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LOGISTICS SUPPORT ANALYSIS CURRENT ENVIRONMENT

Volume 1

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This volume (Volume 1) of the LSA Current Enviroment report identifies the major LSA/LSAR issues, based on a review of several weapon system acquisition programs.
These issues are based on input from both the Air Force and Contractors, and on findings from the organizational assessment, the $IDEF_0$ model, and data flow modeling activities contained in volume 2 of this report.

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PREFACE

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This volume (Volume 1) of the LSA Current Environment report identifies the major LSA/LSAR issues, based on a review of several weapon system acquisition programs. These issues are based on input from both the Air Force and Contractors, and on findings from the organizational assessment, the $IDEF_0$ model, and data flow modeling activities contained in Volume 2 of this report.

Volume 2 of the LSA Current Environment report consists of three appendices that describe the LSA process. In the first appendix the MIL-STD-1388-1 process is functionally decomposed using the Integrated Computer Aided Manufacturing Definition ($IDEF_0$) model. The second appendix uses data flow diagrams to trace the flow of support planning information. Roles and responsibilities of the various Air Force organizations involved in LSA are presented in the third appendix.

Dr. Robert Smith of the Systems Automation Division at the Transportation Systems Center (TSC) of the Department of Transportation directed the TSC LSA team. TSC has drawn upon the knowledge and experience of a number of consultants, and would like particularly to recognize the contribution of staff members from the following organizations: Battelle Columbus Division, DYNATREND Inc., RJO Enterprises, and UNISYS Inc.

Given the complexity of the LSA process the LSA team would be grateful for any contributions that Air Force personnel and Contractors can add to the understanding of the current environment. It is with this kind of dialogue that the team can best assist the Air Force to achieve its goals of cost-effective weapon system acquisition, operation, and support.

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LIST OF ACRONYMS

AAC	Alaskan Air Command
AD	Armament Division
ADP	Automatic Data Processing
AFALC	Air Force Acquisition Logistics Center
AFCC	Air Force Communications Command
AFCMD	Air Force Contract Management Division
AFCOLR	Air Force Coordinating Office for Logistics Research
AFLC	Air Force Logistics Center
AFOTEC	Air Force Operational Test and Evaluation Center
AFR	Air Force Regulation,
AFSC	Air Force Systems Command
AGMC	Aerospace Guidance and Metrology Center
ALC	Air Logistics Center
ASD	Aircraft System Division
ATC	Aeronautical Systems Division
ATI	Automated Technical Information
AU	Air University
BCS	Baseline Comparison System
BIT	Built-In Test
BMO	Ballistic Missile Office
CALS	Computer-aided Acquisition and Logistic Support
CAMS	Comprehensive Automated Maintenance System
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CEP	Concept Exploration Phase
CFP	Concept Formulation Package
DCN	Design Change Notice
DCP	Decision Coordinating Paper
DFD	Data Flow Diagram
DID	Data Item Description
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DOT	Department of Transportation
DPML	Deputy Program Manager for Logistics
DRU	Direct Reporting Unit
DT	Development Testing
DT&E	Development, Test, and Evaluation
DTC	Design To Cost

D&V	Demonstration and Validation
ECP	Engineering Change Proposal
EI	End Item
EIR	Equipment Improvement Recommendation
ESC	Electronic Security Command
ESD	Electronic Systems Division
FFBD	Function Flow Block Diagram
FMEA	Failure Modes and Effects Analysis
FMECA	Failure Modes, Effects and Criticality Analysis
FSD	Full Scale Development
GFE	Government Furnished Equipment
GFM	Government Furnished Material
ICAM	Integrated Computer Aided Manufacturing
ICOM	Inputs, Controls, Outputs, Mechanisms
IDEF	Integrated Computer Aided Manufacturing Definition
ILS	Integrated Logistics Support
ILSM	Integrated Logistics Support Manager
ILSP	Integrated Logistics Support Plan
IM	Item Manager
IOC	Initial Operating Capability
IPB	Illustrated Parts Breakdown
IPS	Integrated Program Summary
ISP	Integrated Support Plan
ISIL	Interim Support Item List
JMSNS	Justification for Major System New Start
LCC	Life Cycle Cost
LCN	LSA Control Number
LL	Lessons Learned
LOA	Letter of Agreement
LOGPAR	Logistics Program Review
LSA	Logistics Support Analysis
LSAP	Logistics Support Analysis Plan
LSAR	Logistics Support Analysis Record
LSR	Logistics Support Resource
LSRF	Logistics Support Resource Funds
MAC	Military Airlift Command
MAJCOM	Major Command
MATE	Multi-Purpose Automatic Test Equipment
MIL-STD	Military Standard
MIO	Management Integration Office
MPP	Modular Planning Process

MRP	Manpower Requirements Personnel
MRSA	Materiel Readiness Support Activity
MTBF	Mean-Time-Between-Failures
MTTR	Mean-Time-To-Repair
NATO	North Atlantic Treaty Organization
O&O	Operational and Organizational
O&S	Operations And Support
OPR	Office of Primary Authority
OT	Operational Testing
OT&E	Operational Test and Evaluation
PACAF	Pacific Air Forces
PD	Product Data
PDD	Product Definition Data
PDR	Preliminary Design Review
PER	Parametric Estimating Relationship
PERT	Program and Evaluation Review Technique
PHS&T	Packaging, Handling, Storage, and Transportation
PM	Preventive Maintenance
PMD	Program Management Directive
PMP	Program Management Plan
PMRT	Program Management Responsibility Transfer
POL	Petroleum, Oil, Lubricant
PPL	Provisioning Parts List
PPSL	Program Parts Selection List
PROD	Production Phase
PT/LD	Physical Teardown/Logistic Demonstration
QPA	Quantity per Assembly
QQPRI	Qualitative and Quantitative Personnel Requirements
R&M	Reliability and Maintainability
RAM	Reliability, Availability, Maintainability
RAS	Requirements Allocation Sheets
RCM	Reliability Centered Maintenance
REMIS	Reliability and Maintainability Information System
RFP	Request For Proposals
RILSA	Resident Integrated Logistics Support Activity
RLA	Repair Level Analyses
ROC	Required Operational Capability
RPSTL	Repair Parts and Special Tools List
RTAT	Repair Turnaround Time
SAC	Strategic Air Command
SCP	System Concept Paper

