303.3.6 Manpower and personnel costs for use in appropriate tradeoffs and evaluations which include costs related to recruitment, training, retention, development, and washout rates.* (303.2.2, 303.2.5, 303.2.6)

303.3.7 Support alternatives for the new system/equipment from Task 302.

303.3.8 Description of system/equipment alternatives under consideration.

303.3.9 Supportability and supportability related design objectives, goals and thresholds, and constraints for the new system/equipment from Task 205.

303.3.10 Historical CER/PER that exist which are applicable to the new system/equipment.

303.3.11 Job and task inventory for applicable personnel job classifications. (303.2.2, 303.2.5, 303.2.6)

303.4 TASK OUTPUT

303.4.1 For each evaluation and tradeoff performed under this task:

a. Identification of the evaluation criteria, analytical relationships and models used, selected alternative(s), appropriate sensitivity analysis results, evaluation and tradeoff results, and any risks involved.

b. Tradeoff and evaluation updates, as applicable.

303.4.2 Recommended support system alternative(s) for each system/equipment alternative and identification of new or critical logistic support resource requirements. (303.2.2)

303.4.3 Recommended system/equipment alternative(s) based on cost, schedule, performance, readiness, and supportability factors. (303.2.3)

303.4.4 System/equipment readiness sensitivity to variations in key design and support parameters. (303.2.4)

303.4.5 Estimates of total manpower and personnel requirements for alternative system/equipment concepts. (303.2.5)

303.4.6 Optimum training and personnel job design for attaining and maintaining the required proficiency of operating and support personnel. (303.2.6)

303.4.7 Repair level analysis results. (303.2.7)

303.4.8 Optimum diagnostic concept for each system/equipment alternative under consideration. (303.2.8)

303.4.9 Comparisons between the supportability, cost, and readiness parameters of the new system/equipment and existing comparable systems/equipment. (303.2.9)

303.4.10 Tradeoff results between system/equipment alternatives and energy requirements. (303.2.10)

303.4.11 Tradeoff results between system/equipment alternatives and survivability and battle damage repair characteristics. (303.2.11)

303.4.12 Tradeoff results between system/equipment alternatives and transportability requirements. (303.2.12)

TASK SECTION 400

DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS

TASK 401

TASK ANALYSIS

401.1 PURPOSE. To analyze required operations and maintenance tasks for the new system/equipment to (1) identify logistic support resource requirements for each task, (2) identify new or critical logistic support resource requirements, (3) identify transportability requirements, (4) identify support requirements which exceed established goals, thresholds, or constraints, (5) provide data to support participation in the development of design alternatives to reduce O&S costs, optimize logistic support resource requirements, or enhance readiness, and (6) provide source data for preparation of required ILS documents (technical manuals, training programs, manpower and personnel lists, etc).

401.2 TASK DESCRIPTION

401.2.1 Conduct a detailed analysis of each operation and maintenance task requirement identified for the new system/equipment (Task 301) and determine the following:

a. Procedural steps required to perform the task to include identification of those tasks that are duty position specific (performed principally by only one individual) or collective tasks (performed by two or more individuals as a team or crew).

b. Logistic support resources required (considering all ILS elements) to perform the task.

c. Task frequency, task interval, elapsed time, and manhours in the system/equipment's intended operational environment and based on the specified annual operating base.

d. Maintenance level assignment based on the established support plan (Task 303).

401.2.2 Document the results of Task 401.2.1 in the LSAR, or equivalent format approved by the requiring authority.

401.2.3 Identify those logistic support resources required to perform each task which are new or critical. New resources are those which require development to operate or maintain the new system/equipment. These can include support and test equipment, facilities, new or restructured personnel skills, training devices, new or special transportation systems, new computer resources, and new repair, test, or inspection techniques or procedures to support new design plans or technology. Critical resources are those which are not new but require special management attention due to schedule constraints, cost implications, or known scarcities. Unless otherwise required, document new and modified logistic support resources in the LSAR, or equivalent documentation approved by the requiring authority, to provide a description and justification for the resource requirement.

401.2.4 Based upon the identified task procedures and personnel assignments, identify training requirements and provide recommendations concerning the best mode of training (formal classroom, on-the-job, or both) and the rationale for the recommendations. Document the results in the LSAR or equivalent format approved by the requiring authority.

401.2.5 Analyze the total logistic support resource requirements for each task and determine which tasks fail to meet established supportability or supportability related design goals or constraints for the new system/equipment. Identify tasks which can be optimized or simplified to reduce O&S costs, optimize logistic support resource requirements, or enhance readiness. Propose alternative designs and participate in the development of alternative approaches to optimize and simplify tasks or to bring task requirements within acceptable levels.

401.2.6 Based upon the identified new or critical logistic support resources, determine what management actions can be taken to minimize the risks associated with each new or critical resource. These actions could include development of detailed tracking procedures, or schedule and budget modifications.

401.2.7 Conduct a transportability analysis on the system/equipment and any sections thereof when sectionalization is required for transport. When the general requirements of MIL-STD-1366 limitations are exceeded, document the transportability engineering characteristics in the LSAR, or equivalent format approved by the requiring authority. Participate in the development of design alternatives when transportability problem areas are surfaced.

401.2.8 For those support resources requiring initial provisioning, document the provisioning technical documentation in the LSAR, or equivalent format approved by the requiring authority.

401.2.9 Validate the key information documented in the LSAR through performance of operations and maintenance tasks on prototype equipment. This validation shall be conducted using the procedures and resources identified during the performance of 401.2.1 and updates shall be made where required. Validation requirements shall be coordinated with other system engineering demonstrations and tests (e.g., maintainability demonstrations, reliability and durability tests) to optimize validation time and requirements.

401.2.10 Prepare output summaries and reports to satisfy ILS documentation requirements as specified by the requiring authority. These shall include all pertinent data contained in the LSAR at the time of preparation.

401.2.11 Update the data in the LSAR as better information becomes available and as applicable input data from other system engineering programs is updated.

401.3 TASK INPUT

401.3.1 Identification of system/equipment hardware and software on which this analysis will be performed.*

401.3.2 Identification of indenture levels to which this analysis will be carried.*

401.3.3 Identification of the levels of maintenance which will be documented during performance of this task.*

401.3.4 Known or projected logistic support resource shortages.*

401.3.5 Schedule and budget ceilings and targets.*

401.3.6 Any supplemental documentation requirements over and above the LSAR. (e.g., transportability clearance diagrams, time lines, etc.)*

401.3.7 Delivery identification of any data item required.*

401.3.8 Information available from the requiring authority relative to:*

a. Existing personnel skills, capabilities, and programs of instruction.

b. Lists of standard support and test equipment.

c. Facilities available.

d. Training devices available.

e. Existing transportation systems and capabilities.

401.3.9 Description of personnel capabilities (target audience) intended to operate and maintain the new system/equipment at each level of maintenance.*

401.3.10 Any limits (numbers or skills) to operators or support personnel for the new system/equipment.*

401.3.11 Annual operating basis for task frequencies.*

401.3.12 Operations and maintenance task requirements from Task 301.

401.3.13 Recommended support plan for the system/equipment from Task 303.

401.3.14 Supportability and supportability related design goals and requirements from Task 205.

401.4 TASK OUTPUT

401.4.1 Completed LSAR data on system/equipment hardware and software and to the indenture level specified by the requiring authority, or equivalent format approved by the requiring authority.

401.4.2 Identification of new or critical logistic support resources required to operate and maintain the new system. (401.2.3)

401.4.3 Alternative design approaches where tasks fail to meet established goals and constraints for the new system/equipment or where the opportunity exists to reduce O&S costs, optimize logistic support resource requirements, or enhance readiness. (401.2.5)

401.4.4 Identification of management actions to minimize the risks associated with each new or critical logistic support resource requirement. (401.2.6)

401.4.5 Validation of key information documented in the LSAR. (401.2.9)

401.4.6 Output summaries and reports as specified by the requiring authority containing all pertinent data contained in the LSAR at the time of preparation. (401.2.10)

401.4.7 Updated LSAR data as better information becomes available and as applicable input data from other system engineering programs is updated. (401.2.11)

TASK 402

EARLY FIELDING ANALYSIS

402.1 PURPOSE. To assess the impact of introduction of the new system/equipment on existing systems, identify sources of manpower and personnel to meet the requirements of the new system/equipment, determine the impact of failure to obtain the necessary logistic support resources for the new system/equipment, and determine essential logistic support resource requirements for a combat environment.

402.2 TASK DESCRIPTION

402.2.1 Assess the impact on existing systems (weapon, supply, maintenance, transportation) from introduction of the new system/equipment. This assessment shall examine impacts on depot workload and scheduling, provisioning and inventory factors, automatic test equipment availability and capability, manpower and personnel factors, training programs and requirements, POL requirements, and transportation systems, and shall identify any changes required to support existing weapon systems due to new system/equipment requirements.

402.2.2 Analyze existing manpower and personnel sources to determine sources to obtain the required manpower and personnel for the new system/equipment. Determine the impact on existing operational systems from using the identified sources for manpower and personnel.

402.2.3 Assess the impact on system/equipment readiness resulting from failure to obtain the required logistic support resources in the quantities required. Do not duplicate analyses performed under Task 303.

402.2.4 Conduct survivability analyses to determine changes in logistic support resource requirements based on combat usage. These analyses shall be based on threat assessments, projected combat scenarios, system/equipment vulnerability, battle damage repair capabilities, and component essentialities in combat. Identify and document recommended combat logistic support resources (e.g., combat supply support stockage lists) and sources to satisfy the requirements. Do not duplicate analyses performed under Task 303.

402.2.5 Develop plans to implement solutions to problems surfaced in the above assessments and analyses.

402.3 TASK INPUT

402.3.1 Delivery identification of any data item required.*

402.3.2 Information available from the requiring authority relative to:*

a. Existing and planned sources for manpower and personnel skills.

b. Capabilities and requirements of existing and planned systems.

c. Projected threats, combat scenarios, system/equipment vulnerability, projected attrition rates, battle damage repair capabilties, and essentialities in combat.

402.3.3 Logistic support resource requirements for the new system/equipment from Task 401.

402.3.4 Evaluation and tradeoff results from Task 303.

402.4 TASK OUTPUT

402.4.1 Impact from the introduction of the new system/equipment on current and planned weapon and support systems. (402.2.1)

402.4.2 Sources of manpower and personnel skills to satisfy the manpower and personnel requirements of the new system/equipment. (402.2.2)

402.4.3 System/equipment readiness impacts from failure to obtain required logistic support resources to operate and maintain the new system/equipment. (402.2.3)

402.4.4 Essential logistic support resource requirements for a combat environment and identification of sources to satisfy these requirements. (402.2.4)

402.4.5 Plans to alleviate problems recognized during the performance of 402.2.1 through 402.2.4. (402.2.5)

TASK 403

POST PRODUCTION SUPPORT ANALYSIS

403.1 PURPOSE. To analyze life cycle support requirements of the new system/equipment prior to closing of production lines to assure that adequate logistic support resources will be available during the system/equipment's remaining life.

403.2 TASK DESCRIPTION. Assess the expected useful life of the system/equipment. Identify support items associated with the system/equipment that will present potential problems due to inadequate sources of supply after shutdown of production lines. Develop and analyze alternative solutions for anticipated support difficulties during the remaining life of the system/equipment. Develop a plan that assures effective support during its remaining life along with the estimated funding requirements to implement the plan. As a minimum, this plan shall address manufacturing, repair centers, data modifications, supply management, and configuration management.

403.3. TASK INPUT

403.3.1 Information available from the requiring authority relative to:*

a. Existing and planned sources of supply.

b. Expected lifetime of the system/equipment.

c. System/equipment reliability and maintainability data.

d. Costs associated with in-house and contractor manufacturing and repair alternatives.

403.3.2 Delivery identification of any data item required.*

403.3.3 Supply and consumption data available on the system/equipment in its operational environment.

403.3.4 Planned product improvements to the system/equipment.

403.3.5 Early fielding analysis results from Task 402.

403.4 TASK OUTPUT. A plan and its associated cost which identifies logistic support resource requirements for the system/equipment throughout its remaining life along with the method to satisfy the requirements.

TASK SECTION 500

SUPPORTABILITY ASSESSMENT

TASK 501

SUPPORTABILITY TEST, EVALUATION, AND VERIFICATION

501.1 PURPOSE. To assess the achievement of specified supportability requirements, identify reasons for deviations from projections, and identify methods of correcting deficiencies and enhancing system readiness.

501.2 TASK DESCRIPTION

501.2.1 Formulate a test and evaluation strategy to assure that specified supportability and supportability related design requirements are achieved, or achievable, for input into system test and evaluation plans. The test and evaluation strategy formulated shall be based upon quantified supportability requirements for the new system/equipment; the supportability, cost, and readiness drivers; and supportability issues with a high degree of risk associated with them. Tradeoffs shall be conducted between the planned test length and cost and the statistical risks incurred. Potential test program limitations in verifying supportability objectives based on previous test and evaluation experience and the resulting effect on the accuracy of the supportability assessment shall be documented.

501.2.2 Establish and document test and evaluation program objectives and criteria and identify test resources, procedures, and schedules required to meet the objectives for inclusion in the coordinated test program and test and evaluation plans. The objectives and criteria established shall provide the basis for assuring that critical supportability issues and requirements have been resolved or achieved within acceptable confidence levels.

501.2.3 Analyze the test results and verify/assess the achievement of specified supportability requirements for the new system/equipment. Determine the extent of improvement required in supportability and supportability related design parameters in order for the system/equipment to meet established goals and thresholds. Identify any areas where established goals or thresholds have not been demonstrated within acceptable confidence levels. Do not duplicate analyses performed in Task 303. Develop corrections for supportability problems uncovered during test and evaluation. These could include modifications to hardware, software, support plans, logistic support resources, or operational tactics. Update the documented support plan and logistic support resource requirements as contained in the LSAR and LSAR output reports based on the test results. Quantify the effects of these updates on the projected cost, readiness, and logistic support resource parameters for the new system/equipment.

501.2.4 Analyze standard reporting systems to determine the amount and accuracy of supportability information that will be obtained on the new system/equipment in its operational environment. Identify any shortfalls in measuring accomplishment against the supportability goals that were established for the new system/equipment, or

in verifying supportability factors which were not tested during the acquisition phases of the item's life cycle. Develop viable plans for obtaining required supportability data from the field which will not be obtained through standard reporting systems. Conduct tradeoff analyses between cost, length of data collection, number of operational units in which to collect data, and statistical accuracy to identify the best data collection plan. Document the data collection plan selected to include details concerning cost, duration, method of data collection, operational units, predicted accuracy, and intended use of the data.

501.2.5 Analyze supportability data as it becomes available from standard supply, maintenance, and readiness reporting systems and from any special data collection programs implemented on the new system/equipment. Verify achievement of the goals and thresholds established for the new system/equipment. In those cases where operational results deviate from projections, determine causes and corrective actions. Analyze feedback information and identify areas where improvements can be cost effectively accomplished. Document recommended improvements.

501.3 TASK INPUT

501.3.1 Delivery identification of any data item required.*

501.3.2 Information available from the requiring authority relative to standard reporting systems.* (501.2.4)

501.3.3 Previous test and evaluation experience on comparable systems.

501.3.4 Supportability and supportability related design factors from Task 205.

501.3.5 Supportability, cost, and readiness drivers for the new system/equipment from Task 203.

501.3.6 Evaluation and tradeoff results from Task 303.

501.3.7 Test results. (501.2.3)

501.3.8 Supportability data on the new system/equipment in its operational environment from standard maintenance, supply, and readiness reporting systems and any special reporting system developed for the new system/equipment. (501.2.5)

501.4 TASK OUTPUT

501.4.1 Test and evaluation strategy for verification of supportability and identification of potential test program limitations and the effect on the accuracy of the supportability assessment. (501.2.1)

501.4.2 Test and evaluation plan for supportability to include test and evaluation objectives, criteria, procedures/methods, resources, and schedules. (501.2.2)

501.4.3 Identification of corrective actions for supportability problems uncovered during test and evaluation. Updated support plan, logistic support resource requirements, LSAR data, and LSAR output reports based upon test results. Identification of improvements required in order to meet supportability goals and thresholds. (501.2.3)

501.4.4 Detailed plans to measure supportability factors on the new system/equipment in its operational environment. (501.2.4)

501.4.5 Comparison of achieved supportability factors with projections, identification of any deviations between projections and operational results, reasons for the deviations, and recommended changes (design, support, or operational) to correct deficiencies or improve readiness. (501.2.5)

Custodians:
Army - TM
Navy - AS
Air Force- 95

Preparing Activity:
Army - TM

(Project No. MISC-0E01)

Review Activities:
Army - TM, AL, AR, AT, AV, CR, ER, GL, ME, MI, MR, MT, TE
Navy - AS, NM, EC, YD, OS, SH, SA, MC, ND, TD
Air Force - 95, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 23, 90
Miscellaneous DOD/NASA - NS

