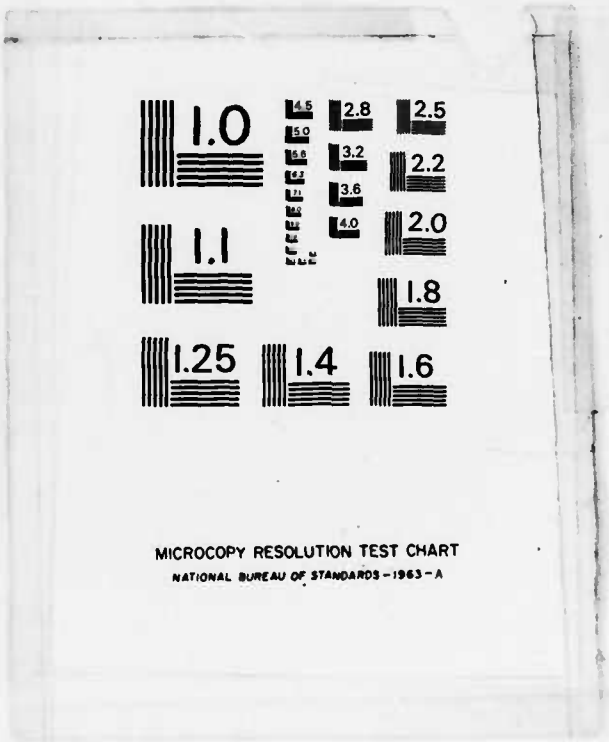
AD-A148 443 A SURVEY OF EFFECTIVE MEASURES IN THE LOGISTICS SUPPORT ANALYSIS PROCESS(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL OF SYST.. P S WOODLAND 1/1

UNCLASSIFIED SEP 84 AFIT/GSM/LSY/84S-32 F/G 15/5 NL


1.0
1.1
1.25
1.4
1.6
2.8
2.5
3.2
2.2
3.6
2.0
4.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(2)

AD-A148 443

A SURVEY OF EFFECTIVE MEASURES IN THE LOGISTICS SUPPORT ANALYSIS PROCESS

THESIS

Paul S. Woodland
Captain, USAF

AFIT/GSM/LSY/84S-32

DTIC FILE COPY

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

DTIC
ELECTE
DEC 1 2 1984
S
B

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

84 12 03 145

REPRODUCED AT GOVERNMENT EXPENSE

AFIT/GSM/LSY/84S-32

A SURVEY OF EFFECTIVE MEASURES IN THE LOGISTICS SUPPORT ANALYSIS PROCESS

THESIS

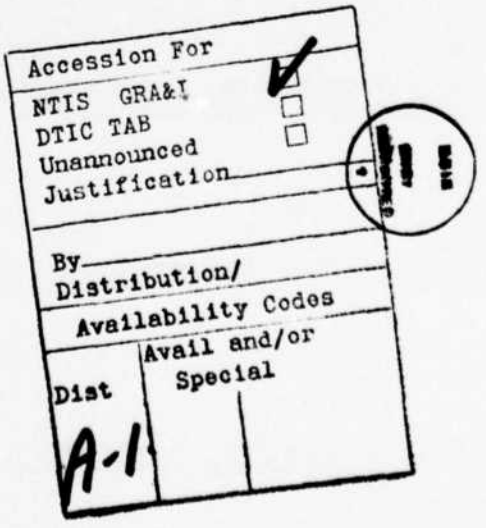
Paul S. Woodland
Captain, USAF

AFIT/GSM/LSY/84S-32

Approved for public release; distribution unlimited

DTIC
ELECTE
DEC 12 1984
B

The contents of the document are technically accurate, and no sensitive items, detrimental ideas, or deleterious information are contained therein. Furthermore, the views expressed in the document are those of the authors and do not necessarily reflect the views of the School of Systems and Logistics, the Air University, the United States Air Force, or the Department of Defense.



AFIT/GSM/LSY/84S-32

A SURVEY OF EFFECTIVE MEASURES IN THE LOGISTICS SUPPORT ANALYSIS PROCESS

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Systems Management

Paul S. Woodland, B.S.
Captain, USAF

September 1984

Approved for public release; distribution unlimited

Acknowledgments

Involvement in this thesis effort certainly would not be complete without acknowledging those who have made it all possible. To Mr. Charles Walker I offer my sincerest thanks to a man who, quite often, satisfied the role of "partner". Your support in collecting the survey instruments as well as the sound ALC advise were most welcome additions to the project. As you know, much of the research process often involves definition of a goal and a dedicated effort toward its accomplishment. Throughout, Mr. William Dean my advisor provided the guidance and direction that makes such a task as this much less "groping in the dark" and more of a truly enlightening experience. My congratulations go out to our accomplishment. Finally, there are those brave individuals who fulfill the roles of family and friends. This support structure does not go without notice. In fact, it is a most necessary component for listening to the ravings of a madman; and thus from insanity comes great vision. Cynthia, your help in word processing and your infinite patience leave me eternally grateful. Thank you. Donald, Vivian, and all of the rest of you were there encouraging the results; leaving me nothing else to say but... it's all done and I appreciate your help. Thanks!