SD	Space Division
SDR	System/Equipment Design Review
SEMP	System Engineering Management Plan
SERD	Support Equipment Recommendation Data
SMR	Source, Maintenance, Recoverability
SOA	Separate Operating Agency
SON	Statement of Need
SORD	System Operational Requirements
SOW	Statement of Work
SPACECOM	Space Command
SPM	System Program Manager
SPO	System Program Office
SSC	Skill Specialty Code
SSSN	System Subsystem Number
STF	Special Task Force
T&E	Test and Evaluation
TAC	Tactical Air Command
TEMP	Test and Evaluation Master Plan
TM	Technical Manual
TMDE	Test, Measurement, And Diagnostic Equipment
TOs	Technical Orders
TRC	Technical Repair Center
TSC	Transportation Systems Center
TTEL	Tools and Test Equipment List
TTS	Training and Training Support
UUT	Unit Under Test
WBS	Work Breakdown Structure

EXECUTIVE SUMMARY

In support of the Air Force Computer-aided Acquisition and Logistic Support (CALS) Program, the Transportation Systems Center (TSC) of the Department of Transportation, is providing the CALS Management Integration Office (MIO) with systems engineering support in three areas: Tech Orders, Product Definition Data, and Logistics Support Analysis (LSA). The LSA effort examines the planning, specification, acquisition, management, transfer, and utilization of LSA and LSA documentation (LSA/LSAR) as a first step in planning the direction of the LSA/LSAR automation effort.

HIGHLIGHTS OF ISSUES IDENTIFIED IN THIS STUDY

The analysis of the current LSA/LSAR environment resulted in the identification of a number of issues relating to the implementation of LSA/LSAR. These issues fall into four general categories: functional, data, institutional, and technical.

FUNCTIONAL ISSUES

The functional issues that emerged relate to LSA tailoring, the LSAR review process and LSAR validation.

- *Tailoring.* Tailoring is the process by which the scope of LSA is adjusted to meet the specific needs of an acquisition. Tailoring is sometimes performed inappropriately, resulting in either insufficient or redundant information.
- *LSAR Review Process.* The LSAR Review process often requires transfer and manual processing of large volumes of paper, that includes the LSAR and technical drawings. Errors and inconsistencies in the LSAR may not be discovered due to the cumbersome and labor-intensive nature of this paper-based process.
- *LSAR Validation.* In many cases, the Contractor "validates" its own LSAR without using Air Force test results. Consequently, LSAR validation may be inadequate and incomplete.

LSA/LSAR DATA ISSUES

LSA/LSAR data issues focus on data integrity, availability, and LSAR scope.

- *Data Integrity.* The LSAR is not currently maintained after acceptance by the Air Force; some Contractor LSAR systems have no mandated cross-indexing systems.
- *Data Availability.* These issues focus on the completeness, timeliness, and accessibility of LSA/LSAR data. Beginning LSA too early in the acquisition process may be costly because data is collected on systems that may not be implemented. If LSA starts too late, its effect on the design process will be negligible and the weapon system supportability requirements may not be met.

- *LSA Scope.* Air Force personnel have suggested expanding the scope of the current LSA/LSAR data to include allocated, estimated, and observed resource requirements; text and analytic reports; additional support planning data; engineering data such as drawings and schematics; and AFOTEC test results.

INSTITUTIONAL ISSUES

Institutional issues focus on education and training, and on accountability.

- *Education and Training.* Inadequate LSA education and training for Air Force and Contractor personnel affects the accuracy, timeliness, and effectiveness of LSA. The Air Force has expressed concern about the length of time required to develop the expertise to perform LSA. There is also a shortage of Air Force personnel who understand the LSA process and who have the training and experience necessary to take full advantage of automated systems.
- *Accountability.* The SPO has overall responsibility for the weapon system acquisition and must make tradeoffs that involve balancing time constraints, budget constraints, and supportability considerations. Sometimes, long term supportability benefits may be traded-off for short-term time and budget requirements increasing the cost of operations and support.

TECHNICAL ISSUES

Three issues emerged concerning present technologies used to support the LSA/LSAR process: paper-based delivery, data compatibility, and system connectivity.

- *Paper-Based Delivery.* Paper is the common delivery format for LSA/LSAR data and reports even though Contractors have developed automated LSAR systems, and some SPOs often have access to these systems to review LSAR data. The volume of paper for a single acquisition is so great that it may make the LSAR unmanageable.
- *Data Compatability.* Different automated LSAR systems may store the same data element in different formats. This may result in LSAR data being transferred on paper between organizations, and then manually reentered into the receiving system, causing duplication of effort and delays. Contractors must often deliver LSAR data on magnetic tape in MIL-STD-1388-2A format.
- *System Connectivity.* Contractor logisticians and designers often use different automated systems that are not interconnected. Lack of communication between the two groups makes the accuracy of the LSAR suspect since the changes made by the designers may not be reflected in the LSAR, which is prepared by the logisticians.

These issues demonstrate the need to assess automation technology options that will enable LSA/LSAR to influence system design with supportability considerations, to integrate support planning activities, and possibly, to provide weapon system operational support.

SECTION 1: INTRODUCTION

1.1 BACKGROUND

The Air Force CALS program was established, in conjunction with the Department of Defense-wide CALS program, to improve weapon system reliability and maintainability and to reduce the cost of acquisition and support. A major objective of CALS is to improve the flow of technical information by introducing automated techniques that will improve the delivery and handling of large quantities of digitized technical data. CALS will significantly reduce the amount of paper and labor necessary to enter, manipulate, transfer, and interpret technical data.

In October 1985, an Air Force Program Management Directive (PMD) established a CALS Management Integration Office (MIO) at HQ AFSC to coordinate the CALS program. The PMD identified the following tasks as necessary to accomplish the CALS objectives:

- Plan for the integration of all existing Automated Technical Information (ATI) projects with a standard information systems framework; to determine the full range of CALS objectives and management concepts; and to plan large-scale demonstrations and implementation of CALS technology for a weapon system acquisition program;
- Ensure that data system structures are consistent and comply with Air Force guidelines;
- Perform a cost analysis of replacing present technical information management methods with automated methods; and
- Prepare and maintain an ATI and CALS Program Management Plan (PMP) that addresses program integration and consolidation of CALS schedules and incorporates improved automated technical information capabilities.

The Air Force CALS MIO is responsible for planning, developing, and implementing the CALS initiatives and has contracted the Transportation Systems Center (TSC) of the Department of Transportation (DOT) to provide systems engineering support. An automation plan has been developed and adopted for Tech Orders (TOs), and analysis of Logistics Support Analysis (LSA) and Product Definition Data (PDD) is now being conducted.

As part of the CALS initiative planning, TSC developed and implemented the Modular Planning Process (MPP), an information engineering systems approach. The MPP is designed to:

- Focus on technical plans that will not be outdated before implementation;

- Incorporate existing/ongoing Air Force systems;
- Meet the information distribution requirements of the user community; and
- Interface with a variety of organizations responsible for weapon systems acquisition and logistics support.