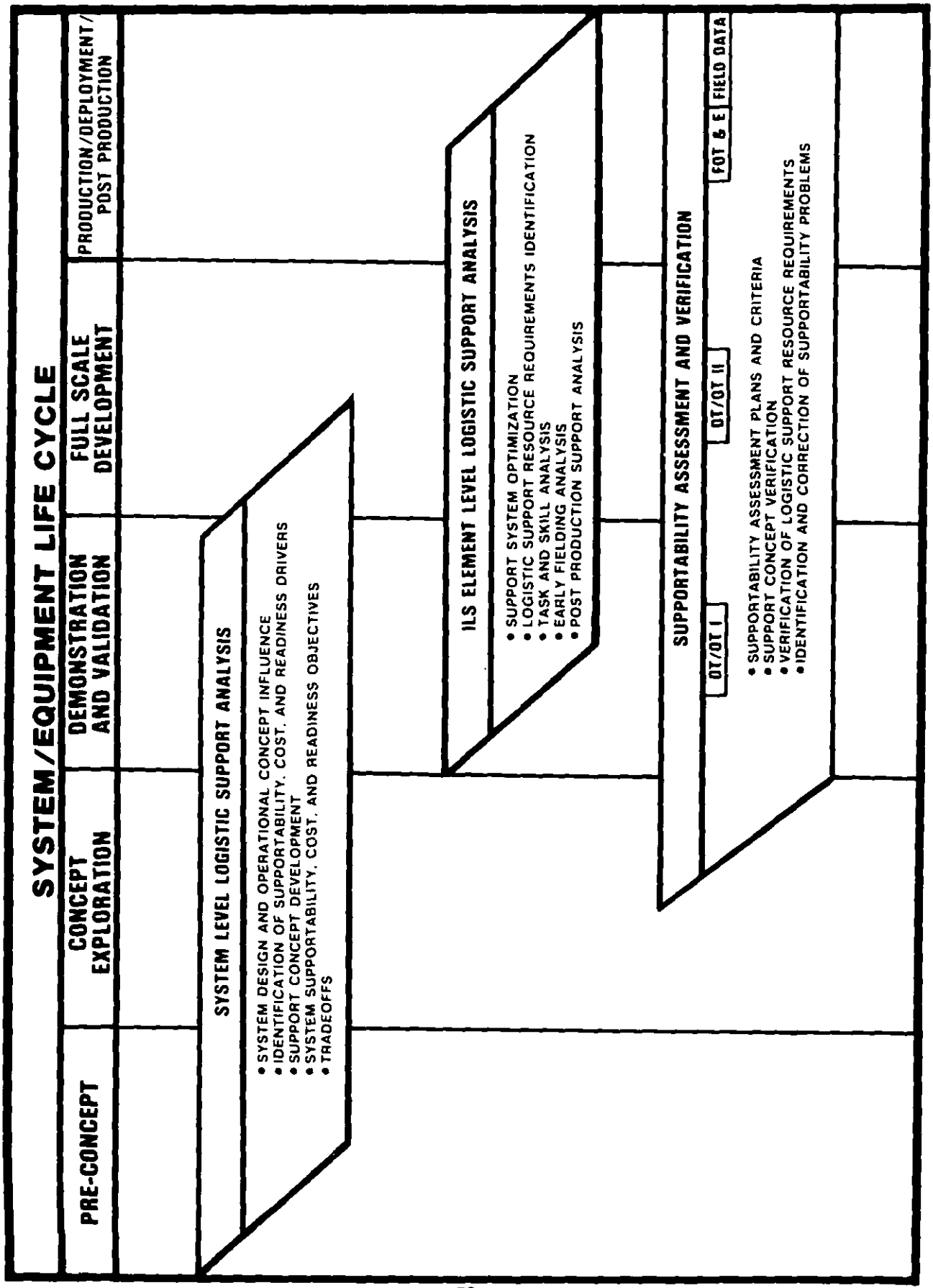


FIGURE 1. Logistic Support Analysis Process Objectives by Program Phase.

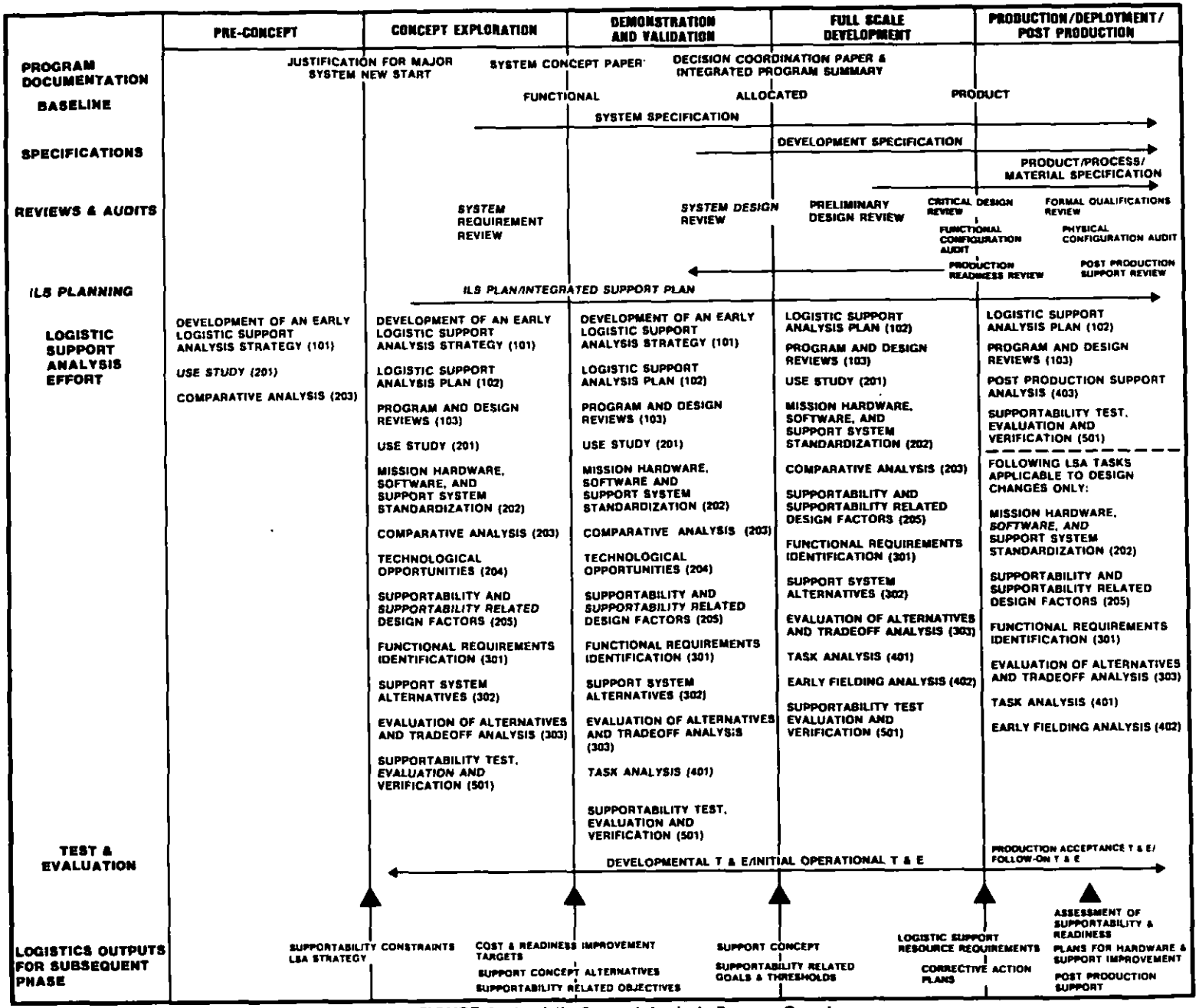
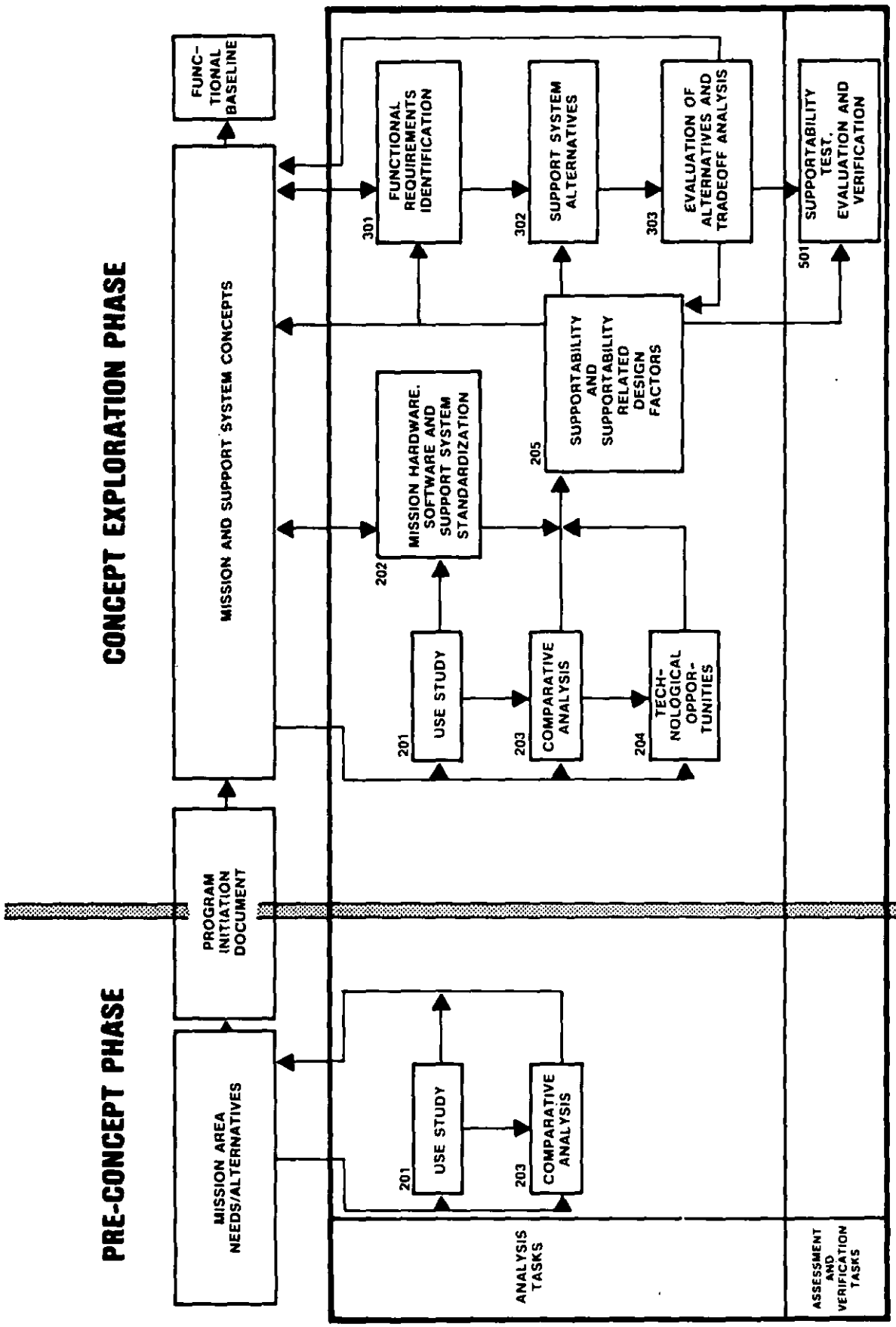
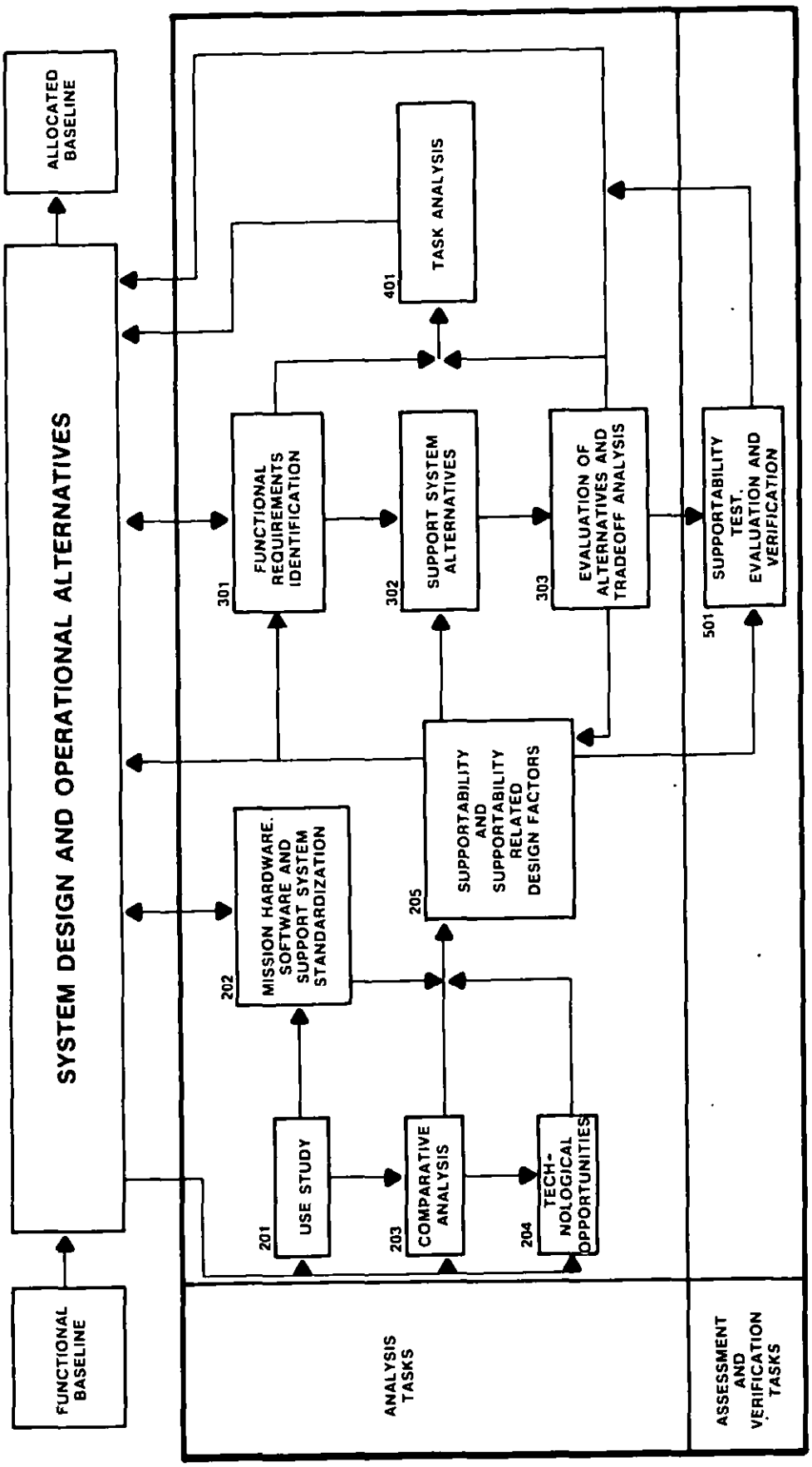


FIGURE 2. Logistic Support Analysis Process Overview.



NOTES:
1. TASKS 101, 102 AND 103 ARE MANAGEMENT ACTIVITIES THAT ARE AN INTEGRAL PART OF THE LSA PROCESS THOUGH NOT SHOWN IN THIS FIGURE
2. REFER TO TABLE III FOR SUBTASK APPLICABILITY BY PROGRAM PHASE

FIGURE 3. Logistic Support Analysis Process Flow Chart.