Paul S. Woodland

Table of Contents

List of Figures

List of Tables

Abstract

This investigation was a general attempt to determine if Logistics Support Analysis (LSA) process effectiveness could be measured within the confines of the Aeronautical Systems Division. Surveys of opinion were sent to LSA program managers representing many programs and general attitudes were collected in response to forty-three measurement questions. Response packages were returned by twenty-five of these individuals. The survey findings were sorted, categorized, and analyzed against a background of five major research questions ranging from the measurability of LSA process effectiveness to the predictive factors contributing to increased levels of overall effectiveness.

Results from the study clearly indicate a preponderance of evidence suggesting that LSA process effectiveness is indeed measurable. While this is clearly the first significant step in modeling the effectiveness issue, the research goes on to identify accepted predictive factors to be used in program assessment. Several categories of factors were examined and offer a point of departure for in-depth variable analysis. Finally the study investigates the qualifications of individual program managers and suggests

criteria for more precise measurement. Success of the research led to detailed conclusions and recommendations for areas requiring future emphasis.

A SURVEY OF EFFECTIVE MEASURES IN THE LOGISTICS SUPPORT ANALYSIS PROCESS

I. Introduction

General Issue

Logistics Support Analysis (LSA) is a methodology used within the bounds of the system engineering process to identify and analyze the support resources required for an evolving weapon system. As such, LSA can be used as a systematic analytical process to determine both quantitative and qualitative support requirements associated with the operations and maintenance of a particular piece of equipment. The process begins early in the concept exploration phase and extends throughout the production and deployment of the weapon system. Specifically, the LSA process is characterized by a number of detailed logistics tasks that form the foundation for very complex analytical trade studies and logistic support assessments. Since the LSA process is lengthy and can easily be misapplied, it requires dedicated and technically competent supervision.

Background

In recent years managers within the Department of Defense (DOD) have met with both exciting and challenging times, especially in the area of weapons system acquisition.

Past government policy allowed the engineering community at large to "establish the program direction" for the acquisition of major military and government hardware. Unfortunately, this kind of situation has resulted in development programs that reach the boundary of the human technological capacity, with little recognition or regard for the practical issues of weapons system support. Government officials now realize that dwindling resources and an increasing national deficit prevent the U.S. from expending large sums of money toward developing systems without adhering to a minimal life cycle cost point of view. Managers now understand the importance of investing in logistic support programs. These programs are important because they help to reduce life cycle cost by improving reliability and maintainability, and by increasing overall system availability. Recent research has shown that operation and maintenance costs often exceed acquisition cost during the first five-to-seven years of an equipment's life; this trend continues to worsen (5:1). Many older systems in the U.S. Air Force inventory, like the F-4 and the B-52, reflect the same trend. As one individual pointed out:

> Since 1967, the operating and support cost for each hour we fly an aircraft have quadrupled.... Over a 20 year period, it has been estimated that the Air Force spends two dollars on operating and support costs for every dollar spent to buy the weapon system; i.e., the cost of research, development, and production [5:1].

DOD agencies have now taken responsibility to reverse the above trends by issuing policy documents for use in the acquisition of military weapons systems. Directive 5000.1 is first in order of precedence for management of systems acquisition and has seniority over all other DOD and military regulation (12:1). The document establishes guidelines for the management of major system acquisitions and assigns to the Defense Systems Acquisition Review Council the responsibility of advising the Secretary of Defense on decisions of importance.

Another directive, DOD 5000.39, establishes policy for the development and management of an Integrated Logistics Support (ILS) program (12:3). This document explains the need for evaluating system supportability issues and bringing them to the forefront of program management responsibility as design constraints coequal with performance, cost, and schedule. To fully understand the significance of support issues and their impact on LSA process effectiveness, the following explanation of ILS and LSA are provided.

Integrated Logistics Support. ILS is a program management concept that is concerned with integrating logistics into the design of equipment, optimizing the system for effectiveness, and minimizing the overall life cycle cost. The objective of an ILS program is to field a system that meets the predetermined readiness objectives at

an affordable cost. The reader may wonder how this is accomplished. Primarily logistics goals may be attained by designing desirable support and maintenance characteristics into the system or equipment being developed (10:2-2). The above task may be as simple as consulting a logistician for general advice during design, or as complex as performing a detailed analysis to determine the optimal equipment configuration for a reliable design that is easily maintainable in the field. ILS may be summed up by saying that it represents a structured iterative approach to the management of various technical activities which are necessary to:

> a. Integrate support considerations into system and equipment design.
> b. Develop support requirements that are related consistently to readiness objectives, to design, and to each other.
> c. Acquire the required support.
> d. Provide the required support during the operational phase at minimum cost [10:2-2].

Central to the ILS program, the Logistics Support Analysis (LSA) process is a key technique that has evolved to accomplish many of the trade off analyses between design and support considerations that are needed to achieve ILS objectives.