The MPP is divided into three phases: an examination of the existing environment, a study of opportunities, and a plan of future direction. These phases are described in Figure 1-1.

Integrated Logistics Support (ILS), which is discussed in Section 2, includes the management and technical activities necessary to define, design for, acquire, and provide weapon system support. ILS has two major phases: planning support and providing support. Together, the LSA process and the Logistics Support Analysis Record (LSAR) comprise the core of support planning. Using the framework of the MPP, TSC is developing an automation plan for the LSA process, its functions, and the LSAR.

This report presents the results of the first phase of the MPP, an examination of the existing support planning environment. It is also the first step in developing an automation plan for LSA.

1.2 PURPOSE

The purpose of the CALS LSA effort is to improve the flow of LSA/LSAR technical information through automation. The automation plan developed must: accommodate all Air Force LSA/LSAR requirements throughout the weapon system life cycle; meet future Air Force requirements, including those that have not yet been defined; and be flexible enough to take advantage of future advances in technology.

The analysis of the current environment focuses on identifying the issues relating to the way LSA is implemented within the Air Force today. The analysis enables the staff of the TSC LSA team to accomplish the following:

- Identify voids and redundancies in the acquisition, management, transfer, and use of LSA/LSAR data;
- Articulate responsibilities of various Air Force organizational entities in the planning, specification, acquisition, management, transfer, and utilization of LSA/LSAR data;
- Increase the understanding of the LSA process by representing the process in a structured, integrated format;
- Clarify some of the differences between the formal LSA process (described in the MIL STDs and other Air Force documentation) and current LSA implementation in various acquisition programs;

EXAMINE THE ENVIRONMENT

Initiate the Process

Perform Initial Assessment
- Create Preliminary Description of Environment
- Identify Organizational Expectations
- Establish Priorities

Develop Specific Procedures
- Establish Management Plan
- Identify Advisory Group
- Prepare Project Plans

Conduct Structured Analysis

Describe Current Environment
- Create Functional Model
- Identify Major Data Elements
- Describe the Organizational Infrastructure
- Identify Major Information Flow Parameters

Assess Transitional Projects
- Identify Objectives
- Describe Functions and Data
- Identify Technologies
- Identify Infrastructure Affected

STUDY THE OPPORTUNITIES

Assess Technology

Identify Existing Technologies
- Review Current Environment
- Review Ongoing Projects
- Identify Existing Technologies

Research Future Technology Opportunities
- Select Technology Areas
- Consult with Technology Experts
- Examine Similar Applications
- Review Development Trends

Establish Technology Alternatives
- Quantify Directions
- Specification of Implementation Issues
- Examine Benefits and Costs

Project Future Requirements

Forecast Requirements
- Review Applicable Scenarios
- Conduct Discussions with MAJCOMs
- Forecast Process Changes
- Assess Infrastructure Constraints

Examine Feasible Alternatives
- Determine Feasibility Issues
- Review Industry Trends

Define Future State

Describe Future Environment
- Define the Impact of Tecnology on Current State
- Define Projected Organizational Responsibilities
- Define Relevant Interface Requirements

Create Functional Model
- Develop a Description of Future State
- Identify Projected Major Information Flow Parameters

PLAN THE DIRECTION

Formulate Alternatives

Assess Critical Issues
- Examine Objectives
- Identify Technologies
- Review Organizational Issues

Propose Initial Alternatives
- Select Future Requirements
- Identify Technologies
- Structure Proposals

Review and Modify Alternatives
- Review Criteria
- Identify Relationships with Transitional Projects
- Define Policies and Organizations Involved

Develop Consensus

Review Progress with Advisory Group
- Identify Discussion Topics and Priorities
- Evaluate Current Environment
- Establish Objectives
- Provide Access to Information

Develop Common Understanding
- Review Future Requirements
- Evaluate Recommended Solutions
- Examine Feasibility Issues

Expand Advocacy Network
- Identify Implementation Agencies
- Select Appropriate Forums
- Communicate the Plans

Prepare Implementation Plan

Define Activity Descriptions
- Establish Implementation Guidelines
- Establish Evaluation Criteria
- Develop Implementation Procedures

Develop Organization Plan
- Confirm Major Milestones
- Establish Transition Plan
- Identify Organizational Responsibilities

Establish Constituency
- Gain Management Acceptance of Plan
- Obtain a Commitment for Execution

Create Documentation
- Establish Goals
- Define Resource Requirements
- Recommend Technologies
- Define Organizational Impact
- Establish Financial Parameters

FIGURE 1-1. MODULAR PLANNING PROCESS OVERVIEW

- Assist in identifying LSA user requirements that might be better addressed with automation;
- Assist in understanding how automation might improve LSA effectiveness;
- Establish a baseline to study the opportunities and, if appropriate, to plan the direction of the LSA automation effort; and
- Provide a benchmark for identifying constituencies that will use LSA/LSAR data in the future environment.

1.3 METHODOLOGY

Documents, site visits, and interviews were used to collect the necessary data for the current LSA environment analysis. Relevant Air Force acquisition regulations, mission and organization regulations were reviewed along with other documents pertaining to LSA. Site visits and interviews were conducted at Air Force organizations involved in current acquisitions and at a number of Contractor facilities. Information on management, analysis, transfer, verification, and use of LSA data was collected at several professional meetings including those of the National Security Industry Association (NSIA), the Air Force-Industry CALS Conference, the CALS Implementation Working Group, and the CALS Automation Working Group. A list of contacts is provided at the end of this volume.

TSC used three analytic techniques to investigate the current LSA/LSAR environment and to identify current LSA/LSAR issues: Integrated Computer Aided Manufacturing (ICAM) Definition ($IDEF_0$) modeling; Data Flow Diagramming; and Organizational Assessment. These techniques are summarized in Sections 1.3.1, 1.3.2, and 1.3.3, and are described in more detail in Volume 2 of this report. Two of these techniques ($IDEF_0$ and Data Flow Diagrams) are activity models, that are used to describe LSA processes, functions, and data flows. Using diagrams to represent processes, activities, information flows and constraints, accompanying narrative, and a glossary that defines the terms, or labels, used in the diagrams, these modeling techniques document how LSA functions. Use of these modeling techniques has enabled the LSA team to define the scope of this project by including additional support planning activities.