NOTES:
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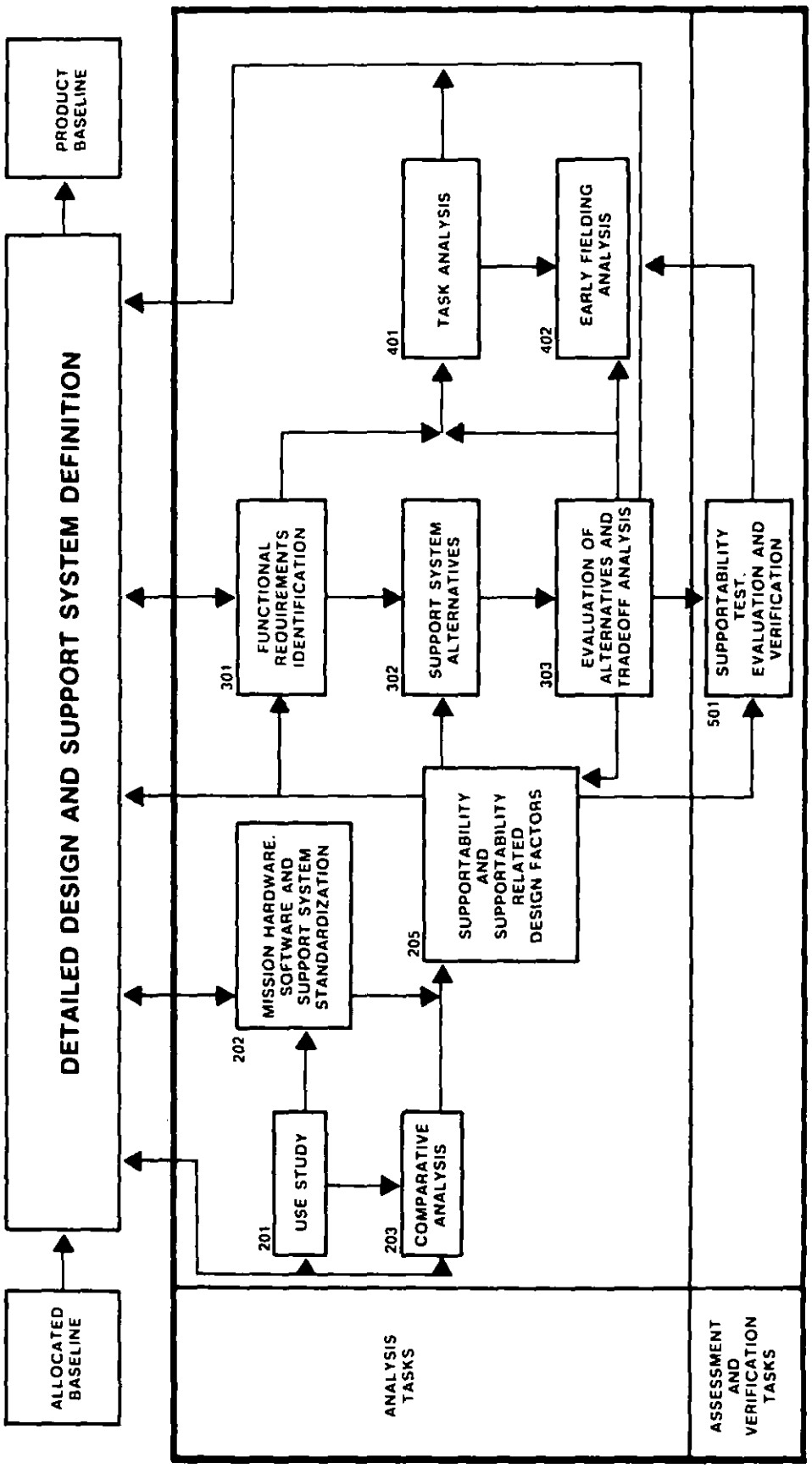
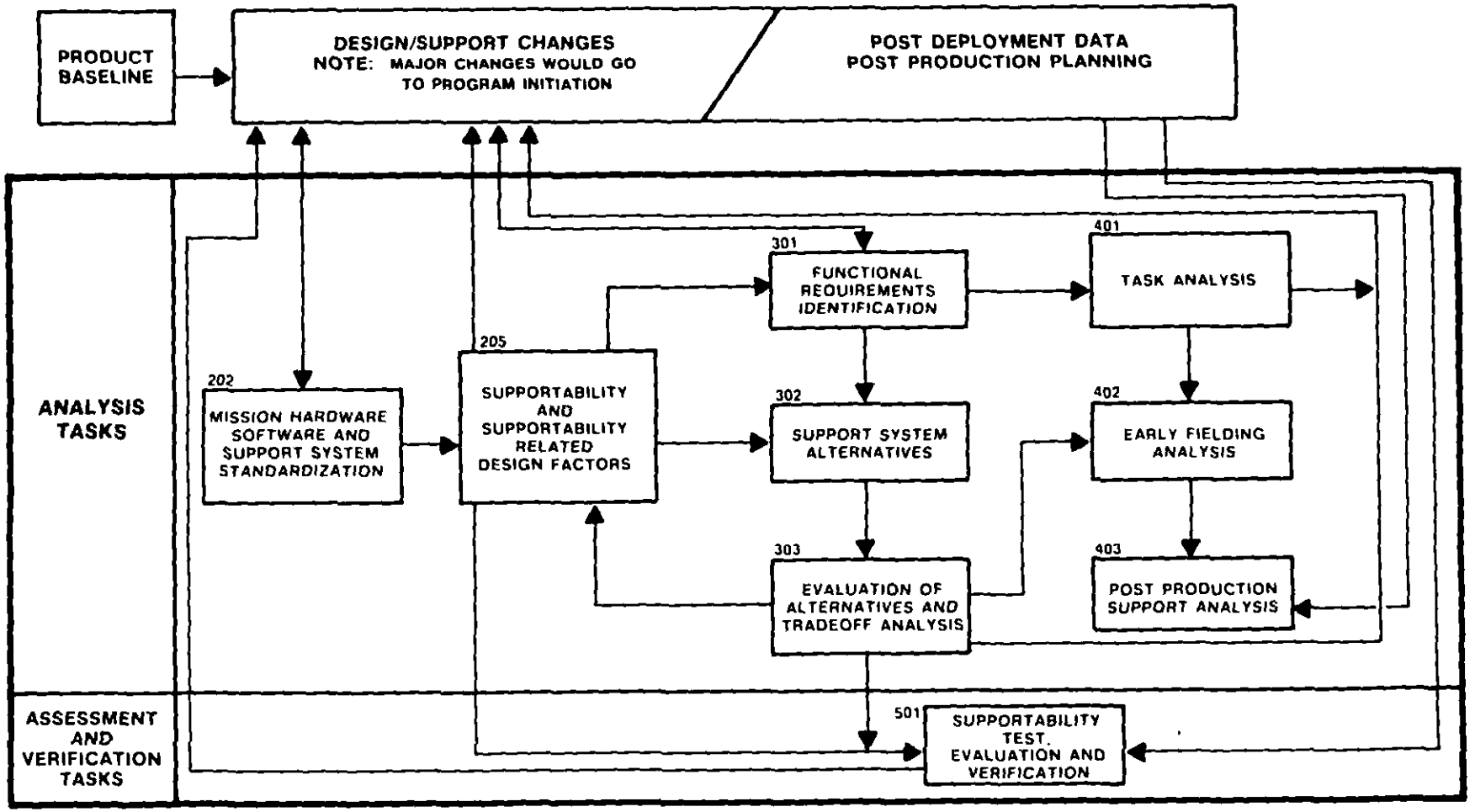
FIGURE 3. Logistic Support Analysis Process Flow Chart.



NOTES:
1. TASKS 101, 102 AND 103 ARE MANAGEMENT ACTIVITIES THAT ARE AN INTEGRAL PART OF THE LSA PROCESS THOUGH NOT SHOWN IN THIS FIGURE
2. REFER TO TABLE III FOR SUBTASK APPLICABILITY BY PROGRAM PHASE
3. TASK 402 PROVIDES DATA TO ILS MANAGEMENT

FIGURE 3. Logistic Support Analysis Process Flow Chart.

PRODUCTION/DEPLOYMENT/POST PRODUCTION PHASE



NOTES:

1. TASKS 101, 102 AND 103 ARE MANAGEMENT ACTIVITIES THAT ARE AN INTEGRAL PART OF THE LSA PROCESS THOUGH NOT SHOWN IN THIS FIGURE
2. REFER TO TABLE III FOR SUBTASK APPLICABILITY BY PROGRAM PHASE
3. TASKS 402 AND 403 PROVIDE DATA TO ILS MANAGEMENT

FIGURE 3. Logistic Support Analysis Process Flow Chart

APPENDIX A

APPLICATION GUIDANCE FOR IMPLEMENTATION OF LOGISTIC SUPPORT ANALYSIS PROGRAM REQUIREMENTS

10. SCOPE

10.1 General. This appendix provides rationale and guidance for the selection and tailoring of LSA tasks in this standard. This appendix is to be used to tailor LSA requirements in the most cost effective manner to meet program objectives. However, it is not to be referenced or implemented in contractual documents. No requirements are contained in this appendix. The users of this appendix may include the Department of Defense contracting activity, Government in-house activity, and prime contractor or subcontractor, who wishes to impose LSA tasks upon a supplier.

10.2 How to Use this Appendix. This appendix provides guidance on structuring LSA programs (paragraph 40) and on applying the individual task and subtask requirements (paragraph 50). The user should first review the major considerations affecting the development of the LSA program contained in paragraph 40 and then refer to the appropriate parts of paragraph 50 based on the tasks and subtasks selected.

20. REFERENCED DOCUMENTS

Military Standards

MIL-STD-680	Contractor Standardization Program Requirements.
MIL-STD-965	Parts Control Program.
MIL-STD-1629	Procedures for Performing a Failure Mode, Effects,and Criticality Analysis.
MIL-STD-1388-2	Logistic Support Analysis Data Element Definitions.

DOD Directives

DODD 5000.1	Major System Acquistions.
DODD 5000.39	Acquisition and Management of Integrated Logistic Support for Systems and Equipment.

30. DEFINITIONS

30.1 General. Key terms used in this appendix are defined in the Glossary, Appendix B.

40. GENERAL APPLICATION GUIDANCE FOR LOGISTIC SUPPORT ANALYSIS PROGRAMS

40.1 LSA Process. LSA is an iterative and multidisciplinary activity with many interfaces. The LSA process can be divided into two general parts: (a) analysis of supportability, and (b) assessment and verification of supportability. The iterative nature of this process and the input - output relationship of the interfaces change with the acquisition phases as described below.

40.1.1 Analysis of Supportability. This portion of the LSA process commences at the system level to affect design and operational concepts; identify gross logistic support resource requirements of alternative concepts; and to relate design, operational, and supportability characteristics to system readiness objectives and goals. The system level analysis is characterized by use studies, comparative analysis and driver identification, identification of technological opportunities, and tradeoffs between support, operational, and design concepts and between alternative support concepts such as organic versus contractor support, built-in versus external test capability, and varying numbers of maintenance levels. Once system level tradeoffs are made, the analysis shifts to lower system indentures and toward support system optimization within the framework established by the system level analysis. This analysis defines the logistic support resource requirements of the system through an integrated analysis of all operator and maintenance functions and tasks to determine task frequencies, task times, personnel and skill requirements, supply support requirements, etc., to include all elements of ILS. Optimization is achieved at this level through allocation of functions and tasks to specific maintenance levels, repair versus discard analyses, RCM analyses, and formulating design recommendations to optimize maintenance times and logistic support resource requirements. Data from this level of the LSA is used as direct input into the development of data products associated with each ILS element such as provisioning lists, personnel and training requirements, and technical manuals. This assures compatibility between ILS element documents and permits common use of data which apply to more than one logistic element.

40.1.2 Assessment and Verification. This part of the LSA process is conducted throughout the system/equipment's life cycle to demonstrate, within stated confidence levels, the validity of the analysis and products developed from the analysis, and to adjust the analysis results and products as required. This part of the process starts with early planning for verification of support concepts and continues through development, acquisition, deployment, and operations to include assessment and verification of post deployment support.

40.1.3 Interfaces. Some of the major LSA activities where interfaces play a key role are listed below along with the interfacing activities:

a. Tradeoff Analysis (Task 303). Interfacing activities - design engineering, reliability, maintainability, safety, human engineering, cost estimating, and ILS element managers.

b. Task Analysis (Task 401). Interfacing activities - reliability, maintainability, human engineering, and safety.

c. Resource Requirements Identification (Task 401). Interfacing activities - design engineering, human engineering, and ILS element managers.

Coordination of these interfaces is a major management challenge which requires final resolution at the working level in some cases. The subtasks in this standard are structured to facilitate assignment of applicable subtasks to the community most directly involved without loss of overall task integrity. For a specific acquisition program, LSA interfaces will be described in the LSAP (Task 102) which should be reviewed to assure that input-output relationships, responsibilities, and timing of activities are properly addressed to prevent overlap and duplication. The following general guidance may be useful in addressing the interface problem.

40.1.3.1 Inputs and Outputs for System Level LSA. Some of the system level LSA involves system analysis/engineering at the hardware-operating-support trade level (Subtask 303.2.3). System level LSA is an input to and subset of these trades and is in turn a collection, synthesis, and "system" analysis of inputs from various specialized areas. Figure 4 shows some of these major relationships in input-output form. The outputs from the system level LSA impact the interfacing activities in that they constitute boundary conditions or goals for specialized engineering programs and ILS element concepts and plans.

40.1.3.2 Refinement and Extension of the System Level LSA. As development progresses, the LSA is iterated and extended to lower indenture levels with the input-output concept described above still functioning. Boundary conditions, constraints, and objectives are refined and expanded based on inputs from specialized engineering and ILS element areas. Additionally, the support system is optimized within the boundaries and objectives established. Specific subtask tradeoffs within engineering specialities and ILS elements are conducted to provide specific boundaries for follow-on efforts. These would include the BIT versus external test trades (Subtask 303.2.8) and training trades (Subtask 303.2.6).

40.1.3.3 Task Analysis Interfaces. LSA includes the requirement for all task analysis, however, specific task areas (e.g., operator tasks or critical maintenance tasks) may be analyzed as part of the

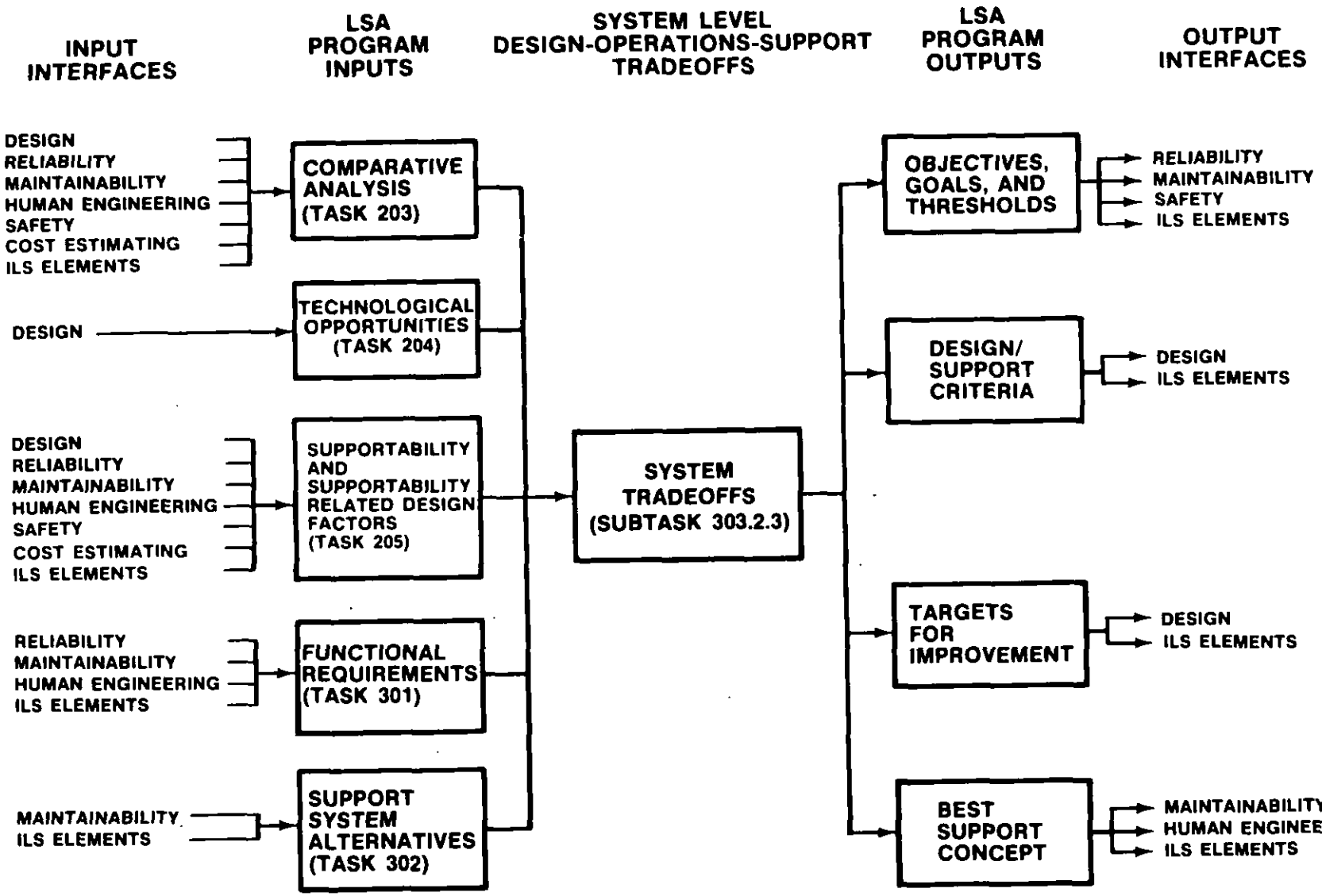


FIGURE 4. System Level Logistic Support Analysis Interfaces.

human engineering program to provide the required input. Additionally, detailed task analysis input data is generally supplied by reliability, maintainability, and safety specialists. Examples of these data include task frequencies, repair times, safety hazards, and failure effects.

40.1.3.4 Resource Requirements Identification. This step in the LSA process involves identification of all logistic support resource requirements. This identification involves many inputs from design and specialized engineering areas and all resource requirements are summarized in the LSA data base. These requirements are then fed to the various ILS element managers for their use in further development of management plans and products for individual ILS elements.

40.2 Major Criteria. Major system acquisition and ILS policies are contained in DOD Directives 5000.1 and 5000.39. The four prime factors that govern system acquisition programs are cost, schedule, performance, and supportability. The LSA process provides direct input into the supportability and cost factors associated with a system/equipment and, therefore, provides significant input into system/equipment decisions. While specific criteria and emphasis will vary from one acquisition to another, three prime issues have emerged at the system level which affect acquisition decisions and which are outputs of the LSA process. These are described below.

40.2.1 Manpower and Personnel Constraints. Demographics indicate the current problems with manpower and personnel shortages (both in terms of quantity, skills, and skill level) will continue for the next decade or more. The problem is of such magnitude that it must be approached through the design process as well as the more traditional manpower and personnel approaches of Services. New system/equipment manpower quantities and skill level demands must be managed like other major design parameters, such as performance and weight, beginning with the earliest conceptions of the new system/equipment.

40.2.2 System Readiness. Logistic related design parameters (such as R&M), logistic support resources (such as spares and manpower), and logistic system parameters (such as resupply time) must be related to system readiness objectives and goals. Such objectives may vary from system to system, and from peacetime to wartime. Operational availability is frequently a good peacetime measure, while operational availability, sortie rates (surge and sustained), and percent coverage are frequently used wartime measures which are key for peacetime readiness and wartime capability. System readiness measures are equal to performance, schedule, and cost as design parameters, and must be managed accordingly beginning with the earliest conception of new systems/equipment.

40.2.3 Cost. It is necessary to consider support investment and O&S costs, as well as other acquisition costs, in major system

acquisitions. Life cycle cost (LCC) estimates compare the investment and support resource requirements for various system alternatives. The cost methodology should explicitly address the resource requirements to achieve specified levels of readiness for given assumptions concerning hardware R&M characteristics, usage rates, and scenarios. Various segments of LCC and O&S costs are vital to proper tradeoff decisions. Cost uncertainty in some areas of resource requirements, such as manpower and energy, is such that sensitivities need to be addressed. Major elements of life cycle costs are to be addressed. The objective is to minimize cost within major constraints such as system readiness objectives.

40.3 Strategy in Developing Analysis Requirements.

40.3.1 General. The key to a productive but cost effective analysis effort is the concentration of available resources on activities which most benefit the program. Such concentration might be called the analysis strategy. This involves the establishment of an analysis program which will evolve achievable supportability and support system objectives. The broad objectives of LSA are to influence hardware design, structure the most effective support concept, and to define logistic support resource requirements. These general objectives must be translated into more specific objectives for individual projects, particularly in early phases when maximum flexibility exists. Objectives are iterated and refined until they become firm program goals or requirements. Development of an analysis strategy is a very difficult task involving a large number of interacting variables. Strategy considerations and the possible impact of these variables must be addressed in the tailoring process. Analysis tasks and subtasks must be tailored and scheduled to meet project decision points. The guidance included here is designed to assist in the tailoring process, however, it is not all inclusive and requires adaptation to specific programs.