1.3.1 Integrated Computer Aided Manufacturing (ICAM) Definition ($IDEF_0$) Model

An $IDEF_0$ model was used to provide a graphic representation of the MIL-STD-1388-1A process. Three major components make up the model: a node tree, a series of diagrams, and a glossary. A node tree was developed to present the hierarchical relationships between LSA task sections, tasks, and subtasks. Diagrams were developed to depict activity relationships within each layer of the hierarchy. Each diagram is accompanied by a glossary describing the activities on the diagram. Taken as a whole, the $IDEF_0$ model provides a description of LSA processes by using diagrams to depict discrete activities within LSA. The $IDEF_0$ model identifies and depicts the input data required to perform an activity; the output products resulting from that activity; the mechanisms that perform the task; and the controls that govern task performance. Collectively, these four constructs allow analysis of the relationships between LSA tasks and decomposition of each task into subcomponents and constructs.

1.3.2 Data Flow Diagram (DFD) Model

In addition to the functional analysis presented by the $IDEF_0$ model, the analysis of the current LSA environment includes the flow of data between the Air Force and Contractor organizations. The Gane and Sarson (1982) technique of data flow diagramming is well suited to documenting this analysis because it focuses on the flow of data, identifying its sources and destinations. Other data modeling techniques, such as $IDEF_1$, focus on the identification of data entities, the construction of a static data model relating the various data entities, and the documentation of the data model in a data dictionary.

A functional node tree was developed to present the hierarchical decomposition of the support planning process into its component functions. The DFDs are graphic representations of the flow of data between these functions and the organizations involved in support planning, including LSA/ILS interfaces. The DFDs are accompanied by a glossary that includes functional descriptions and definitions of all diagram constructs (i.e., data flows, data stores, processes, and external entities). The data flow diagramming approach complements and extends the scope of the $IDEF_0$ model. DFDs show the sources and destinations of information and allow the reader to follow the flow of data between activities or from from the Contractor to Air Force organizations.

1.3.3 Organizational Assessment

The roles of the various Air Force organizations involved in LSA are defined by Air Force regulation and by current practice. An understanding of the roles of these organizations is critical to determining how automation could improve the effectiveness of LSA. To develop this understanding, an organizational assessment was conducted, resulting in the development of summary matrices with accompanying explanatory text, mapping LSA tasks to Air Force organizations. This assessment shows how LSA is currently implemented, identifies the impact of LSA on various Air Force organizational entities, and describes the context within which LSA is implemented.

1.4 SCOPE

This report examines the current Air Force organizational and functional environment of LSA and documents the interfaces between LSA and ILS. In addition, it presents the LSA/LSAR issues that were identified through the analysis, documentation review, and interviews. The report provides the background information necessary for subsequent analytic efforts and recommendations in the development of the LSA automation plan.

1.5 ORGANIZATION

This report consists of two volumes. This first volume presents an overview of the current LSA environment and discusses the current LSA/LSAR issues. Section 2 (of Volume 1) presents a brief discussion of ILS and defines support planning, LSA, and LSAR. LSA policies and implementation practices are also described. Section 3 highlights the issues that emerged from the current environment analysis, and Section 4 presents the conclusions drawn from the analysis. A list of references and points of contact concludes the volume.

SECTION 2: LOGISTICS SUPPORT ANALYSIS (LSA)

2.1 INTRODUCTION

This section presents a brief discussion of ILS, defines support planning in the context of this report, summarizes the scope of LSA and LSAR, and describes the overall management of the LSA program.

In the early 1970s, the United States Air Force established an acquisition management policy that included the application of ILS throughout the entire life cycle of a weapon system. ILS unifies the management and analysis activities that are necessary to ensure effective and economical support of an Air Force weapon system, both before and after fielding. ILS has four major objectives:

- To cause support considerations to influence weapon system design;
- To define support requirements that are optimally related to the weapon system design and to each other;
- To acquire the necessary weapon system support; and
- To provide, at minimum cost, the support required during the operational stage.

As defined in AFR 800-8, there are ten ILS elements for which the ILS objectives need to be achieved. These ILS elements are: Maintenance Planning; Manpower and Personnel; Supply Support; Technical Data; Training and Training Support; Computer Resources Support; Facilities; Packaging, Handling, Storage, and Transportation; and Design Interface.

ILS activities associated with the ILS elements can be divided into two phases: support planning and providing support. The scope of support planning encompasses LSA which is the tool used during the acquisition phase to achieve the ILS objectives. LSA integrates each ILS element with the other elements and with the design process.

2.2 SUPPORT PLANNING: LSA AND LSAR

Support planning is an acquisition process, performed primarily by the SPO and the Contractor, with assistance from the Supporting and Participating Commands. The support requirements of weapon system are documented by the Operating Command. The relationship between support planning, LSA and LSAR is that the LSA process is the primary analytic tool for performing support planning. Most of the information needed to plan weapon system support is contained in the LSAR.

2.2.1 Support Planning

The support planning function is decomposed into three primary functions: Manage Support Planning, Analyze Support Requirements, and Validate Requirements. Support planning activities include the LSA process and the interface of the LSA process and records with the ILS elements. In addition, support planning includes the Air Force activities undertaken to acquire the necessary data for weapon system support and delivery of that data to the end-users. The DFDs presented in Volume 2 of this report show the decomposition of the support planning process into its component activities and the relationships between these activities and various Air Force organizations.

2.2.2 Logistics Support Analysis (LSA)

LSA is an iterative analytical process designed to ensure that support requirements are identified and addressed as an integral consideration in the weapon system design process. The overall objectives of the LSA process, as stated in the Air Force LSA Primer, are to:

- Cause supportability requirements to be an integral part of system requirements and design;
- Define support requirements that are optimally related to the design and to each other;
- Define the required support during the operational phase; and
- Prepare the attendant data products.

LSA is applied throughout the acquisition cycle as part of the systems engineering effort and is budgeted and funded as a systems engineering cost. MIL-STD-1388-1A defines five LSA task sections:

Task Section 100: Program Planning and Control;

Task Section 200: Mission and Support Systems Definition;

Task Section 300: Preparation and Evaluation of Alternatives;

Task Section 400: Determination of Logistics Support Resource Requirements;

Task Section 500: Supportability Assessment.

Within each of these task sections, there are several tasks and many subtasks defined by the standard. These tasks and subtasks are depicted in the $IDEF_0$ model and DFDs, which are presented in Volume 2 of this report.

The documentation for LSA is not limited to LSAR records but also includes reports, such as the Tradeoff Analysis, the Post Production Support Plan, the Supportability Assessment Report, and the Use Study. As defined in MIL-STD-1388-1A, the LSA documentation encompasses all the information developed as a result of performing the LSA tasks. Air Force personnel are responsible for the management of the LSA process and validation of the data created by LSA. The Contractor is responsible for most of the analytic work.

2.2.3 Logistics Support Analysis Record (LSAR)

Currently, the LSAR is a collection of 15 data record types defined by MIL-STD-1388-2A that is designed to provide a database of logistics technical information for acquisition programs. The LSAR serves as a standard to specify the content and format of the logistics technical information that Contractors must develop and transfer to the Air Force. It includes, but is not limited to LSA task output.

2.3 LSA POLICIES AND MANAGEMENT

Application of LSA is required for all Air Force managed acquisition and major modification programs. Major modification programs are Class IV (improvement of safety, reliability, maintainability, and/or security) and Class V (improvement of operational capability) modification programs. LSA is to be performed as an integral part of the systems engineering effort within these programs. On inter-service acquisition programs, LSA includes the constraints and requirements of all participating services. In accordance with MIL-STD-1388, the LSA tasks are tailored to meet program hardware and software requirements and to be consistent with the level of supportability information available about a weapon system at the beginning of an acquisition or modification.

The application of LSA in weapon system acquisition programs is governed by MIL-STD-1388-1A and 2A. AFSC, which is designated by HQ USAF to manage the weapon system acquisition, is responsible for the LSA program during the acquisition cycle. AFSC establishes a System Program Office (SPO) and appoints a Program Manager (PM) to manage the SPO. The PM is responsible for the acquisition program including the LSA program implementation. One of the PM's responsibilities is to tailor LSA to meet the specific program requirements; this responsibility, and others relating to acquisition logistics, is delegated to the Deputy Program Manager for Logistics (DPML) or Integrated Logistics Support Manager (ILSM), who are responsible for the implementation of LSA. Recently, the Air Force has developed the concept of the Resident Integrated Logistics Support Activity (RILSA) which is comprised of full-time personnel from AFSC, AFLC, and the MAJCOM. Continuous on-line review of the LSAR is one of the major responsibilities of the RILSA. The Contractor, who is responsible for conducting most of the LSA tasks, normally creates a management structure parallel to that established by AFSC.

LSA documentation and data delivery requirements are set forth in the Statement of Work (SOW) and Contract Data Requirements Lists (CDRLs) as part of the Request for Proposal (RFP). The contract requirements specify either a paper-based or magnetic media delivery format for the LSAR and other LSA documentation. As specified in the Air Force LSA Primer:

> "The LSAR can be a manual database, a computer-based system, or a combination of both depending on program requirements. If an automated data processing system is used, it must be either the DoD software or a system validated for the program and output reports used. Validation is performed by the DoD Joint Service Review Team at Materiel Readiness Support Center (MRSA). Validation is required not later than the LSA Guidance Conference. Preferably, the Contractor will present validation of the ADP system as part of his proposal."

SECTION 3: CURRENT AIR FORCE LSA/LSAR ISSUES

3.1 INTRODUCTION

Based on a review of several weapon system acquisition programs, the analysis of the current LSA environment identified many LSA/LSAR issues. These issues are presented in this section and include problems, suggestions, and concerns raised by Air Force and Contractor personnel involved in various acquisitions, as well as the findings resulting from the organizational assessment, and the $IDEF_0$ and data flow modeling activities described in Volume 2 of this report.

Since each acquisition program is unique, MIL–STD–1388–1A provides an LSA tailoring process to adjust the LSA program and its LSAR requirements to meet the needs of a specific acquisition program. Due to the nature of each LSA program, an issue raised by personnel involved in one acquisition program may not be an issue for another program. These issues provide a basis for defining future LSA opportunities and requirements, and are presented using the following categories: LSA/LSAR Functional; LSA/LSAR Data; Institutional; and Technical issues.

3.2 LSA/LSAR FUNCTIONAL ISSUES

In the current LSA environment, there are three major LSA task groups: Manage the LSA Process (Task Section 100); Analyze and Synthesize Logistics Support Requirements (Task Sections 200–400); and Test and Correct Logistics Support Adequacy (Task Section 500). Among its many acquisition management tasks, the SPO, through the DPML, is responsible for managing the LSA program and overseeing the test and correction tasks while the Contractor performs most of the analysis tasks.

The following issues were raised: Tailoring, LSAR Review Process, and LSAR Validation.

3.2.1 Tailoring

MIL–STD–1388–1A defines tailoring as follows:

> "Tailoring is the process by which the individual requirements of the selected specifications and standards are evaluated to determine the extent to which each requirement is most suitable for a specific materiel acquisition. Tailoring permits the modification of these requirements, where necessary, to assure that each tailored document invoked states only the minimum needs of the Air Force. Tailoring is not a license to specify a zero LSA program and must conform to provisions of existing regulations governing LSA programs."

Appropriate tailoring determines the effectiveness of the whole LSA/LSAR program in influencing weapon system design and implementing logistics support. Budget constraints, time constraints imposed by accelerated acquisition programs, poor understanding of the tailoring process and of the value of LSA contribute to inappropriate tailoring. Two tailoring concerns were identified:

- *Failure to tailor LSA.* In some cases, information that is not pertinent to the specific weapon system acquisition is included in the contract data requirements. When a data call is made for a weapon system acquisition, Air Force organizations request various standard LSA reports. The SPO must determine which LSAR data elements should be placed on the contract to meet the needs of the requesting organizations. Often, the requested reports include some data that are of no interest to the organization making the request. Currently, the SPO has no simple method to separate essential from nonessential data on the reports, and may require the Contractor to deliver all of the data elements that could possibly appear on the report, even though the requesting organization may only need selected data elements. Requiring the Contractor to deliver such unnecessary data increases the cost of LSA/LSAR to the Air Force.
- *Inappropriate tailoring.* Contractor and Air Force personnel report that tailoring is sometimes performed inappropriately, eliminating necessary LSA tasks, rather than limiting the level of effort for these tasks. This is often the result of the fact that tailoring must be done at the subtask level but input and output data are defined at the task level. The information normally produced by the subtasks that have been tailored out of the LSA program may be necessary input for subsequent, required tasks. Thus, the information needed to fulfill LSA contract requirements, to influence weapon system design, and to plan logistic support may be tailored away inadvertently. In some weapon system modifications and accelerated acquisitions, the LSA tailoring specified in the LSA Plan has eliminated all LSA tasks other than the LSA Plan.

3.2.2 LSAR Review Process

The Air Force may review the LSAR both informally and at formal LSAR Reviews. In some acquisitions, SPO personnel have online access to the Contractor LSAR system and can review and comment on LSAR data throughout the acquisition phase. In other acquisitions, the SPO receives the LSAR data only in paper form 30 to 60 days prior to the formal LSAR review meeting. LSAR data is approved only after the formal LSAR Review. Air Force personnel raised three concerns over the current paper-based LSAR review process:

- *Formal LSAR Reviews.* To conduct the LSAR Reviews, Air Force personnel usually meet at the Contractor site where the weapon system is being developed. Thousands of data elements must be reviewed during a period of a few days. Often, errors and omissions in the LSAR are not discovered because of the cumbersome nature of the paper-based LSAR Review. Some data may be reviewed many times while other data is never reviewed at all. In programs which use the RILSA, this problem has been alleviated somewhat because the LSAR data has been reviewed two or three times by personnel at the RILSA before it is reviewed at the LSAR Review.