40.3.2 Task Selection and Focusing.

40.3.2.1 General. Selection of analysis requirements must take place at the subtask level since the subtasks are generally written for specific phases and types of programs. The rationale for selecting particular subtasks involves a wide range of considerations. Figure 5 portrays a general tailoring logic tree which should be followed in selecting tasks. Table III identifies task and subtask applicability by phase of development and engineering activity. The guidance in Table III may require adjustment for specific acquisition programs since it is based on typical theoretical programs, and since it is not unusual for some aspects of a development program to be in one phase and other aspects in another. The initial selection of tasks and subtasks can be adjusted for the following considerations:

a. The amount of design freedom.

b. Time phasing adjustments if program is "fast track".

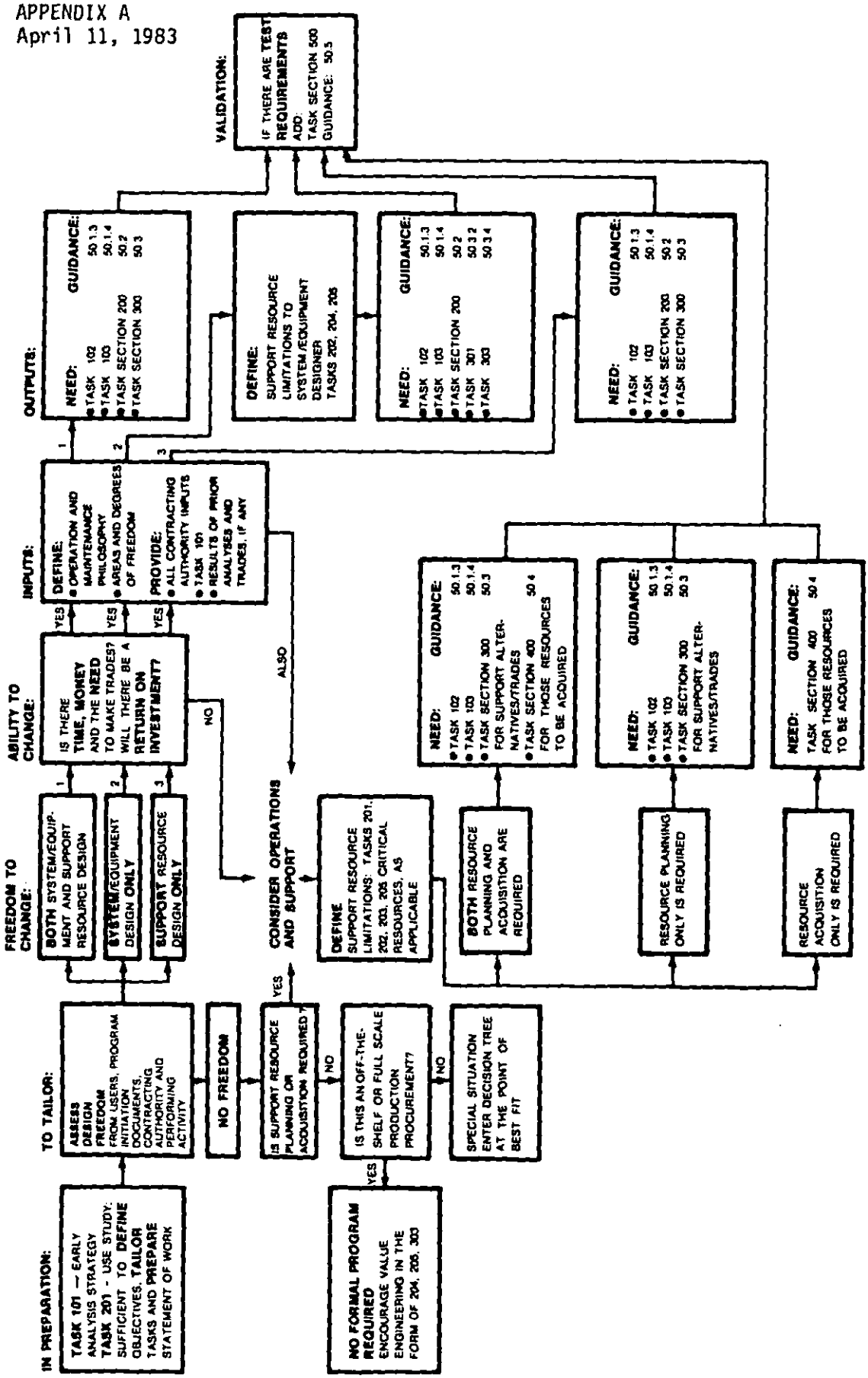


FIGURE 5. Logistic Support Analysis Tailoring Decision Logic.

c. Work already done.

d. Data availability and relevancy.

e. Time and resource availability.

f. Policy directive (DODD 5000.39) information needs (see Table II).

g. Desired tasks not in the standard.

h. Procurement considerations.

Additional guidance on these factors is given later in this section. Most of the factors above tend to reduce or restrict the amount of analysis activity. However, selections should be checked against Table II. If the subtasks in Table II are not covered, their feasibility and utility must be assessed. If it is impossible or unwise to do these subtasks, the reasons should be documented and waivers obtained.

40.3.2.2 Focusing. After the initial selection of subtasks is completed, further focusing is needed to concentrate effort in high leverage areas and to specify other requirements. Considerations under focusing should include:

a. Modification or restriction of the subtask to significant areas.

b. Specification of subtasks such that they can easily be assigned to the most appropriate community.

c. Specification of models and associated data to be used.

d. Specification of areas or activity requiring requester approval.

The requiring authority should be as specific as possible in defining analysis needs for tasks and subtasks under the task input to be specified. Often 10 to 20 percent of the subsystems control 80 to 90 percent of the support demands. Some Task 303 evaluations and tradeoffs are very general and would benefit from greater specificity to focus on key areas. Models and definitions, particularly for life cycle cost, to be used for a particular analysis should be specified, if possible, especially if there is competition. Model considerations are discussed in greater depth under procurement considerations. The remainder of this section discusses the specific impact of the various factors to be considered in the development of the LSA strategy.

40.3.3 Factors Impacting on Strategy.

40.3.3.1 Type of Program/Change. Program categories include a new program, product improvement program, or "off-the-shelf" program. It is not unusual for programs to be restructured. Major modifications may require a redo or new approach to some of the analysis work already done. The type of program impacts objectives and subtask selection and focusing. On a product improvement program, potential analysis objectives might focus on (1) support risks on the changed part of the system/equipment and (2) opportunities for improvement on the total system/equipment through improvement in supportabilitiy characteristics. New or high technology efforts imply increased risk in attainment of supportability goals, and the consequent need for activity to reduce these risks. Modernization using previously proven technology has less risks of goal attainment and may offer more opportunity to reduce logistic support burdens through use of newer (but not necessarily high risk) technology. Such considerations can obviously impact preliminary objective determination. System versus equipment considerations can impact subtask selection and focusing. For example, a more limited and focused readiness analysis may be more appropriate for an equipment contract. Additionally, alternative support concepts may be more limited for equipment level contracts due to a fixed system support concept. System readiness objectives may be to "hold the line" or they may be more ambitious. Readiness goals must be a primary management focus beginning with program initiation. If such goals are ambitious, one focus of the early analyses should be toward readiness related system design and support objectives, such as reliability and turnaround time. Systems and equipments which have large support personnel demands or which have high O&S costs obviously present greater investment opportunities for improvement than those with low demands or costs and, therefore, should receive greater consideration in selecting preliminary analysis objectives.

40.3.3.2 Amount of Design Freedom. The amount of design freedom is a key consideration in subtask selection. Design freedom is related to program considerations such as phasing. The objective of most of the front end analysis subtasks is to influence selection of design characteristics to achieve improvements in readiness, supportability, and cost. If the design is fixed, there may be little benefit from doing these tasks. Some of the factors listed in paragraph 40.3.3.1 give clues in this regard. Product improvement might limit design freedom to specific subsystems unless areas of no or minor change are open to redesign opportunity to reduce logistic support burdens. Fast track programs tend to move up or back various possible analysis subtasks, but fast track programs also tend to use existing technology and plan on preplanned product improvement rather than employ new technology. The point of design freedom thus shifts. Design freedom may exist for the support system but not the mission system. LSA effort and objectives should be focused accordingly. The LSA objective of causing supportability requirements to be an integral part of system/equipment requirements

and design can best be achieved if designers are oriented toward supportability objectives commencing with the design effort. Technical information generated and documented during the design process must be disseminated among designers and supportability specialists to surface interface problems between design concepts and operators, maintainers, and support equipment. Technical design information such as diagnostic features, electro/mechanical interfaces, reliability estimates, item functions, adjustment requirements, and connector and pin assignments, which determines supportability should be an integral part of design documentation. When design freedom exists, the performing activity's LSA plan should describe the generation, control, and approval of this type of information.

40.3.3.3 Time and Resources Available. To influence design, logistic support analyses require time and resources. Don't specify a task whose results would not be available in time to affect design unless the potential improvement can be scheduled as part of a preplanned product improvement. "Fast track" programs, as their name implies, tend to reduce the time to do "design influence" analysis tasks. A possible offset to time restrictions is the accomplishment of some analysis task off-line as "off-the-shelf" assets to be employed at the appropriate time. The accomplishment of "design influence" logistic support analyses require resources in the form of people and money. It is DOD policy to fund readiness and support considerations in the front end of programs. Nevertheless, resources are constrained in practice. If program funds are short, it may be possible to perform some tasks, such as early scoping of the analysis effort, comparative analysis, and driver identification, by use of in-house capabilities. Another possible approach when funds are short is to capitalize on the interrelationships between some tasks and subtasks. For example, the comparative analysis feeds driver identification, which in turn feeds selection of targets for improvement. If for some reason only one of these tasks could be afforded, then the targets for improvement would be the logical pick of the three. Such an approach obviously loses precision since judgments are substituted for hard data on the deleted tasks. It should, therefore, be employed only as a last resort. If the in-house capability is limited but funds are available, such subtasks might also be accomplished by "study" contractors with special expertise.

40.3.3.4 Work Already Done. Work already accomplished can impact subtask selection. Tasks such as comparative analysis, driver identification and improvement initiatives may already have been done as inputs to the preparation of program initiation or other requirements documents. The quality of this work should be assessed. If adequate, it may need updating rather than a complete revision. Likewise, program initiation or other requirements documents may prescribe objectives or constraints which tend to bound the scope of the analysis effort. However, it is essential to test the realism of such constraints or objectives and the analysis which supported their specification prior to accepting them as hard bounds.

40.3.3.5 Past Experience and Historical Data. The availability, accuracy, and relevancy of experience and historical data bases on similar existing systems is crucial for accomplishment of some tasks and subtasks in this standard. Available data bases must be examined to determine if extensive work is needed to provide focus or relevancy. If such data bases are not available, a special "sample data" effort should be considered, particularly if the needed data is in an area of possible high leverage.

40.3.3.6 Procurement Considerations. The requiring authority must initially decide and specify the LSA tasks that are to be done solely by the Government or independent agency, those that are to be shared between the Government and the system/equipment developer, and those that are to be performed solely by the system/equipment developer. Once done, the LSA portion of the contracting plan can be developed and work requirements written into the procurement documentation. It is very useful to allow the prospective performing activities, under the bidding terms of the procurement, to recommend adding or deleting LSA tasks and to provide a more detailed subtask definition and schedule. Additionally, prospective performing activities should be encouraged to make use of cost effective data generation procedures. The prospective performing activity's tailoring process and cost reduction efforts should become a factor in the assessment of its capability to perform the LSA program. Acquisition program objectives must be considered in preparing procurement documents. For example, in a technology demonstration procurement, one may specifically exclude certain LSA task requirements. Supportability objectives for this type of procurement would best be served through design influence and generation of an LSA data base for subsequent detailed analysis effort when the technology is utilized. If the acquisition program is oriented to develop and procure a system/equipment, then other LSA tasks become equally important. The nature of the procurement may force the performing activity to do some analysis activity in order to make a rational bid. More procurement considerations are discussed in the next section.

40.4 Application in Procurement. The procurement process offers an excellent opportunity to refine the LSA strategy by involvement of potential performing activities when competition is present. This section discusses some aspects of the procurement process prior to issuance of the request for proposal (RFP) or other solicitation document, and considerations in preparing the LSA portion of the RFP. The guidance in this section should be applied as appropriate to the phase and nature of the program.

40.4.1 Pre-RFP and Bidders Briefings. Properly structured pre-RFP and bidders briefings can provide opportunities for feedback from potential bidders on selecting and focusing analysis task and data item requirements. This helps assure the requiring authority that it has not included inappropriate RFP requirements, such as trades in areas where there is no freedom to trade, or data requirements which are premature or duplicative.

40.4.2 Preparing LSA RFP Requirements. The RFP is normally the first formal communication between the Government and industry. It is, therefore, a key document in the acquisition process. Industry interprets an RFP to be an expression of all the items of importance to the Government since it will be around these items that a contract will be written. Industry taxes its ingenuity to provide a competitive product that meets the stated requirements. This section discusses some suggested practices in preparing the RFP.

40.4.2.1 Broad Versus Specifics. Give the total support picture as early as possible. Structure the RFP to pose the broad problem to be addressed by the LSA program and provide information on absolutely necessary analysis subtasks and data required. Don't go into unnecessary detail in establishing requirements at too early a time, especially if the scenarios are conceptual and design is still only crudely defined. Describe the freedom the bidder has for feedback. The bidder can then draw from experience and innovation to fine tune the requirements. Bidder feedback should be considered as recommendations only to preclude legal problems. Don't destroy credibility by asking for inputs which are inconsequential in source selection or to the program as a whole.

40.4.2.2 Interweave Supportability Requirements and Constraints. Structure the RFP in such a way that supportability constraints and supportability related design requirements are interwoven into the appropriate system/development specification sections or other system/equipment description. This gives everyone involved with the design an appreciation of the supportability constraints and requirements. A properly structured RFP requires readiness and supportability inputs into many sections of the RFP. Consequently, more than just the logistics portions of the SOW and contract data requirements list must be addressed. The major areas for supportability input into an RFP include the following:

a. Section B, Supplies/Services and Prices. Establish supportability work efforts and requirements as separate contract line items where possible.

b. Section C, Description/Specifications. Enter supportability work efforts and supportability design requirements.

c. Section F, Deliveries or Performance. Consider statement that delivery of the system/equipment will not be accepted without concurrent delivery of required logistic products.

d. Section H, Special Provisions. Consider inclusion of supportability incentives such as a design to life cycle cost goal.

e. Section I, General Provisions. Ensure that applicable Defense Acquisition Regulation clause(s) on rights in technical data and computer software are included.

f. Section L, Instructions and Conditions, and Notices to Offerors. Ensure proposal preparation instructions relative to supportability aspect of the RFP are detailed and clearly written. Consider a separate proposal section for supportability.

g. Section M, Evaluation Factors for Award. Ensure sufficient weighting is given to supportability.

40.4.2.3 Relative Importance of Requirements. State the order of importance of the supportability related parameters being requested to the source selection criteria. This permits the LSA team to make an honest effort to provide the best LSA subtask selection for the least cost. For example, indicate that R&M are to be of high priority, and size and weight to be of low priority only if it is true; not when the size and weight requirements are inflexible and paramount. Identify any requirements which are soft, and in which the requester would consider slight reductions for other significant benefits.

40.4.2.4 Support Related Design Drivers. Consistent with the degree of design freedom, ask the bidder to identify those design attributes which may prove to be the key influencing factors in readiness, acquisition cost, O&S cost, and logistic support resource demands. Have the bidder identify the LSA subtasks that will be used to analyze these requirements.

40.4.2.5 Alternate Support Concepts. It is DOD policy to encourage innovative analysis approaches which can be used to pinpoint potential readiness, O&S cost, and supportability benefits. When options are not foreclosed due to prior investments, the RFP should allow the contractor to suggest analysis approaches to reduce support costs by changing the way an item is supported. This does not mean that a contractor should be permitted to violate the basic requirements; on the contrary, the contractor should be made to understand that proposed alternatives must be totally compliant with the requirements. However, the contractor should be permitted to offer alternatives which go beyond basic compliance. It should be possible to favorably evaluate a contractor who proposes LSA techniques that can be used to identify system/equipment design that meets requirements together with an innovative alternate support scheme, if the alternate scheme meets support requirements and realistically promises lower support costs.

40.4.2.6 Evaluation Methods and Models. The RFP should indicate how the requester plans to evaluate the degree to which LSA requirements have been satisfied. The proof of compliance with such requirements should be as straightforward as that for compliance with performance requirements. The contractor should be told what technically auditable information he needs to provide to permit such evaluations. It is imperative that data structure, fixed

constraints, and defining statements be identical for all competing contractors. If contractors are required to perform modeling, identical models tailored to the competition and the specifics of the program should be provided to all, and all bidders should be required to use them.

40.5 Task Documentation. The development and maintenance of good documentation covering the results of LSA tasks contained in this standard serve the following purposes:

a. Provides an audit trail of analyses performed and decisions made affecting the supportability of a system/equipment.

b. Provides analysis results for input to follow-on analysis tasks later in the system/equipment's life cycle.

c. Provides source data for use by ILS element functional managers and a standard method of recording ILS element data from functional managers.

d. Provides input into materiel acquisition program documents.

e. Helps prevent duplication of analyses.

f. Provides an experience data base for use on future acquisition programs.

40.5.1 Individual analysis tasks performed as part of a system/equipment's LSA program may be performed by a Government activity, contractor activity, or both. Task documentation must be developed to the degree that will allow another activity to use the task results as input data to perform other LSA tasks, or as input to conduct the same task to a more detailed level in a later acquisition phase. When some tasks are performed by the Government and others are performed by a contractor, procedures must be established to provide for the data interchange between the performing activities. Tasks performed by Government activities should be documented equivalent to the applicable Data Item Description (DID) requirements to assure compatibility of documentation.