- *Acceptance tracking.* Data elements that are not questioned at the LSAR Review are often accepted by default. Currently, there is no method to track acceptance of specific LSAR elements. As a result, incomplete or inaccurate data may be accepted.
- *Engineering drawings.* Often the engineering drawings necessary to conduct a meaningful LSAR Review are not available at the same time as the LSAR, which is usually provided 30 to 60 days prior to the LSAR Review. If the drawings are provided, they are usually paper-based and are not integrated with the LSAR or LSA Reports. To complete the LSAR Review, the engineering drawings must be manually correlated with the paper-based LSAR, resulting in an unwieldy volume of paper for large acquisitions.

3.2.3 LSAR Validation

Before the SPO approves the LSAR for acceptance by the Air Force, the data must be validated. Although organizations, such as the Air Force Operational Test and Evaluation Center (AFOTEC), Aerospace Guidance and Metrology Center (AGMC), Air Training Command (ATC), Electronic Security Command (ESC), and the Air Logistics Centers (ALCs) are available to assist in LSAR validation, they are not often used. In many cases, the Contractor "validates" its own LSAR without input from any of the organizations listed above. Consequently, LSAR validation may be inadequate and incomplete and, as a result, the SPO may not have accurate data necessary to plan appropriate weapon system support.

3.3 LSA/LSAR DATA ISSUES

Inaccurate, inconsistent, and untimely LSA/LSAR data decreases the degree to which the Air Force can use LSA to affect weapon system design and plan weapon system support, two principal objectives of LSA. Since the paper-based LSAR data is often outdated because it does not reflect design changes made by the contractor after the shipment of the LSAR to the Air Force for review, the Air Force cannot make valid recommendations for design changes. Data issues can be grouped into three categories: Data Integrity; Data Availability; and LSAR Scope.

3.3.1 Data Integrity

Data integrity issues focus on the factors that affect the accuracy and consistency of LSA/LSAR data. Inaccurate or incomplete LSAR data may result in failure to acquire necessary replacement parts, in the acquisition of too many parts, or in storage of these parts at inappropriate locations. Factors that contribute to loss of data integrity include:

- *LSAR maintenance.* Currently, Air Force policy does not require the maintenance (update) of LSAR after acceptance. Updates made during acquisition program reviews, such as the Provisioning Conference and the Support Equipment Requirements Document (SERD) Review, are not reflected in the LSAR. For example, the Source, Maintenance, and Recoverability (SMR) codes may be changed at the Provisioning Conference but not in the LSAR H and H1 records. These records initialize the D220 provisioning database for weapon system support. Failure to update the records may result in inaccurate decisions because the data is inaccurate and there is no integrated database to support the decisions.

- *Numbering scheme indexing.* In some Contractor LSAR systems, Logistics Control Numbers (LCNs), Work Unit Codes (WUCs), and System, Subsystem Numbers (SSSNs) are used to access different records. Since there is no mandated cross-indexing between these numbering schemes, there is no assurance that changes made to identical data elements in records with different numbering schemes will be made for all occurrences of the data element. Depending on the record, when SPO personnel access data elements in these LSAR systems, they may obtain different values for the same data element.

3.3.2 Data Availability

Data availability issues focus on the completeness, timeliness, and accessibility of LSA/LSAR data. Examples of these three issues are presented below:

- *Completeness.* In some accelerated acquisition programs the LSARs are not completed in a timely fashion and are backfilled from other sources, such as TOs. Such incomplete LSARs may indicate that the Contractor performed LSA tasks have not taken place at the appropriate time or that they have not taken place at all. Consequently, the weapon system design may not adequately reflect supportability requirements. In addition, the SPO and other Air Force organizations which need the data to plan and provide weapon system support are forced to acquire it by other means, resulting in duplicate data purchases.

- *Initial LSA task scheduling.* Air Force regulations govern the time at which LSA starts. However, a rigidly defined LSA start time(s) may have a serious impact on the efficiency and effectiveness of LSA. Beginning LSA too early in the acquisition process may be costly because data is collected on systems and alternatives that may not be implemented. On the other hand, an early LSA start time may identify unworkable alternatives, prevent them from being implemented, and result in cost saving. If the LSA data is collected on early prototypes and is not updated, as is sometimes the case, then LSAR does not reflect the actual weapon system to be delivered. If LSA starts too late, its effect on the design process will be negligible and the weapon system supportability requirements may not be met.

- *Reporting and query capability.* Since current LSAR systems permit only limited database query capability, SPO personnel cannot generate custom LSAR output reports. Instead, they must request that the Contractor generate the reports. Although the SPO may need the information quickly, it can take weeks for the Contractor to process the request and generate the report. Generally, other Air Force organizations cannot generate custom reports because they do not have the automated capability to develop them. Air Force personnel have also expressed concern about the limited data base query capability of automated systems that precludes searching the LSAR for all references to a specific topic.

3.3.3 LSAR Scope

The current scope of LSAR is specified by MIL-STD-1388-2A (some expansion is planned under MIL-STD-1388-2B Record A2: Tradeoff Analyses and Use Study Criteria). Air Force personnel have suggested that the scope of the current LSA/LSAR data be expanded to include:

- Allocated, estimated, and observed resource requirements;
- Text and analytic reports, which are currently available only in paper form and are not kept as part of a central database;
- Additional support planning data, such as software maintenance and maintenance scenarios for space operations;
- Engineering data such as drawings and schematics; and
- AFOTEC test results.

3.3.4 Duplicate Data

In addition to the LSAR and LSA reports, in some cases, the Air Force purchases such information as facility reports, and reliability and maintainability (R&M) reports. Since the Air Force has, in many cases, paid for this information in the LSAR but also acquires it through another purchase, unnecessary and unreasonable costs are incurred. An example of this is facilities information, which is often purchased twice: once well in advance of the weapon system in order to have the required facilities available when the system is fielded, and a second time through the LSA. Since the first set of facilities data are the ones that will be used to provide the facilities, the facilities information in the LSA is redundant.

3.4 INSTITUTIONAL ISSUES

The institutional issues can be grouped into two categories: Education and Training, and Accountability.

3.4.1 Education and Training

The issue of inadequate LSA education and training for Air Force and Contractor personnel has been cited as affecting the accuracy, timeliness, and effectiveness of LSA. For example:

- *Education.* Currently, no Air Force organization offers a university-level course or series of courses in LSA. Both the Air Force and Contractors have expressed concern about the length of time required to develop the expertise to perform LSA. They report that it is easy to train personnel to fill out LSAR sheets, but that educating personnel in LSA performance and application requires an extensive investment of time and other resources. There is also a need for the Air Force to provide more explicit guidelines on how to perform LSA. MIL-STD-1388-1A and 2A specify what the LSA tasks are and what data is to be recorded in LSAR but not how to perform LSA.

- *Training.* There is a shortage of Air Force personnel trained to use Contractor LSAR systems. Presently, there are multiple Contractor systems in use, each of which is different. Current Air Force LSA training programs have not been designed to include an introduction to automated Contractor systems as part of the course content and most SPO personnel do not have the time to learn to use these multiple Contractor systems independently.

3.4.2 Accountability

The SPO has overall responsibility for the weapon system acquisition. One aspect of this responsibility entails optimizing the relationship between time, budget, and LSA requirements. Two accountability issues were raised:

- *Time, budget, and LSA tradeoffs.* To accomplish the weapon system acquisition, the SPO must make tradeoffs that involve balancing time constraints, budget constraints, and supportability considerations. In some acquisitions, some longer term supportability benefits may be traded-off for short-term time and budget requirements. Over the life of the weapon system, this may significantly increase the cost of operations and support, which already accounts for two thirds of the total life cycle cost of the system.

- *LSA/LSAR acquisition and use.* Although the ALCs, AFALC, and the Using Command can voice their supportability and data requirements early in the acquisition, their involvement in the ongoing LSA/LSAR process is often minimal. Because of this lack of involvement, the use of LSA/LSAR data by these organizations post-PMRT is nonexistent. On newer acquisitions, the Using Command and AFLC are becoming more involved with LSA, consequently the LSA process is receiving more attention. The current environment analysis indicates that potential uses of LSA/LSAR data to facilitate ILS are not made.

For example, facilities data and training data are often purchased twice, and information in the D records is not fully utilized to create tech orders. Failure to use LSA/LSAR after PMRT results in part from the perception that LSA is an acquisition system with no real utility after PMRT. There is some evidence that these attitudes are changing and that the ALCs in particular are becoming more involved in the LSA process.

3.5 TECHNICAL ISSUES

Technical issues focus on: paper-based delivery; data compatibility; and system connectivity.

3.5.1 Paper-Based Delivery

LSA/LSAR is a paper-based process that has not changed significantly in twenty years. The LSAR reports for a single weapon system may require two tractor trailer trucks to transport. To limit the volume of paper, various Contractors have developed automated LSAR systems that they use to produce LSAR and LSA Reports. In many cases, SPO personnel have access to these systems to review LSAR data. However, paper is still the most common delivery format for LSA/LSAR data and reports because of the data exchange difficulties caused by isolated incompatible automated systems, lack of trained personnel, and limited query capability of most current automated systems. Formal quarterly LSAR reviews are virtually always conducted in a paper-based mode. Because of the volume of material to be reviewed and the level of detail involved, these reviews are generally conceded to be highly inefficient means of assuring accurate, reliable LSAR data. Since the review process is not automated, it is difficult to check the accuracy and/or completeness of the review process.

3.5.2 Data Compatibility

The use of paper as the primary LSA/LSAR data exchange medium and the difficulties involved with automated data transfer between the various LSA systems hamper effective data exchange between Contractors and the Air Force and between Air Force organizations. The following data compatibility concerns were raised:

- *Data format compatibility.* Different LSAR systems may store the same data element in different formats. For example, a data element may be stored as a "string" (alphanumeric characters) in a file generated by one computer system while the computer system reading the file may expect that data element to be an integer or real number. In some cases, this data incompatibility causes the LSAR data to be transferred between organizations and then manually re-entered into the receiving system, causing duplication of effort and delays in the overall LSA/LSAR process.
- *Software compatibility.* Currently, the Contractor must deliver LSA/LSAR data using the media and format specified in the contract. Often the contract speci-

fies magnetic tape with LSAR data stored in MIL-STD-1388-2A format. These tapes can be read by the receiving organization using MRSA software, however, some ALCs and MAJCOMs which use DEC equipment have encountered difficulty reading the tapes.

- *Hardware-specific systems.* As more automated on-line LSAR systems are developed, the enhanced functionality of these systems may be gained at the cost of requiring specific hardware.

3.5.3 System Connectivity

In addition to different organizations using a variety of automated systems, an organization may also use a variety of systems. It is difficult to share/transfer information between these systems and organizations.

Contractors perform most technical activities in LSA. In some Contractor organizations, LSA is conducted by logisticians independent of the engineering design efforts, despite the intent that LSA be integrated with the design process. During the weapon system development, Contractor logisticians and designers often use different automated systems that are not interconnected. Lack of communication between the two groups makes the accuracy of the LSAR suspect since the changes made by the designers may not be reflected in the LSAR, which is maintained by the logisticians. Conversely, the design changes may not reflect input from the logisticians. Both the Air Force and Contractors recognize the necessity to manage appropriately the LSA process and place greater emphasis on the integration between functions. Integrated LSAR systems would greatly enhance the probability that supportability considerations are incorporated into weapon system design.

3.6 RELATIONSHIP OF LSA/LSAR ISSUES TO AIR FORCE ORGANIZATIONS

The current LSA/LSAR environment analysis identified several Air Force organizations as major players in LSA/LSAR as well as several minor players. The major players are AFSC (SPO), AFLC (ALC and AFALC) and the Using Commands. ATC and AFOTEC have lesser roles in the current LSA/LSAR process. SPO/DPML personnel are most directly affected by the majority of the LSA/LSAR issues, however, most issues affect all Air Force organizations who play a role in the LSA/LSAR process.

Several LSA/LSAR issues were raised by Contractors. Although the SPO is responsible for managing the LSA program, the Contractor, not the Air Force, performs the majority of the LSA tasks. Therefore, the issues must be addressed in terms of the content, form, and time frame of LSA/LSAR information delivered by the Contractor to the Air Force, and in terms of the way LSA/LSAR is managed, distributed, and used by the Air Force.