40.5.2 When LSA tasks are performed by a contractor, task documentation that is required for delivery to the Government will be specified on the CDRL, DD Form 1423, with appropriate DID's being cited. The CDRL will identify data and information that the contractor will be obligated to deliver under the contract. DID's are used to define and describe the data required to be furnished by the contractor. Applicable DID's that describe the data resulting from performance of the LSA tasks contained in this standard are identified in Table III. These DID's are structured to identify the maximum range of data that can be documented in a report. The requiring authority can tailor down these requirements by deleting

unwanted data from Block 10 of the DD Form 1664 and making apropriate use of the CDRL. For example, if the requiring authority wants a System/Design Trade Study Report which only covers the tradeoff analysis results (Task 303) or the data from only one of the tradeoff subtasks (e.g., 303.2.7, repair level analysis), this can be accomplished through appropriate entries on the CDRL. By appropriately completing the CDRL and lining out unwanted data in Block 10 of the applicable DID's, the requiring authority can structure the deliverable data products to cost effectively meet program requirements.

40.5.3 There is a considerable distinction between data and the documentation of data. Additionally, there is a large number of different forms of documentation for LSA data which frequently overlap. Because of these factors, LSA program data and data formatting requirements must be carefully scoped to meet program needs in a cost effective manner. Factors which affect data and documentation costs include the following:

a. Timing of preparation and delivery. Documentation or recording of data should coincide with the generation of such data in the design and analysis sequences in order that such data will not have to be recreated at added expense at a later date. Delivery of data should be postponed until actual need date in order to acquire data in its most complete form without repetitive updates.

b. Use of the data by the performing activity. The less use, the more expensive.

c. Special formatting requirements.

d. Degree of detail required.

e. Degree of research required to obtain the data.

f. Accuracy and amount of verification required.

g. Duration of responsibility for data contents.

h. Availability and accuracy of source data from which to construct documentation. For example, poorly prepared or inaccurate schematics will increase the cost of technical manuals.

40.5.4 Data and data documentation costs can be effectively controlled by the following methods:

a. Screening requirements prior to preparation of solicitation documents. Each data requirement should be reviewed for data content, end use, formatting needs, scheduled delivery, and estimated cost to eliminate duplication and assure proper integration and scheduling of requirements. This function is generally performed by ILS management.

b. Using contractor format whenever possible. This generally reduces cost and may also provide important insights to contractor controls, checks, and balances between design and LSA functions. Additionally, reformatting requirements often result in a distillation of original data which can provide misleading or incomplete information.

c. Involve potential bidders in briefings and planning conferences prior to issuance of a solicitation document. This helps assure that data and data documentation requirements are realistic and that maximum use is made of data already available.

40.6 Supportability Modeling. The utility of models to perform some aspects of LSA is almost in direct proportion to equipment complexity. For complex systems, a model is almost mandatory in order to relate the system/equipment's design, operational, and support parameters to system performance. Models are defined as systematic, analytical processes used to predict system parameters. They can vary from a simple analytical equation for inherent availability to a complex simulation model covering a multiple end item environment and all levels of maintenance. As a general rule, models used early in the life cycle would be system level models requiring a small amount of input data. Later in the acquisition process, as the design becomes better defined and a support concept is established, a more detailed model might be more applicable. Models used during the LSA process should only be as complex as required to analyze the problem at hand. Simple, easy to apply models requiring little input data should be used whenever possible to enhance the timeliness of the results. When system readiness, life cycle cost, O&S cost, or other models are specified in RFP's, the requiring authority needs to assess the proposal to evaluate the bidder's understanding of the model and its results. Model estimates and data should be traceable from the operational and support concepts to the R&M predictions and design. There should be evidence that design features justify the input data used.

50. DETAILED GUIDANCE FOR TASK SECTIONS, TASKS, AND SUBTASKS

50.1 Task Section 100 - Program Planning and Control.

50.1.1 General Considerations.

50.1.1.1 Program Management. Good management of the LSA effort requires (1) planning which identifies all the required actions, (2) scheduling which identifies the timing of each required action and who is responsible for each action, and (3) execution through timely management decisions. Management procedures must be established to assure that the right information is available at the right time so that timely decisions can be made. LSA planning and management must always be performed by the requiring authority. The basic elements of LSA planning and management outlined in the three tasks in Task Section 100 must be accomplished even when they do not appear as contractual requirements.

50.1.1.2 Identifying Analysis Task Requirements . The determination of what LSA tasks should be performed for a given acquisition program and life cycle phase was covered in paragraph 40 above.

50.1.1.3 Timing. Scheduling task accomplishment is critical for the LSA program to achieve its objectives. Scheduling and managing task accomplishment can be significantly aided by employing a program evaluation and review technique (PERT) or other critical path networking techniques. The criteria that must be applied for proper scheduling of LSA actions is to assure that (1) all required actions are completed and data available when it is needed, and (2) only the required actions are done and only the required data is available to prevent wasting resources and time. Factors to consider when scheduling LSA tasks include the following:

a. During the early phases of acquisition, LSA tasks must be completed and supportability information available when system/equipment alternatives are being considered in order to achieve design influence. Later in the acquisition process, LSA tasks must be completed and supportability information available to assure that the ILS elements are identified, tested, and fielded on a timely basis.

b. When comparing alternatives, do not analyze below the level necessary to evaluate differences. Lower level analyses can be conducted after an alternative is selected.

c. Sometimes it can be too late in an acquisition program to do some LSA tasks. For example, when design is fixed, design oriented tradeoffs offer little or no return on investment.

50.1.1.4 Program Execution. A successful LSA effort requires that the identified tasks be conducted by the identified time. Assurance of this is achieved through continuing monitoring of the effort to identify problems as they occur, and having an established mechanism to make management decisions to eliminate or minimize the problems as they occur. Efficient program execution requires that working arrangements between the LSA program and other system engineering programs be established to identify mutual interests, maximize the benefits of mutually supporting tasks, and minimize effort overlap.

50.1.2 Development of an Early Logistic Support Analysis Strategy (Task 101). This task is the earliest planning activity for an LSA program and is the key first step in developing the most cost effective program. Analyzing probable design and operational approaches, supportability characteristics, and available data before finalizing task requirements assures that the LSA program is focused on the key areas which provide maximum supportability impact on design. The small investment in this task is essential to assure a good return on future investments. While most germane to developing a strategy for concept exploration activity, this task is generally applicable prior to preparation of any solicitation document containing LSA task requirements.

50.1.3 Logistic Support Analysis Plan (Task 102).

50.1.3.1 The LSAP is the basic tool for establishing and executing an effective LSA program. It should effectively document what LSA tasks are to be accomplished, when each task will be accomplished, what organizational units will be responsible for their accomplishment, and how the results of each task will be used. The LSAP may be a stand alone document or may be included as part of the program's ISP when an ISP is required. Plans submitted in response to solicitation documents assist the requiring authority in evaluating the prospective performing activity's approach to and understanding of the LSA task requirements, and the organizational structure for performing LSA tasks.

50.1.3.2 The LSAP is generally submitted in response to a solicitation document and generally becomes a part of the SOW when approved by the requiring authority. When requiring an LSAP, the requiring authority should allow the performing activity to propose additional tasks or task modifications, with supporting rationale to show overall program benefits, to those tasks contained in the solicitation document. The LSAP should be a dynamic document that reflects current program status and planned actions. Accordingly, procedures must be established for updates and approval of updates by the requiring authority when conditions warrant. Program schedule changes, test results, or LSA task results may dictate a change in the LSAP in order for it to be used effectively as a management document.

50.1.4 Program and Design Reviews (Task 103).

50.1.4.1 This task is directed toward four types of reviews; (1) review of design information within the performing activity from a supportability standpoint, (2) system/equipment design reviews, (3) formal system/equipment program reviews, and (4) detailed LSA program reviews. The first type (Subtask 103.2.1) provides supportability specialists the authority with which to manage design influence and tradeoffs. For most developers this type of review is a normal operating practice and imposition of this subtask would not impose any additional cost. This subtask is only applicable during design and design modification efforts and, therefore, should not be applied to nondevelopmental acquisition programs. Contractor procedures for this type of review would be included in the LSAP.

50.1.4.2 System/equipment design reviews and program reviews (Subtasks 103.2.2 and 103.2.3) such as preliminary design reviews, critical design reviews, and production readiness reviews are an important management and technical tool of the requiring authority. They should be specified in SOW's to assure adequate staffing and funding and are typically held periodically during an acquisition program to evaluate overall program progress, consistency, and technical adequacy. An overall LSA program status should be an integral part of these reviews whether conducted internally, with

subcontractors, or with the requiring authority. The results of performing activity's internal and subcontractor reviews should be documented and made available to the requiring authority on request.

50.1.4.3 In addition to system/equipment program and design reviews, specific reviews of the LSA program should be periodically conducted (Subtask 103.2.4). These reviews should provide a more detailed coverage of items addressed at program and design reviews and should address progress on all LSA tasks specified in the SOW. Representative discussion items include task results, data, status of assigned actions, design and supportability problems, test schedule and progress, and the status of subcontractors' and suppliers' efforts. LSA reviews should be conducted as part of ILS reviews when possible, and should be specified and scheduled in the SOW for Task 103. An integral part of this review process is the conduction of a detailed guidance conference as soon as possible after contract award to assure a thorough and consistent understanding of the LSA requirements between the requiring authority and performing activity. Additionally, the requiring authority must establish review policies which maximize the resources available for review. Sampling vs 100 percent review of LSA data, scheduling reviews on an as required rather than a fixed schedule basis, and concentrating on drivers and high risk areas are some of the considerations that must be addressed in establishing the review policies.

50.1.4.4 In addition to formal reviews, useful information can often be gained from performing activity data which is not submitted formally, but which can be made available through an accession list. A data item for this list must be included in the CDRL. This list is a compilation of documents and data which the requiring authority can order, or which can be reviewed at the performing activity's facility. Typically, the details of design analyses, test planning, test results, and technical decisions are included. These data constitute a source of information not otherwise available.

50.2 Task Section 200 - Mission and Support Systems Definition.

50.2.1 General Considerations. It is essential to conduct LSA early in an acquisition program to identify constraints, thresholds, and targets for improvement, and to provide supportability input into early tradeoffs. It is during the early phases of an acquisition program that the greatest opportunity exists to influence design from a supportability standpoint. These analyses can identify supportability parameters for the new system/equipment which are reasonably attainable, along with the prime drivers of supportability, cost, and readiness. The drivers, once identified, provide a basis for concentrated analysis effort to identify targets and methods of improvement. Mission and support systems definition tasks are generally conducted at system and subsystem levels early in the system acquisition process (Concept, and Demonstration and Validation Phases). Identification and analysis of risks play a key

role due to the high level of uncertainty and unknowns early in the life cycle. Performance of these tasks requires examination of current operational systems and their characteristics, as well as projected systems and capabilities that will be available in the time frame that the new system/equipment will reach its operational environment. New system/equipment supportability and supportability related design constraints must be established based upon support systems and resources that will be available when the new system/equipment is fielded. These may be less than, equal to, or greater than the corresponding capabilities for current systems. When supportability analyses have been performed prior to formal program initiation during mission area or weapon system analysis, the range and scope of tasks in this task section should be appropriately tailored to prevent doing the same analysis twice.

50.2.2 Use Study (Task 201). The use study is the prerequisite analysis task to all others in an LSA program. It must be done to satisfy DOD directive requirements and to provide the basis for all ILS planning and readiness analyses for the new system/equipment. The operational concept specifies how the new system/equipment will be integrated into the force structure and deployed and operated in peacetime and wartime to satisfy the mission need. This concept provides the framework around which the support system must be developed. The use study analysis establishes the quantitative supportability factors required for readiness and ILS resource projections. Because of the significant impact of the operational concept on readiness analyses and ILS planning, the use study should look at both the most probable and worst case scenarios for peacetime and wartime employment of the new system/equipment. Field visits (Subtask 201.2.3) to operational units and depots can provide a significant input into the use study in terms of identifying existing capabilities, resources, and problems. Field visits can be useful once the operational environment for the new system/equipment is identified in sufficient detail to determine existing operational units and depots that would most likely be involved in the operations and support of the new system/equipment.

50.2.3 Mission Hardware, Software, and Support System Standardization (Task 202).

50.2.3.1 In many cases, utilization of existing logistic support resources can substantially reduce life cycle cost, enhance readiness, minimize the impact of introduction of the new system/equiment, and increase the mobility of the operational unit using the new system/equipment. Factors that support these potential benefits are the following:

a. Use of existing items avoids the development costs that would be incurred to develop new items.

b. Cost to develop new training programs may be avoided.

c. The probability that the resource will be available for use may be greater.

d. Commonality of support items between end items in an operational unit may require fewer items to be moved in times of mobilization, thereby increasing the operation units' readiness.

e. Personnel proficiency in using support and test equipment can be increased through an increase in frequency of use of the same item, rather than having to learn how to use different items.

50.2.3.2 The same potential benefits may apply to using resources under development. In this case, the cost of development may be spread over a number of end items. However, the risk involved is increased because the developmental item is unproven in an operational environment and is subject to program delays or cancellation. Support system standardization requirements can also arise from DOD or Service support policies. Examples of these requirements can include standard software language requirements or use of standard multisystem test equipment.

50.2.3.3 Once existing and planned resources have been analyzed and the benefits determined, then system/equipment requirements and constraints must be identified and documented in order to achieve the benefits. Supportability and supportability related design requirements to achieve the benefits from support system standardization must be established prior to initiation of the design effort so that the cost of redesigning to meet requirements can be minimized. At the same time, performance of this task should only define requirements to the level necessary based on the projected level of design effort. For example, only system and subsystem level support standardization requirements should be identified if only system and subsystem level design alternatives are to be developed and evaluated.

50.2.3.4 Identification of existing logistic support resources available can be accomplished through use of DOD and Service level handbooks, catalogs, and registers which identify available support equipment; test, measurement, and diagnostic equipment; tools and tool kit contents; personnel skills; and other resources. Field visits conducted as part of the use study (Task 201) can also identify existing capabilities and resources available to support the new item.

50.2.3.5 Standardization through mission hardware and software standardization programs (MIL-STD-680) and parts control programs (MIL-STD-965) can help minimize equipment and parts proliferation, reduce life cycle costs, increase system readiness, and increase standardization and interoperability levels between Services and countries. A comprehensive standardization program will include

participation from supportability activities as well as the other system engineering disciplines, due to the impacts of standardization on mission performance, reliability, maintainability, safety, quality, and survivability. Standardization approaches will generally be investigated starting in the Concept Phase due to S&I considerations and continue to progressively lower levels of indenture throughout the acquisition program. This effort is normally included as a separate contract requirement and care should be exercised in citing Task 202 (Subtasks 202.2.2 and 202.2.3) in order to avoid duplication of effort. The standardization program can normally provide the required data for Subtasks 202.2.2 and 202.2.3. Additionally, care should be exercised in the performance of this task to assure that standardization requirements are not established on poor performance items or items which can be significantly improved.

50.2.4 Comparative Analysis (Task 203). There are three major purposes for accomplishing Task 203:

a. To define a sound analytical foundation for making projections for new system/equipment parameters and identifying targets of improvement.

b. To identify the supportability, cost, and readiness drivers for the new system/equipment.

c. To identify risks involved in using comparative system data in subsequent analyses.

50.2.4.1 A major key to having an effective LSA program is the efficient analysis and use of the data obtained on comparative systems. This process is also called a historical data review. It involves making good use of experience information available from other systems/equipment so that the new system/equipment will be an improvement in supportability as well as performance. When a realistic comparative system can be established, information on the comparative system helps identify the following:

a. High failure rate potential of subsystems and components.

b. Major downtime contributors.

c. Design features which enhance supportability.

d. Potential supportability problem areas to include design features which degrade supportability.

e. Design concepts with potential safety or human factors impacts.

f. Gross requirements for logistic support resources.

g. Design, operational, and support concepts which drive the logistic support requirements, O&S costs, and achieved readiness levels of the system/equipment.

50.2.4.2 Identifying comparative systems and subsystems and establishing BCS's requires a general knowledge of the design, operational, and support characteristics of the new system/equipment and the type of parameter to be projected. If design parameters (R&M, etc.) are to be projected, then current operational systems/equipment which are similar in design characteristics to the new system/equipment's design characteristics must be identified. If major subsystems have been identified for the new system, the BCS for projecting design parameters may be a composite of subsystems from more than one weapon system. If support parameters (resupply time, turnaround times, transportation times, etc.) are to be projected, then current systems (support systems) which are similar to the new system/equipment's support concept must be identified. This may be a support system completely different than the one supporting similar systems/equipment in design characteristics.

50.2.4.3 The level of detail required in describing comparative systems will vary depending on the amount of detail known on the new system/equipment's design, operational, and support characteristics and the accuracy required in the estimates for new system/equipment parameters. Comparative systems and subsystems are normally identified by the requiring authority. BCS's should be established at a level commensurate with expected design progression. When the performing activity is a contractor, the level of comparison must be specified, as well as data sources to be used. Task 203 contains two subtasks (203.2.1 and 203.2.2) which are designed to provide for different levels of detail in identifying comparative systems. For example, if the design concept for the new system/equipment is very general, then only a general level comparative system description (Subtask 203.2.1) should be established. When more detail and accuracy are required, then Subtask 203.2.2 should be used. However, as more detail is required the cost of the analysis increases, therefore, the appropriate subtask should be selected accordingly.

50.2.4.4 Assumptions made in establishing a comparative system and associated risks involved play an important role in determining the accuracy of the new system/equipment projections. Low similarity between the new system/equipment's design, operation, or support concept and existing systems should be documented and new system/equipment projections treated accordingly. Additionally, inherent risks are involved in constructing composite comparative systems unless environmental and operational differences are identified and the supportability, cost, and readiness values adjusted accordingly.