SECTION 4: CONCLUSION

This analysis of the current LSA environment within the Air Force helps to define automation opportunities for inclusion in an eventual CALS Operational Support Automation Plan. This section summarizes the main points that have emerged from the analysis:

- The LSA process has clearly established utility in acquisitions and has the potential for value in operational support; however, today, LSA documentation has limited value because it is often untimely, inaccurate, inconsistent, and not readily accessible.
- The utility and efficiency of LSA documentation can be enhanced by including additional data, particularly engineering drawings, in the data base.
- The current paper-oriented LSA process is difficult and inefficient to work with. Most of the formal LSAR reviews are paper-based, labor intensive, and error prone. There is no viable system for checking the accuracy of the review process.
- Automating the LSA process mitigates some of the difficulties with LSA documentation and results in increased efficiency and effectiveness in designing for supportability.
- Automated systems currently exist and are used productively in the LSA process. All but one of the automated systems are contractor-owned and operated. These contractor systems are usually not integrated, making the transfer of data between Contractors, other organizations, and across functional areas difficult.
- The Air Force is responsible for developing the LSA strategy, tailoring and managing the process, reviewing, and accepting the results. The Air Force must balance competing interests of cost and performance with supportability. In some cases, supportability is sacrificed. A more efficient LSA process would insure that supportability is inherent in the design of weapon systems.
- Contractors perform most technical activities in LSA. Communication between the logistics support team and design engineers is often weak. In spite of this, the Air Force and Contractors recognize the necessity to manage appropriately the LSA process and are focusing greater emphasis on the integration between functions (concurrent engineering).

These conclusions point clearly to the need for a more efficient, effective LSA/LSAR process. It is equally clear that automating the LSA/LSAR process would provide a route to improving the integration of supportability concerns into system design.

REFERENCES

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MIL-STD-470 Maintainability Program Requirements.

MIL-STD-471 Maintainability Verification/Demonstration/Evaluation.

MIL-STD-490 Specification Practices.

MIL-STD-499 Engineering Management.

MIL-STD-680 Contractor Standardization Plans and Management.

MIL-STD-785 Reliability Program for Systems and Equipment Development and Production.

MIL-STD-881 Work Breakdown Structure for Defense Material Items.

MIL-STD-882 System Safety Program for Systems and Associated Subsystems and Equipment; Requirements for

MIL-STD-965 Parts Control Program.

MIL-STD-1367 Packaging, Handling, Storage, and Transportability Program Requirements (for Systems and Equipments).

MIL-STD-1388-1A Logistics Support Analysis.

MIL-STD-1388-2A DoD Requirements for a Logistics Support Analysis Record.

MIL-STD-1390 Level of Repair.

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MIL-STD-1561 Provisioning Procedures, Uniform DoD.

MIL-STD-1629 Procedures for Performing a Failure Mode, Effects, and Criticality Analysis.

MIL-STD-2073 DoD Materiel, Procedures for Development and Application of Packaging Requirements.

MIL-STD-2073-1 DoD Packaging Data Forms Instruction for Preparation and Use.

DATA ITEM DESCRIPTIONS

DI-A-7088 Conference Agenda.

DI-A-7089	Conference Minutes.
DI-E-7026	Parts Control Program Plan.
DI-E-7027	Program Parts Selection Lists (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-S-7017A	Logistics Support Analysis Plan.
DI-L-7114	Logistics Support Analysis Strategy Report.
DI-L-7121	Supportability Assessment Report.
DI-L-7145	Logistics Support Analysis Record (LSAR) Data.
DI-L-7159	Task Narrative Master File.
DI-L-7180	Logistics Support Analysis Control Number Master File.
DI-L-7181	Parts Master File.
DI-L-10827	Integrated Support Plan.
DI-P-7119	Post Production Support Plan.
DI-S-3606	System/Design Track Study Report.
DI-S-4057	Scientific and Technical Reports.
DI-S-7115	Use Study Report.
DI-S-7116	Comparative Analysis Report.
DI-S-7117	Technological Opportunities Report.
DI-S-7118	Early Fielding Analysis Report.
DI-S-7120	Supportability Assessment Plan.

REGULATIONS

AFLCR/AFSCR 800-36	Logistics Support Analysis.

AFLC 23-17	Air Force Acquisition Logistics Center.
AFLC 23-31	Commander, Air Logistics Centers.
AFLC 23-42	Directorate of Maintenance, Air Logistics Centers.
AFLC 23-43	Directorate of Material Management.
AFLC 23-49	Directorate of Competition Advocacy.
AFR 50-8	Policy and Guidance for Instructional System Development.
AFR 57-1	Operational Needs.
AFR 57-4	Modification Approval and Management.
AFR 65-110	Production Management Branch.
AFR 800-xx	Acquisition Management - Logistics Support Analysis.
AFR 800-2	Acquisition Program Management.
AFR 800-8	Integrated Logistics Support (ILS) Program.
AFR 800-11	Life Cycle Cost Management Program.
AFR 800-12	Acquisition of Support Equipment.
AFR 800-14	Test and Evaluation.
AFR 800-18	Air Force Reliability and Maintainability Program.
AFR 800-34	Engineering Data Acquisition.
AFR 800-36	Provisioning of Spares and Repair Parts.
MAC REG 23-2	Organization and Functions HQ, Military Airlift Comand.

DIRECTIVES

DoDD 3-M-1	Test and Evaluation Master Plan (TEMP) Guidelines.
DoDD 39	Acquisition and Management of Integrated Logistics Support for Systems and Equipment.
DoDD 4120.3	Defense Standardization and Specification Program.
DoDD 5000.2	Major System Acquisition Procedures.

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800-34 Acquisition Logistics Management.

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Gane, C. and Sarson, T. "Structured Systems Analysis: Tools and Techniques", McDonnel-Douglas Corporation, 1982.

McCarty, D. and Bayles, R. "View from the DPML: Performance and Supportability:, 1987.

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PRINCIPAL POINTS OF CONTACT

Principal points of contact for the LSA process are listed in Figure R-1.

AFLC					
HQ	AFALC	LMSC	SM/ALC	WR/ALC	LOC
MMAT	ERR	SQP	MMT	MMAMA	AT
MMTIB	ERT	SMO	CR		
XRIC	LSE	SMIR	CREEB		
	LSG	SHO	MAQ		
	OAJB	SMW	MMMP		
	ERL	SMA	MAW		
	ER	SBP	MAWS		
		SMIE	MAN		
		SHT	MME		
		SMIA	MMED		
			MMEDS		

AFSC			
ASD	ESD	BMO	HQ
ALH	JSL	ALT	PLLP
YXYL	JSTML		PLXC
ALT	PLLM		
YCL			
ENE			
B1LRE			

TAC	MAC	AFSPACECOM	USAF	DoD	USAMC
HQ	HQ	HQ	HQ	WSIAO	MRSA
SMO–J	LG	LKYY	LEYM		
TACLLD	LGXA				
	LGMM				
	LGXAS				
	LGMMC				
	XPQC				

CONTRACTORS:

MARTIN–MARIETTA	ROCKWELL	McDONNELL DOUGLAS	NORTHROP
GRUMMAN	LOCKHEED	SIMMONS	ERC

FIGURE R-1. LSA CONTACTS