50.2.4.5 Qualitative supportability problems (Subtask 203.2.4) on existing systems should be thoroughly analyzed to provide insight into areas for improvement during the development of the new system/equipment.

50.2.4.6 Supportability, cost, and readiness drivers are identified (Subtask 203.2.5 and 203.2.6) so that areas of improvement can be identified and supportability and supportability related design contraints can be formulated to achieve the improvements. Major problems on existing systems must be identified and approaches to eliminate or reduce these problems must be developed. As with other tasks in this standard, the timing and scope of this effort must be commensurate with the timing and scope of the system/equipment design effort in order for the constraints to be effective. Concept phase analyses would be at the system and subsystem level so that system and subsystem level constraints could be defined prior to entry into the Demonstration and Validation Phase.

50.2.4.7 Supportability, cost, and readiness drivers may be identified from a number of perspectives; drivers could be specific ILS elements, specific support functions (e.g., alignment or calibration requirements), specific mission subsystems/components, or specific features of the operational scenario/requirement. Proper driver identification is a prerequisite to establishment of the most effective constraints for achieving improvements. Care must be exercised to assure that true drivers are identified and not the effects of a driver. For example, supply support cost is not a cost driver if it is a result of poor reliabilty of a subsystem. In this case, the subsystem reliability would be the cost driver. The identification of drivers is dependent upon the availability of data on comparative systems. When citing Subtasks 203.2.5 and 203.2.6, the requiring authority must consider the data bases available to support driver identification. Additionally, this task can be performed by specialty areas and the results consolidated under the LSA program. For example, manpower, personnel, and training analysis may be performed by human engineering and training specialists, and maintainability comparisons may be done under the maintainability program.

50.2.5 Technological Opportunities (Task 204). This task should be performed by design personnel in conjunction with supportabilty specialists. It is designed to identify potential technological approaches to achieve new system/equipment supportability improvements. It will identify the expected effect of improvements on supportability, cost, and readiness values so that supportability and supportability related design objectives for the new system/equipment can be established. Particular attention should be devoted to the application of technological advancements to system/equipment drivers and areas where qualitative problems were identified on comparative systems. Improvements can be developed at

any level (system, subsystem, or below), however, they should be prioritized based on the contribution of each to system and subsystem level supportability values.

50.2.6. Supportability and Supportability Related Design Factors (Task 205).

50.2.6.1 This task establishes the supportability parameters governing the new system/equipment's development. These parameters will include objectives, goals and thresholds, qualitative and quantitative constraints, and system/equipment specification requirements. Subtask 205.2.1 quantifies the supportability impacts of alternative concepts which serve as a basis for the remaining subtasks.

50.2.6.2 The type of parameter developed as a result of performing Task 205 will depend on the phase of development. Generally, prior to Milestone I, supportability objectives will be established (Subtask 205.2.2). These objectives are established based on the results of previous mission and support systems definition tasks, especially the opportunities identified as a result of Task 204, and are subject to tradeoffs to achieve the most cost effective solution to the mission need. After Milestone I and prior to Milestone II, goals and thresholds are established (Subtask 205.2.5) which are not subject to tradeoff. Thresholds represent the minimum essential levels of performance that must be satisfied at specified points in the acquisition.

50.2.6.3 Overall system/equipment objectives or goals and thresholds must be allocated and translated to arrive at supportability requirements to be included in the system, subsystem, or support system specification or other document for contract compliance (Subtask 205.2.3). This subtask is necessary to assure that specification or contract parameters include only those parameters which the performing activity can control through design and support system development. The support burden and other effects of the GFE/GFM, administrative and logistic delay time, and other items outside the control of the performing activity must be accounted for in this process. For example, if the overall threshold for manpower is 100 manhours/system/year, and a government furnished subsystem requires 25 manhours/system/year, then the contract should reflect a threshold of 75 manhours/system/year for performing activity developed hardware. This translation from supportability objectives or goals and thresholds to specification requirements is also important for readiness parameters. When the item under procurement is a complete weapon system, then applicable readiness parameters may be suitable for inclusion in the system specification. However, if the item under procurement is less than a weapon system (i.e., subsystem or equipment going into a weapon system) then other parameters would be more appropriate (e.g., logistic related R&M parameters).

50.2.6.4 When performing Subtask 205.2.3, thorough consideration should be given to possible supportability incentives which may be included in the contract. However, incentives should be at the system level (possibly subsystem for some acquisitions) to prevent optimization approaches at lower levels which do not represent optimum system level solutions. This should not preclude component level initiatives such as reliability improvement warranties (RIW).

50.3 Task Section 300 - Preparation and Evaluation of Alternatives.

50.3.1 General Considerations.

50.3.1.1 Iterations. The tasks contained in this section are highly iterative in nature and are applicable in each phase of the life cycle. Additionally, they are generally performed in sequence; that is, functions are identified (Task 301), alternatives are developed to satisfy the functions (Task 302), and evaluations and tradeoffs are conducted (Task 303). This process is then iterated to increasingly lower levels of indenture and detail in the classic system engineering manner.

50.3.1.2 Timing. The identification of functions, development of alternatives, and tradeoff analyses should be conducted to a level of detail and at a time consistent with the design and operational concept development. In the early phases of the life cycle, functions and alternatives should only be developed to the level required to analyze differences and conduct tradeoffs. More detail can be developed after tradeoffs are made and the range of alternatives is narrowed. At the same time, the support plan must be finalized at a time which allows for the development and testing of the necesary ILS element resources to carry out the support plan.

50.3.2 Functional Requirements Identification (Task 301). Identification of the operating and maintenance functions for the new system/equipment must coincide with critical design decisions to assure development of a system which achieves the best balance between cost, schedule, performance, and supportability. Special emphasis should be placed on the functional requirements which are supportability, cost, or readiness drivers for the new system/equipment or which are new functions that must be performed based on new design technology or new operational concepts. Identification of the functions which are drivers provides a basis for developing new support approaches or design concepts to enhance the supportability of the new system/equipment. Identification of the new functional requirements provides the basis for management attention due to the potential supportability risks. Functional flow block diagrams are a useful tool in identifying functional requirements and establishing relationships between functions. Additionally, other system engineering programs provide a significant input to the functional requirements identification process. For example, human engineering

specialists may be best qualified to identify and analyze operations functions, transportation specialists may be best qualified to identify and analyze transportation requirements, etc. The LSA program under Task 301, consolidates the functional requirements developed by the appropriate specialty areas to assure the support system developed for the new system/equipment satisfies all functional requirements.

50.3.2.1 Task 301 is designed to provide for varying levels of detail from system and subsystem level functions (Subtasks 301.2.1 through 301.2.3) to detailed operations and maintenance tasks requirements (Subtask 301.2.4). Appropriate subtask requirements should be identified based on the level of design definition and schedule requirements. Table III provides general guidelines for the timing of each subtask.

50.3.2.2 Operations and support task requirements (Subtask 301.2.4) are identified using three analysis techniques: (1) FMECA, (2) an RCM analysis, and (3) a detailed review of the system/equipment functional requirements. The FMECA identifies the failure modes of the system and its components thus identifying the corrective maintenance requirements. The RCM analysis identifies preventive maintenance requirements (1) to detect and correct incipient failures either before they occur or before they develop into major defects, (2) to reduce the probability of failure, (3) to detect hidden failures that have occurred, or (4) to increase the cost effectiveness of the system/equipment's maintenance program. The review of the system/equipment's functional requirements identifies those tasks which are neither corrective nor preventive but must be performed in order for the system/equipment to operate as intended in its environment. These tasks include operations, turnaround tasks, reloading, mission profile changes, transportation tasks, etc.

50.3.2.3 A FMECA systematically identifies the likely modes of failure, the possible effects of each failure, and the criticality of each effect on mission completion, safety, or some other outcome of significance. The FMECA requirements will generally be included under the Reliability Program, however, FMECA requirements for a system must be developed in conjunction with the LSA program requirements due to the necessity of having FMECA results to conduct some LSA tasks. In particular, the FMECA provides the basis for built-in and external test specification and evaluation. This coordination should consider the timing of the FMECA, level of detail, and documentation requirements.

50.3.2.4 RCM analysis consists of a systematic approach of analyzing system/equipment reliability and safety data to determine the feasibility and desirability of preventive maintenance tasks, to highlight maintenance problem areas for design review consideration, and to establish the most effective preventive maintenance program

for the new system/equipment. RCM logic is applied to the individual failure modes of each reparable item in the system/equipment identified during the FMECA, through a progressive determination of how impending failures can be detected and corrected in order to preserve, to the degree possible, the inherent levels of reliability and safety in the system/equipment.

50.3.2.5 Task requirements to satisfy the system/equipment's functional requirements which are not identified during the FMECA and RCM analysis are generally system level tasks. These tasks must be analyzed relatively early in the life cycle (Demonstration and Validation Phase) so that the system/equipment's design can be appropriately defined to preclude supportability problems. These tasks are often constrained by system/equipment requirements (e.g., turnaround time cannot exceed a certain value or the system must be transportable via a given mode) and the detailed task analysis must be conducted in a timely fashion so that design corrections can be made when the requirements are exceeded.

50.3.3 Support System Alternatives (Task 302). Support alternatives for a new system/equipment must cover each element of ILS, and satisfy all functional requirements. Initial support alternatives will be system level support concepts which address the supportability, cost, and readiness drivers and the unique functional requirements of the new system. After tradeoff and evaluation of these alternatives (Task 303), alternatives will be formulated at a lower level for further tradeoffs and evaluations. Conducting this analysis in an iterative fashion from the top down helps assure efficient use of resources in conducting the LSA. Support alternatives should be formulated to equivalent levels of detail for tradeoffs and evaluation, and then further detail developed after the tradeoff analysis is conducted. This process continues in an iterative manner throughout the materiel acquisition process until the system level support concept is refined into a detailed support plan covering all levels of maintenance, all items of hardware and software requiring support, and all operations and maintenance tasks. Where applicable, depot maintenance interservicing considerations should be included in alternative support concepts.

50.3.3.1 Alternative support systems are formulated by synthesizing alternatives for individual ILS elements into support systems. During this process, the following points must be considered:

a. Interrelationships that exist between the ILS elements (e.g., manpower, personnel, and training alternatives may depend upon support equipment alternatives).

b. Formulation of detailed alternatives for one element of ILS may not be cost effective until higher level system alternatives are evaluated and selected.

50.3.3.2 In some cases, formulating support alternatives may be an inherent feature of models used in the evaluation and tradeoff process. This is especially true for many RLA models used during Full Scale Development where repair versus discard alternatives and alternative maintenance levels for repair and discard are automatically formulated and analyzed during execution of the model. In these cases, citing Task 303 and specifying use of a particular model may limit the required scope of Task 302. Additionally, the scope of Task 302 may be limited when dealing with equipment level acquisitions. In these cases, the support alternatives may be restricted due to the system level support concept.

50.3.4 Evaluation of Alternatives and Tradeoff Analysis (Task 303). Tradeoff analysis between design, operational, and support alternatives is an inherent part of system development. Optimum benefits are realized when these analyses are conducted considering all system factors (cost, schedule, performance, and supportability) before the system is finalized. The nature of the tradeoff models and techniques used and the magnitude, scope, and level of detail of the analysis will depend upon both the acquisition phase and the system complexity. Tradeoffs early in the program will generally be interdisciplinary and broad in scope. As development progresses, tradeoffs are progressively refined, inputs become more specific, and outputs influence a smaller number of related parameters.

50.3.4.1 Tradeoffs between the support alternatives identified for the new system/equipment are conducted to identify the support approach which best satisfies the requirements. These tradeoffs are conducted by using a model or manual procedure which relates the design, operation, and logistic support resource factors of alternatives to the supportability requirements for the system/equipment. Alternatives can then be ranked and the sensitivity of the results to changes in key design, operation, or support factors can be determined. Results, including the rationale for selection and rejection of alternatives, should be documented for subsequent iterations and refinements. Tradeoff analysis results, both between support alternatives and between support, design, and operational alternatives, become a prime data input into the system decision process. As such, the tradeoff analysis results must include indentification of assumptions and risks involved.

50.3.4.2 Subtask 303.2.1 provides the general requirements for each evaluation and tradeoff performed under Task 303. Subtasks 303.2.2 and 303.2.3 are continuing requirements throughout a system/equipment's life cycle to analyze alternative support approaches and alternative design, operations, and support approaches, respectively. The remaining subtasks represent key tradeoffs and evaluations that are frequently applicable during given phases of the life cycle as indicated in Table III. For a given acquisition program, the range of potential tradeoffs and evaluations is essentially

limitless. Procedures should be established between the requiring authority and performing activity to allow for specific evaluations and tradeoffs to be identified and conducted as required throughout the acquisition process. In selecting and conducting tradeoffs and evaluations for a given acquisition program, the following factors should be considered:

a. System readiness analysis (Subtask 303.2.4) should always be considered a high priority.

b. Select the tradeoff subtasks which deal with the supportability, cost, and readiness drivers of the system. Additionally, the scope of the selected tradeoff and evaluation subtasks can be limited to the drivers.

c. Some tradeoffs and evaluations lend themselves to being performed by a specific community for input into the LSA program. For example, the diagnostic trade (Subtask 303.2.8) may best be performed under the Maintainability Program, the training trade (Subtask 303.2.6) may best be performed by training specialists, etc.

d. Care should be exercised in using manhours as a criteria parameter for manpower trades (Subtask 303.2.5) because of two factors. First, each integral number of people has a range of manhours associated with it. Adding or reducing manhours has no effect on the number of people required until either the upper or lower limit of the range is breached. Then, and only then, does the number of people required change. Second, there is not a direct correlation between manhours and number of people required unless personnel skills are considered. For example, the same number of manhours may equate to one person required or many people required depending on the number of different skills required.

e. Conceptual phase repair level analyses (Subtask 303.2.7) should only analyze gross concepts.

f. Where applicable (e.g., in doing contractor versus organic support alternatives), assure that realistic personnel costs are used. Often Service published personnel costs do not include costs associated with recruitment, washouts, retention, etc., and use of these personnel costs may bias the tradeoff results.

50.4 Task Section 400 - Determination of Logistic Support Resource Requirements.

50.4.1 General Considerations. Logistic support resource requirements associated with proposed system/equipment alternatives must be identified and refined as the system/equipment progresses through its development. The extent of identification depends upon the magnitude and complexity of the new system/equipment and the phase

of the acquisition cycle. As development progresses and the basic design and operational characteristics are established, this determination becomes a process of analyzing specific design and operational data to more completely identify detailed logistic support resource requirements. This portion of the LSA defines the requirements of the principal elements of ILS. This analysis can be very costly and involve development of a considerable amount of documentation. In determining the timing and scope of analysis tasks in this section, the following should be considered:

a. Early identification of logistic support resource requirements should be limited to new or critical requirements so that available resources are effectively used and sufficient acquisition time is allocated to the development and testing of these requirements. This identification should be accomplished as part of Task 303 (Subtask 303.2.2) and documentation should be limited to the minimum essential data.

b. Resource requirements for different system alternatives should only be identified to the level required for evaluation and tradeoff of the alternatives.

c. Logistic support resource requirements must be identified in a time frame which considers the schedule for developing the required documentation for each element of ILS. Schedule accomplishment of these tasks considering the time required to provision, develop technical manuals, establish training programs, etc.

d. There are different levels of documentation that can be applied to the identification of logistic support resource requirements. (For example, supply support requirements can be identified through documentation of only a few data elements early in a program while later the total range of data elements required to accomplish initial provisioning can be documented.)

e. Detailed input data for identification of logistic support resource requirements is generated by many system engineering functions. Therefore, analysis and documentation requirements and timing must be a coordinated effort between the LSA program and other system engineering programs to avoid duplication of effort and assure timely availability of required input data.

50.4.2 Task Analysis (Task 401). This task provides the detailed identification of requirements for all elements of ILS to operate and support the new system/equipment. It also includes an analysis of requirements to identify areas where supportability enhancements can be achieved. During performance of this task, the following will be determined for each operations and maintenance task:

a. Maintenance level.

b. Number of personnel, skill levels, skill specialities, manhours, and elapsed time.

c. Spares, repair parts, and consumables required.

d. Support equipment; test, measurement, and diagnostic equipment (TMDE); and test program sets (TPS) required.

e. Training and training materiel required along with recommended training locations and rationale.

f. Procedural steps required to perform the task.

g. Facilities required.

i. Interval for and the frequency of task performance in the intended operational environment. The annual operating basis for task frequencies must be carefully selected and widely understood to prevent misuse of the information generated by this task.

j. Packaging, handling, storage, and transportation requirements.

50.4.2.1 The timing and depth for performance of Task 401 is governed by the level of design and operation definition and by the program schedule. The analysis cannot be cost effectively performed until required input information from the design activity is available and cannot be delayed beyond a point that does not allow sufficient time to conduct the task analysis and use the results to develop ILS element documentation (e.g., technical manuals, personnel requirements list, etc.) in a timely manner. Demonstration and Validation Phase efforts should be limited to only essential information. During Full Scale Development (FSD), this task would be performed for all system/equipment components. During the Production and Deployment Phase, this task would be performed on any design changes.

50.4.2.2 The scope of this task can be effectively tailored to cost effectively meet program needs through identification of system hardware and software on which the analysis will be performed, identification of indenture level to which the analysis will be carried, identification of the maintenance levels that will be included in the analysis, and the identification of the amount of documentation required. This tailoring process must be done in conjunction with other system engineering programs and must consider the requirements of each ILS functional element.

50.4.2.3 Task analysis is probably the area of an LSA program which requires the most coordination and interfacing in that it involves essentially every system engineering discipline and ILS functional

element manager. When properly interfaced, task analysis provides a very cost effective means for assuring supportability of the system/equipment and developing an integrated support system for the system/equipment. When not properly interfaced, task analysis can be a very costly process which duplicates other analyses and generates incompatible ILS products. Design, reliability, maintainability, human engineering, safety, and others are all involved in satisfying the task analysis requirements of Task 401. The LSA program integrates and translates these inputs into output products required for preparation of ILS documents.

50.4.3 Early Fielding Analysis (Task 402). This task is designed to assure an effective fielding of the new system/equipment with all required resources. Subtask 402.2.1 is designed to quantify the effect on existing systems from the new system/equipment's deployment. This impact determination is necessary for the acquisition decision process to result in improved overall force capability and to assure planning to accommodate the new system/equipment effectively. Subtask 402.2.2 specifically addresses the manpower and personnel impact of the deployment. This subtask identifies where the necessary people and skills will come from for the new system/equipment, and what impact will be felt from this on other weapon systems. Subtask 402.2.3 identifies the effect on system readiness for varying levels of logistic support resources. This analysis forms the quantitative basis for budget requirements. Subtask 402.2.4 identifies logistic support resource requirements in alternative operational environments and provides the basis for wartime reserve stocks and mobilization plans and requirements. Subtask 402.2.5 requires plans to be developed to alleviate any potential fielding problems for the new system/equipment. These subtasks should only be selectively applied to equipment level acquisitons.

50.4.4 Post Production Support Analysis (Task 403). This task is intended to assure potential post production support problems are identified and addressed. Reprocurement problems, closing of production lines, obsolescence of design, expected discontinuances of business by manufacturers, etc., in the post deployment environment cause problems in assuring an adequate supply of spare and repair parts. If these factors are determined to present potential problems, plans must be established early to assure that effective life cycle support will be available for the new system/equipment.

50.5 Task Section 500 - Supportability Assessment.

50.5.1 General Considerations.

50.5.1.1 Types of Assessment. There are two general areas of supportability assessment covered in this section; assessment as part of the formal test and evaluation program, and assessment after deployment through analysis of operational, maintenance, and supply

data on the system/equipment in its operational environment. In the first case, the assessments are made prior to deployment and, where applicable, upon initial deployment during follow-on test and evaluation. In the second case, the assessments are made based upon data available on the system/equipment in its normal operating environment.

50.5.1.2 Test and Evaluation. The supportability test and evaluation program must serve three objectives: (1) provide measured data for supportability and supportability related design parameters for input into system level estimates of readiness, O&S costs, and logistic support resource requirements; (2) expose supportability problems so that they can be corrected prior to deployment; and (3) demonstrate contractual compliance with quantitative supportability and supportability related design requirements. Test and evaluation planning, scheduling, and cost investment must be related to these objectives to maximize the return on investment. Development of an effective test and evaluation program requires close coordination of efforts between all system engineering disciplines to prevent duplication of tests and to maximize test program effectiveness. Reliability tests, maintainability demonstrations, publications validation/verification efforts, environmental tests, endurance/durability tests, and other tests shall be used in satisfying supportability assessment requirements. A well integrated test program involves establishing test conditions that maximize the utility of the test results. This is an important factor considering that the availability of hardware and time to conduct tests and evaluations are generally at a premium for most acquisitions, and that test results are a vital feedback loop because they represent the first hard data available for the new system/equipment.

50.5.1.3 Test Environment. One major factor that determines the utility of test results to satisfy the objectives of the supportability test and evaluation program is the test environment. Historically, there has been a large gap between test results and field-observed parameters. This wide gap is to a large degree caused by conducting tests in ideal environments, using contractor technicians to perform maintenance during test, ignoring some test results (nonchargeable failures), and not using the planned resources (technical manuals, tools, test equipment, personnel, etc.) during the tests. Realistic test environments must be established considering the intended operational environment and the intended logistic support resources (all elements of ILS) that will be available to operate and maintain the system/equipment after deployment. While a total simulation of the field environment may not be practical or cost effective, test environments should be established to be as close as possible and known differences between the test and field environments must be accounted for in using test results to update system level projections for readiness, O&S costs, and logistic support resource requirements. Additionally, expected levels of maturation to supportability parameters should be applied to test and evaluation results to get a good projection of expected supportability.

50.5.1.4 Post-Deployment Assessments. A system's ultimate measure of supportability is determined by how well it performs in its environment after deployment. Analysis of feedback data from the operational environment is the necessary final step in verifying that the system/equipment has met its objectives and in evaluating post deployment support. In some cases, this assessment can be made using field feedback data that is routinely available from standard readiness, supply, and maintenance reporting systems; while in other cases, data from standard reporting systems must be supplemented in order to meet the verification objective within acceptable confidence levels. Any requirement for supplemental data must be weighed against the cost and resources to obtain the data and any impact upon using units to gather the data.

50.5.2 Supportability Test, Evaluation, and Verification (Task 501).

50.5.2.1 Initial supportability test and evaluation planning (Subtask 501.2.1) occurs prior to the life cycle phase in which the tests will be conducted. This planning shall include identification of the resources (hardware, time, and support) required for testing. Test and evaluation strategies should be based on the supportability and supportability related design requirements; the supportability cost, and readiness drivers; and areas with a high degree of risk associated with them. Test and evaluation plans shall include supportability objectives and criteria integrated with other system engineering test requirements. Pre-Milestone I planning shall include strategies for evaluation (during Demonstration and Validation Phase testing) of design and operational features that affect the feasibility of the system/equipment's supportability, cost, and readiness objectives. Pre-Milestone II planning shall include strategies for demonstrating (during FSD testing) established supportability and supportability related design objectives within stated confidence levels through the intermediate/general support maintenance level; evaluation of operability and operator training; demonstration of the adequacy of the logistic support plan to include all elements of ILS; and quantification of requirements for fuel, ordnance, supply, and other ILS elements. Preproduction planning shall include strategies for assessing (during FOT&E) mission hardware, software, and support items not fully tested prior to production; demonstration, in an operational environment, that initial production items meet the thresholds for mature systems; and, refinement of operating tactics, training requirements, and force unit organizational concepts as required.

50.5.2.2 Detailed test plans and criteria are established (Subtask 501.2.2) based on the test and evaluation objectives of the system/equipment. An important category of data that must be provided by the LSA program is the identification of the ILS elements that must be provided to testing activities for test and evaluation. This identification is an integral part of Tasks 301, 303, and 401. Task 501 provides detailed plans for test and evaluation of these resources.

50.5.2.3 Data resulting from testing will be analyzed as part of Task 501 (Subtask 501.2.3) to accomplish the following:

a. Correct deficiencies discovered during test and validate corrective actions implemented to eliminate deficiencies identified during previous tests.

b. Update system level projections for readiness, O&S costs, and logistic support resource requirements.

c. Identify the amount of improvement required in supportability and supportability related design parameters to meet established goals and thresholds.

d. Identify achievement or nonachievement of contractual requirements.

e. Provide an assessment of supportability for input into the materiel acquisition decision process.

f. Update LSAR data.

g. Provide a data base of experience information for subsequent comparative analyses on future system/equipment acquisitions.

50.5.2.4 Subtasks 501.2.4 and 501.2.5 provide the requirements for post deployment assessment of the new system/equipment. In those cases where existing standard field reporting systems will not provide the necessary data or accuracy to conduct this analysis, then supplemental data collection programs must be planned, approved, budgeted for, and implemented. Planning activities (Subtask 501.2.4) would normally occur prior to production, and data review and analysis (Subtask 501.2.5) would occur following deployment. Care should be exercised in planning this activity to assure that field results are collected during "normal" field operations. Collecting data immediately after deployment may be biased if any of the following situations are in effect:

a. New equipment fielding teams are with the system/equipment.

b. Operator and maintenance personnel received training from other than the intended normal training sources.

c. Initial supply support was obtained from other than standard supply systems.

d. Interim support resources are being used pending deployment of other items (e.g., support and test equipment).

50.5.2.5 Analysis of data obtained from field reporting systems can provide significant information for system/equipment enhancements through logistic support resource modifications, product improvement programs, or modifications of operating tactics. Additionally, comparative analysis between field results, test and evaluation results, and engineering estimates can provide information for use on future acquisition programs to better project supportability, cost, and readiness parameters.

TABLE II. Logistic Support Analysis Information Requirements for Major Systems by Milestone.

INFORMATION REQUIREMENT	RELATED LOGISTIC SUPPORT ANALYSIS TASKS (SUBTASKS)
PROGRAM INITIATION	
1. Manpower and other logistic resource constraints for the new system.	1. 201 (201.2.1, 201.2.2) 203 (203.2.1, 203.2.3)
MILESTONE I	
1. Support cost, manpower requirements, and R&M of current comparable equipment.	1. 203 (203.2.3)
2. Manpower, cost, and readiness drivers.	2. 203 (203.2.5)
3. Readiness and support cost targets for improvement.	3. 204 (204.2.1)
4. Evaluation of logistic resource implications of alternative operational and support concepts.	4. 205 (205.2.1)
5. System readiness objectives.	5. 205 (205.2.2)
6. New technology items that require advances in repair technology.	6. 301 (301.2.2)
7. Major items of support-related hardware and software requiring development.	7. 303 (303.2.2)
8. Manpower sensitivity to alternative employment concepts.	8. 303 (303.2.5)
9. Significant differences in the training implications of alternative systems considered.	9. 303 (303.2.6)
10. Critical manpower, logistic, and R&M parameters compared to existing systems.	10. 303 (303.2.9)

TABLE II. Logistic Support Analysis Information Requirements for Major Systems by Milestone - Continued.

INFORMATION REQUIREMENT	RELATED LOGISTIC SUPPORT ANALYSIS TASKS (SUBTASKS)
MILESTONE II	
1. Manpower and support resource sensitivity to changes in key parameters, associated impacts on system readiness, and logistic risk areas.	1. 205 (205.2.1) 303 (303.2.5)
2. Readiness, R&M, manpower, and other logistic goals and thresholds, and comparison with existing systems.	2. 205 (205.2.5) 303 (303.2.9)
3. Baseline support concept.	3. 301 (301.2.1) 302 (302.2.1) 303 (303.2.2)
4. Subsystems considered for long-term contractor support.	4. 302 (302.2.1) 303 (303.2.2)
5. Tradeoff results to optimize the balance among hardware characteristics, support concepts and support resource requirements.	5. 303 (303.2.3)
6. Formal training requirements.	6. 303 (303.2.6) 401 (401.2.4)
7. Capability of current and planned support systems to meet logistic objectives.	7. 303 (303.2.1)
8. Adequate test and evaluation plans to assess achievement of support-related thresholds, adequacy of support plans and resources, and impacts on cost and readiness objectives.	8. 501 (501.2.2)
9. Effect of test results on support resource requirements.	9. 501 (501.2.3)
10. Updated Milestone I information.	10. 203/204/205 301/302/303

TABLE II. Logistic Support Analysis Information Requirements for Major Systems by Milestone - Continued.

INFORMATION REQUIREMENT	RELATED LOGISTIC SUPPORT ANALYSIS TASKS (SUBTASKS)
PRODUCTION	
1. Detailed support planning requirements.	1. 302 (302.2.3) 303 (303.2.2) 401/402
2. Manpower and training requirements to support peacetime readiness and wartime employment.	2. 401/402
3. Acceptable R&M demonstrations, maintenance plan, manpower, and support resources.	3. 401/402 501 (501.2.3)
4. Impact on system readiness of failure to obtain required personnel.	4. 402 (402.2.3)
5. Plans for evaluating manpower requirements during FOT&E.	5. 501 (501.2.2)
6. Updated Milestone II information.	6. 205 301/302/303 401 501

TABLE III

Logistic Support Analysis Task Application and Documentation Matrix

TASK TITLE	APPLICABILITY BY PHASE*					APPLICABLE DATA ITEM DESCRIPTIONS	REMARKS
	PRE-CON-CEPT	CON-CEPT	DVAL	FSD	PROD		
101 DEVELOPMENT OF AN EARLY LOGISTIC SUPPORT ANALYSIS STRATEGY	NA	G (3,4)	G (3,4)	S(3)	NA	DI-L-7114 Logistic Support Analysis Strategy Report	
102 LOGISTIC SUPPORT ANALYSIS PLAN	NA	G(4)	G(4)	G(4)	(G,4)	DI-L-7017A Logistic Support Analysis Plan	
103 PROGRAM AND DESIGN REVIEWS	NA	G (2,4)	G (2,4)	G (2,4)	G (2,4)	DI-A-7088 Conference Agenda DI-A-7089 Conference Minutes DI-L-7017A Logistic Support Analysis Plan	DI-A-7088 and DI-A-7089 apply to any conference or review. Subtask 103.2.1 only.
201 USE STUDY	G(5)	G(4)	G(4)	G(4)	NA	DI-S-7115 Use Study Report	

TABLE III

Logistic Support Analysis Task Application and Documentation Matrix - Continued.

TASK TITLE	APPLICABILITY BY PHASE*					APPLICABLE DATA ITEM DESCRIPTIONS	REMARKS
	PRE-CON-CEPT	CON-CEPT	DVAL	FSD	PROD		
202 MISSION HARDWARE, SOFTWARE, AND SUPPORT SYSTEM STANDARD-IZATION	NA	G (2,4)	G (2,4)	G (2,4)	C (2,4)	DI-S-3606 System/Design Trade Study Reports DI-E-7026 Parts Control Program Plan DI-E-7027 Program Parts Selection List (PPSL) DI-E-7028 Nonstandard Parts Approval Requests/ Proposed Additions to an Approved PPSL DI-E-7029 Military Detail Specifications and Specification Sheets DI-E-7030 Test Data for Nonstandard Parts	DI-E-7026 through DI-E-7030 pertain to the Parts Control Program. These DID's require citing MIL-STD-965 on the contract.
203 COMPARATIVE ANALYSIS	G	G	G	G	NA	DI-S-7116 Comparative Analysis Report	
Subtask 203.2.1	G	G	G	NA	NA		
Subtask 203.2.2	G(5)	G(5)	G(4)	G(4)	NA		
Subtask 203.2.3	G(5)	G(5)	G(4)	NA	NA		
Subtask 203.2.4	G(5)	G(5)	G(4)	G(4)	NA		
Subtask 203.2.5	G(5)	G(5)	G(4)	G(4)	NA		
Subtask 203.2.6	G	G	G	NA	NA		
Subtask 203.2.7	NA	G(5)	G(4)	G(4)	NA		
Subtask 203.2.8	G	G	G	G	NA		

TABLE III

Logistic Support Analysis Task Application and Documentation Matrix - Continued.

TASK TITLE	APPLICABILITY BY PHASE*					APPLICABLE DATA ITEM DESCRIPTIONS	REMARKS
	PRE-CON-CEPT	CON-CEPT	DVAL	FSD	PROD		
204 TECHNOLOGICAL OPPORTUNITIES	NA	G	G	S	NA	DI-S-7117 Technological Opportunities Report	
205 SUPPORTABILITIY AND SUPPORTABILITY RELATED DESIGN FACTORS	NA	G	G	G	C	DI-S-3606 System/Design Trade Study Reports	
Subtask 205.2.1	NA	G	G	NA	NA	DI-S-4057 Scientific and Technical Reports	Subtask 205.2.3 only. See MIL-STD-1388-2 for LSAR data element definitions.
Subtask 205.2.2	NA	G	G	NA	NA		
Subtask 205.2.3	NA	G	G	G	C		
Subtask 205.2.4	NA	G(4)	G(4)	NA	NA		
Subtask 205.2.5	NA	NA	G	NA	NA		
301 FUNCTIONAL REQUIREMENTS IDENTIFICATION	NA	G	G	G	C	DI-S-3606 System/Design Trade Study Reports	
Subtask 301.2.1	NA	G	G	S(1)	C(1)	DI-S-4057 Scientific and Technical Reports	Subtasks 301.2.4 and 301.2.6 only. Data requirements must be coordinated with Reliability, Maintainability, and Human Engineering Program requirements.
Subtask 301.2.2	NA	G	G	S(1)	C(1)		
Subtask 301.2.3	NA	G	G	S(1)	C(1)		
Subtask 301.2.4	NA	S	G	G	C		
Subtask 301.2.5	NA	G	G	G	C		
Subtask 301.2.6	NA	G	G	G	C		

TABLE III

Logistic Support Analysis Task Application and Documentation Matrix - Continued.

TASK TITLE	APPLICABILITY BY PHASE*					APPLICABLE DATA ITEM DESCRIPTIONS	REMARKS
	PRE-CON-CEPT	CON-CEPT	DVAL	FSD	PROD		
302 SUPPORT SYSTEM ALTERNATIVES	NA	G	G	G	C(1)	DI-S-3606 System/Design Trade Study Reports	
Subtask 302.2.1	NA	G(4)	G(4)	NA	NA		
Subtask 302.2.2	NA	G	G	S	NA		
Subtask 302.2.3	NA	S	S	G(4)	C(1,4)		
Subtask 302.2.4	NA	S	S	G	C(1)		
Subtask 302.2.5	NA	G	G	G	C(1)		
303 EVALUATION OF ALTER-NATIVES AND TRADE-OFF ANALYSIS	NA	G	G	G	C	DI-S-3606 System/Design Trade Study Reports	
Subtask 303.2.1	NA	G	G	G	C		
Subtask 303.2.2	NA	G	G	G	C		
Subtask 303.2.3	NA	G	G	G	C		
Subtask 303.2.4	NA	G	G	G	NA		
Subtask 303.2.5	NA	G	G	S	NA		
Subtask 303.2.6	NA	G	G	G	C		
Subtask 303.2.7	NA	S(1)	G	G	C		
Subtask 303.2.8	NA	G	G	S(1)	NA		
Subtask 303.2.9	NA	G(5)	G(4)	S(1)	C(4)		
Subtask 303.2.10	NA	G(5)	G(4)	S	C(4)		
Subtask 303.2.11	NA	G(5)	G(4)	G(4)	C(4)		
Subtask 303.2.12	NA	G(5)	G(4)	NA	NA		

TABLE III

Logistic Support Analysis Task Application and Documentation Matrix - Continued.

TASK TITLE	APPLICABILITY BY PHASE*					APPLICABLE DATA ITEM DESCRIPTIONS	REMARKS
	PRE-CON-CEPT	CON-CEPT	DVAL	FSD	PROD		
401 TASK ANALYSIS	NA	NA	S	G	C	DI-S-3606 System/Design Trade Study Reports	Subtasks 401.2.5, 401.2.6, and 401.2.9.
Subtask 401.2.1	NA	NA	S	G	C		
Subtask 401.2.2	NA	NA	S	G	C		
Subtask 401.2.3	NA	NA	S	G(4)	C(4)	DI-S-4057 Scientific and Technical Reports	Data requirements must be coordinated with ILS element data requirements. See MIL-STD-1388-2 for LSAR data element definitions.
Subtask 401.2.4	NA	NA	S	G(4)	C(4)		
Subtask 401.2.5	NA	NA	S	G	C		
Subtask 401.2.6	NA	NA	S	G	C		
Subtask 401.2.7	NA	NA	G(4)	S(1)	C(1)		
Subtask 401.2.8	NA	NA	S	G	C		
Subtask 401.2.9	NA	NA	S	G	C		
Subtask 401.2.10	NA	NA	S	G(4)	C(4)		
Subtask 401.2.11	NA	NA	S	G	C		
402 EARLY FIELDING ANALYSIS	NA	NA	NA	G	C	DI-S-7118 Early Fielding Analysis Report	
403 POST PRODUCTION SUPPORT ANALYSIS	NA	NA	NA	NA	G	DI-P-7119 Post Production Support Plan	
501 SUPPORTABILITY TEST, EVALUATION, AND VERIFICATION	NA	G	G	G	G	DI-S-7120 Supportability Assessment Plan	Subtasks 501.2.1, 501.2.2, and 501.2.4.
Subtask 501.2.1	NA	G	G	S	NA	DI-S-7121 Supportability Assessment Report	Subtasks 501.2.3 and 501.2.5.
Subtask 501.2.2	NA	NA	G(4)	G(4)	S		
Subtask 501.2.3	NA	NA	G(4)	G(4)	S		
Subtask 501.2.4	NA	NA	NA	G(4)	S		These data requirements must be coordinated with other system test planning and reporting requirements.
Subtask 501.2.5	NA	NA	NA	NA	G(4)		

Table III

Logistic Support Analysis Task Application and Documentation Matrix - Continued.

*Program phases are characterized by the following design status:

1. PRE-CONCEPT - No design. Mission area analyses are performed on a continuing basis to include supportability and sustainability considerations within mission areas. Program requirements grow out of these analyses.

2. CONCEPT - Design is only conceptual. Best opportunity for identifying alternatives, conducting tradeoffs, and influencing design from a supportability standpoint.

3. DVAL - Performance characteristics are more or less established. Actual design is still flexible. Debugging and major changes in construction are taking place. Support alternatives and support, design, and operations alternatives are being traded. May result in a prototype.

4. FSD - Results in a prototype. Design is concentrating on construction, parts selection, and fine tuning of performance. No major design influence is possible. Design influence is limited to packaging, partitioning, testability, accessibility, etc. Support system is optimized.

5. PROD - Design is fixed. Logistic support resource planing is complete. No opportunity for tradeoffs or further optimization.

CODE DEFINITIONS:

S - Selectively applicable.

G - Generally applicable.

C - Generally applicable to design changes only.

NA - Not Applicable.

(1) - Requires considerable interpretation of intent to be cost effective.

(2) - MIL-STD-1388-1A is not the primary implementation document. Other MIL-STD's or statement of work requirements must be included to define the total requirements.

(3) - Done just prior to initiation of the phase.

(4) - Selectively applicable for equipment level acquisitions.

(5) - Not applicable for equipment level acquisitions.

APPENDIX B

GLOSSARY

10. SCOPE

10.1 Appendix B shall be considered as forming a part of the basic standard.

10.2 The purpose of this appendix is to provide definitions of terms used for clarity of understanding and completeness of information. As a general rule, the definitions provided are currently accepted and have been extracted verbatim from other directives (regulations, manuals, MIL-STD's, DOD Directives, etc.). A limited number of terms are presented for which definitions were developed from several reference documents.

20. DEFINITIONS

Acquisition Phases -

(a) Concept Exploration Phase - The identification and exploration of alternative solutions or solution concepts to satisfy a validated need.

(b) Demonstration and Validation Phase - The period when selected candidate solutions are refined through extensive study and analyses; hardware development, if appropriate; test; and evaluations.

(c) Full-Scale Development Phase - The period when the system and the principal items necessary for its support are designed, fabricated, tested, and evaluated.

(d) Production and Deployment Phase - The period from production approval until the last system is delivered and accepted.

Availability - A measure of the degree to which an item is in an operable and commitable state at the start of a mission when the mission is called for at an unknown (random) time.

Baseline Comparison System (BCS) - A current operational system, or a composite of current operational subsystems, which most closely represents the design, operational, and support characteristics of the new system under development.

Comparability Analysis - An examination of two or more systems and their relationships to discover resemblances or differences.

Computer Resources Support - The facilities, hardware, software, and manpower needed to operate and support embedded computer systems. One of the principal elements of ILS.

Constraints - Restrictions or key boundary conditions that impact overall capability, priority, and resources in system acquisition.

Contract Data Requirements List (CDRL), DD Form 1423 - A form used as the sole list of data and information which the contractor will be obligated to deliver under the contract, with the exception of that data specifically required by standard Defense Acquisition Regulation (DAR) clauses.

Cost Estimating Relationship (CER) - A statistically derived equation which relates Life Cycle Cost or some portions thereof directly to parameters that describe the performance, operating, or logistics environment of a system.

Corrective Maintenance - All actions performed as a result of failure to restore an item to a specified condition. Corrective maintenance can include any or all of the following steps: Localization, Isolation, Disassembly, Interchange, Reassembly, Alignment, and Checkout.

Data Item Description (DID), DD Form 1664 - A form used to define and describe the data required to be furnished by the contractor. Completed forms are provided to contractors in support of and, for identification of, each data item listed on the CDRL.

Design Parameters - Qualitative, quantitative, physical, and functional value characteristics that are inputs to the design process, for use in design tradeoffs, risk analyses, and development of a system that is responsive to system requirements.

End Item - A final combination of end products, component parts, and/or materials which is ready for its intended use; e.g., ship, tank, mobile machine shop, aircraft.

Facilities - The permanent or semipermanent real property assets required to support the materiel system, including conducting studies to define types of facilities or facility improvements, locations, space needs, environmental requirements, and equipment. One of the principal elements of ILS.

Failure Modes, Effects, and Criticality Analysis (FMECA) - An analysis to identify potential design weaknesses through systematic, documented consideration of the following: all likely ways in which a component or equipment can fail; causes for each mode; and the effects of each failure (which may be different for each mission phase).

Fast Track Program - An acquisition program in which time constraints require the design, development, production, testing, and support acquisition process to be compressed or overlapped.

Follow-on Test and Evaluation (FOT&E) - That test and evaluation which is conducted after the production decision to continue and refine the estimates made during previous operational test and evaluation, to evaluate changes, and to evaluate the system to insure that it continues to meet operational needs and retain its effectiveness in a new environment or against a new threat.

Functional Support Requirement (FSR) - A function (transport, repair, resupply, recover, calibrate, overhaul, etc.) that the support system must perform for the end item to be maintained in or restored to a satisfactory operational condition in its operational environment.

Goals - Values, or a range of values, apportioned to the various design, operational, and support elements of a system which are established to optimize the system requirements.

Government Furnished Material (GFM) - Material provided by the Government to a contractor or comparable Government production facility to be incorporated in, attached to, used with or in support of an end item to be delivered to the Government or ordering activity, or which may be consumed or expended in the performance of a contract. It includes, but is not limited to, raw and processed materials, parts, components, assemblies, tools and supplies. Material categorized as Government Furnished Equipment (GFE) and Government Furnished Aeronautical Equipment (GFAE) are included.

Integrated Logistic Support (ILS) - A disciplined approach to the activities necessary to: (a) cause support considerations to be integrated into system and equipment design, (b) develop support requirements that are consistently related to design and to each other, (c) acquire the required support; and (d) provide the required support during the operational phase at minimum cost.

Logistic Support Analysis (LSA) - The selective application of scientific and engineering efforts undertaken during the acquisition process, as part of the system engineering and design process, to assist in complying with supportability and other ILS objectives.

Logistic Support Analysis Documentation - All data resulting from performance of LSA tasks conducted under this standard pertaining to an acquisition program.

Logistic Support Analysis Record (LSAR) - That portion of LSA documentation consisting of detailed data pertaining to the identification of logistic support resource requirements of a system/equipment. See MIL-STD-1388-2 for LSAR data element definitions.

Maintainability - The measure of the ability of an item to be retained in or restored to specified condition when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair.

Maintenance Levels - The basic levels of maintenance into which all maintenance activity is divided. The scope of maintenance performed within each level must be commensurate with the personnel, equipment, technical data, and facilities provided.

Maintenance Planning - The process conducted to evolve and establish maintenance concepts and requirements for a materiel system. One of the principal elements of ILS.

Manpower - The total demand, expressed in terms of the number of individuals, associated with a system. Manpower is indexed by manpower requirements, which consist of quantified lists of jobs, slots, or billets that are characterized by the descriptions of the required number of individuals who fill the job, slots, or billets.

Manpower and Personnel - The identification and acquisition of military and civilian personnel with the skills and the grade required to operate and support a materiel system at peacetime and wartime rates. One of the principal elements of ILS.

Objectives - Qualitative or quantitative values, or range of values, apportioned to the various design, operational, and support elements of a system which represent the desirable levels of performance. Objectives are subject to tradeoffs to optimize system requirements.

Operating and Support (O&S) Costs - The cost of operation, maintenance, and follow-on logistics support of the end item and its associated support systems. This term and "ownership cost" are synonymous.

Operational Concept - A statement about intended employment of forces that provides guidance for posturing and supporting combat forces. Standards are specified for deployment, organization, basing, and support from which detailed resource requirements and implementing programs can be derived.

Operational Scenario - An outline projecting a course of action under representative operational conditions for an operational system.

Operational Suitability - The degree to which a system can be satisfactorily placed in field use, with consideration being given availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistics supportability, and training requirements.

Optimization Models - Models which accurately describe a given system and which can be used, through sensitivity analysis, to determine the best operation of the system being modeled.

Packaging, Handling, Storage, and Transportation - The resources, processes, procedures, design considerations and methods to ensure that all system, equipment, and support items are preserved, packaged, handled, and transported properly including: environmental considerations and equipment preservation requirements for short and long term storage, and transportability. One of the principal elements of ILS.

Parametric Estimating Relationship (PER) - Statistical parametric analysis essentially involves development and application of mathematical expressions commonly called "cost estimating relationships" (CER's). Basically, CER's are developed by statistically analyzing past history to correlate cost with significant physical and functional parameters.

Performing Activity - That activity (government, contractor, subcontractor, or vendor) which is responsible for performance of LSA tasks or subtasks as specified in a contract or other formal document of agreement.

Personnel - The supply of individuals, identified by specialty or classification, skill, skill level, and rate or rank, required to satisfy the manpower demand associated with a system. This supply includes both those individuals who support the system directly (i.e., operate and maintain the system), and those individuals who support the system indirectly by performing those functions necessary to produce and maintain the personnel required to support the system directly. Indirect support functions include recruitment, training, retention, and development.

Preventive Maintenance - All actions performed in an attempt to retain an item in specified condition by providing systematic inspection, detection, and prevention of incipient failures.

Provisioning - The process of determining and acquiring the range and quantity (depth) of spares and repair parts, and support and test equipment required to operate and maintain an end item of materiel for an initial period of service.

Readiness Drivers - Those system characteristics which have the largest effect on a system's readiness values. These may be design (hardware or software), support, or operational characteristics.

Reliability - (1) The duration or probability of failure-free performance under stated conditions. (2) The probability that an item can perform its intended function for a specified interval under stated conditions. (For nonredundant items this is equivalent to definition (1). For redundant items this is equivalent to mission reliability.)

Reliability and Maintainability Interface - Reliability and maintainability design parameters are a key factor in the design of affordable and supportable systems. R&M parameters provide inputs into the design and LSA process that quantitatively link system readiness to the ILS elements. One of the principal elements of ILS.

Reliability Centered Maintenance - A systematic approach for identifying preventive maintenance tasks for an equipment end item in accordance with a specified set of procedures and for establishing intervals between maintenance tasks.

Repair Parts - Those support items that are an integral part of the end item or system which are coded as nonreparable.

Requiring Authority - That activity (government, contractor, or subcontractor) which levies LSA task or subtask performance requirements on another activity (performing activity) through a contract or other document of agreement.

Risks - The opposite of confidence or assurance; the probability that the conclusion reached as to the contents of a lot (number of defects or defective range) is incorrect.

Scheduled Maintenance - Preventive maintenance performed at prescribed points in the item's life.

Sensitivity Analysis - An analysis concerned with determining the amount by which model parameter estimates can be in error before the generated decision alternative will no longer be superior to others.

Site Survey - An examination of potential locations and supporting technical facilities for capability to base a system.

Source, Maintenance and Recoverability (SMR) Codes - Uniform codes assigned to all support items early in the acquisition cycle to convey maintenance and supply instructions to the various logistic support levels and using commands. They are assigned based on the logistic support planned for the end item and its components. The uniform code format is composed of three, two character parts; Source Codes, Maintenance Codes, and Recoverability Codes in that order.

Spares - Those support items that are an integral part of the end item or system which are coded as reparable.

Standardization and Interoperability.

Standardization. The process by which member nations achieve the closest practicable cooperation among forces; the most efficient use of research, development, and production resources; and agree to adopt on the broadest possible basis the use of: (1) common or compatible operational, administrative, and logistics procedures; (2) common or compatible technical procedures and criteria; (3) common, compatible, or interchangeable supplies, components, weapons, or equipment; and (4) common or compatible tactical doctrine with corresponding organizational compatibility.

Interoperability. The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.

Supply Support - All management actions, procedures, and techniques required to determine requirements for, acquire, catalog, receive, store, transfer, issue, and dispose of secondary items. This includes provisioning for initial support as well as replenishment supply support. One of the principal elements of ILS.

Supportability - The degree to which system design characteristics and planned logistics resources including manpower meet system peacetime operational and wartime utilization requirements.

Supportability Assessment - An evaluation of how well the composite of support considerations necessary to achieve the effective and economical support of a system for its life cycle meets stated quantitative and qualitative requirements. This includes integrated logistic support and logistic support resource related O&S cost considerations.

Supportability Factors - Qualitative and quantitative indicators of supportability.

Supportability Related Design Factors - Those supportability factors which include only the effects of an item's design. Examples include inherent reliability and maintainability values, testability values, transportability characteristics, etc.

Support Concept - A complete system level description of a support system, consisting of an integrated set of ILS element concepts, which meets the functional support requirements and is in harmony with the design and operational concepts.

Support Equipment - All equipment (mobile or fixed) required to support the operation and maintenance of a materiel system. This includes associated multiuse end items, ground handling and maintenance equipment, tools, metrology and calibration equipment, communications resources, test equipment and automatic test equipment, with diagnostic software for both on and off equipment maintenance. It includes the acquisition of logistics support for the support and test equipment itself. One of the principal elements of ILS.

Support Plan - A detailed description of a support system covering each element of ILS and having consistency between the elements of ILS. Support plans cover lower hardware indenture levels and provide a more detailed coverage of maintenance level functions than support concepts.

Support Resources - The materiel and personnel elements required to operate and maintain a system to meet readiness and sustainability requirements. New support resources are those which require development. Critical support resources are those which are not new but require special management attention due to schedule requirements, cost implications, known scarcities, or foreign markets.

Support System - A composite of all the resources that must be acquired for operating and maintaining a system or equipment throughout its life cycle.

System Engineering Process - A logical sequence of activities and decisions transforming an operational need into a description of system performance parameters and a preferred system configuration.

System/Equipment - The item under analysis, be it a complete system, or any portion thereof being procured.

System Readiness - A measure or measures of the ability of a system to undertake and sustain a specified set of missions at planned peacetime and wartime utilization rates. System readiness measures take explicit account of the effects of system design (reliability and maintainability), the characteristics and performance of the support system, and the quantity and location of support resources. Examples of typical readiness measures are sortie rate, mission capable rate, operational availability, and asset ready rate.

Tailoring - The process by which the individual requirements (sections, paragraphs, or sentences) of the selected specifications and standards are evaluated to determine the extent to which each requirement is most suitable for a specific materiel acquisition and the modification of these requirements, where necessary, to assure that each tailored document invoked states only the minimum needs of the Government. Tailoring is not a license to specify a zero LSA program, and must conform to provisions of existing regulations governing LSA programs.

Technical Data - Recorded information regardless of form or character (e.g. manuals, drawings) of a scientific or technical nature. Computer programs and related software are not technical data; documentation of computer programs and related software are. Also excluded are financial data or other information related to contract administration. One of the principal elements of ILS.

Testability - A design characteristic which allows the status (operable, inoperable, or degraded) of an item and the location of any faults within the item to be confidently determined in a timely fashion.

Thresholds - Values, or a range of values, apportioned to the various design, operational, and support elements of a system which impose a quantitative or qualitative minimum - essential level of performance. Thresholds are usually associated with a goal.

Tradeoff - The determination of the optimum balance between system characteristics (cost, schedule, performance, and supportability).

Training - The structured process by which individuals are provided with the skills necessary for successful performance in their job, slot, billet, or specialty.

Training and Training Devices - The processes, procedures, techniques, and equipment used to train active and reserve personnel to operate and support a materiel system. This includes individual and crew training, new equipment training, and logistic support for the training devices themselves. One of the principal elements of ILS.

Transportability - The inherent capability of material to be moved with available and projected transportation assets to meet schedules established in mobility plans, and the impact of system equipment and support items on the strategic mobility of operating military forces.

Unscheduled Maintenance - Corrective maintenance required by item conditions.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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