Logistics Support Analysis. Because of the extensive nature of the process, LSA remains an often misunderstood and confusing concept. There are a number of existing definitions for LSA; however, AFLCP/AFSCP 800-34 clearly

states that the objective of LSA is to structure a process which systematically pulls together all engineering functions that contribute to the design, development, and deployment of an integrated logistics system (11:10-1). The LSA process begins early in the concept exploration phase of the acquisition cycle and is applied throughout the development process and on into production and deployment.

The LSA process represents a composite of systematic actions taken to identify, analyze, and influence decisions made about logistics support. Initially, the thrust of LSA is to identify quantitative and qualitative objectives for logistics support. The LSA objectives later become the basis for design parameters which are translated into hardware development. LSA provides the input needed for performance specification and the design/cost tradeoff analyses that are conducted on an iterative basis. As an iterative process, various LSA analyses (e.g., risk,logistic support, operational availability) are conducted repeatedly.

Early in program development, LSA is used in the evaluation of alternative hardware designs and their impact on support postures and operational readiness. Design-related risks and constraints on logistic resources like material, personnel, and training are identified and optimum alternatives are selected at this point. As the

program progresses and the design configuration becomes fixed, LSA provides timely information for all areas of Integrated Logistics Support. For example, analysis of the weapons system's configuration can provide the detailed information needed to identify not only the support equipment needed, but the personnel specialty skills required as well. This information is needed to describe, and put into place, a support system that meets the LSA requirements (6:5). Finally, LSA data is stored for historical purposes; this comparative tool can be used as a design baseline to influence decisions made on future systems. Continuous feedback and corrective actions make the LSA process valuable during the system's life cycle and long after it ceases to exist. As with all tools, LSA has the potential to make significant contributions in the form of positive enhancements to the acquisition of a weapons system, but this applies only when there are diligent people who understand the process and are flexible enough to tailor it to specific program needs.

Specific Problem

In recent years, the Department of Defense (DOD) has required all major acquisition programs to establish LSA programs and designate LSA program managers. This requirement, combined with the increasing difficulty associated with effective application of the LSA process has caused concern within the acquisition logistics community. The joint-command guidance office for LSA management (AFALC/PTA) has expressed serious concern over the effectiveness of LSA program management within Air Force Systems Command Product Divisions. Little information has been collected which discusses the competency of LSA program managers or the effectiveness of process application. Within the Aeronautical Systems Division (ASD), there is no substantial data base from which to draw conclusions about the degree to which the LSA process is begin applied effectively to ASD programs. Measures of effectiveness need to be identified for the purpose of measuring the LSA program management process.

Research Questions

1. Can LSA process effectiveness be measured?

2. What level of effectiveness can be assigned to the LSA programs surveyed in ASD?

3. Which factors can be identified that may aid in measuring increased levels of LSA effectiveness

4. What percentage of participating LSA program managers seem qualified to make judgment on the issue of effectiveness?

5. Have individual program requirements been effectively tailored and levied against the appropriate contractors?

II. Literature Review

Background

Government efforts to infuse consideration of the complex constraints of logistics support into the engineering design process have been underway for many years. As early as 1964, DOD Directives and instructions established a requirement for each service to implement some type of Logistics Support Analysis Program (3:1). This early attempt to formulate government policy was met with separate efforts by each of the services to develop and implement the DOD Directive. Unfortunately, there was no collective effort to accomplish objectives and no unified standard specifying how LSA was to be achieved. Within Air Force circles, the Ballistic Systems Division (BSD) prepared a detailed set of LSA requirements for the Minuteman Program (3:1). The Navy similarly developed Maintenance Engineering Analysis (LSA equivalent) and applied the process to both the F-4 and F-111 Programs (3:1). Air Force attempts to apply the LSA processes initially met with little success. In summary, the Logistics Support Analysis process during the 1960's was crude and only marginally effective in accomplishing stated objectives.

In the early 1970's, the services met and decided to establish a single source of guidance for the application of LSA. The resulting document was a military standard for

Logistics Support Analysis (MIL-STD-1388-1), dated 15 October 1973. The new standardestablished criteria governing performance of Logistics Support Analysis as an integral part of the engineering process and the definition of support system requirements (6:1). Although not fully successful, the standard did provide for an integrated investigation by the joint services into the structured requirements of LSA. Because of obvious inadequacies, the first military standard was rewritten to result in the new MIL-STD-1388-1A. MIL-STD-1388-1A provides a single approach for all military services to conduct and document logistics support analysis as part of the Integrated Logistics Support Program (12:3). The revised document is intended for use by government agencies and defense contractors in establishing military LSA programs. The new emphasis for logistics analysis is now centered around the determination of manpower, personnel and training requirements.

Logistics Support Analysis

Generally the Air Force Request For Proposal (RFP) is the first communication with industry that contains requirements for LSA (11:10-1). The RFP is sent to potential contractors requesting a proposal describing how each contractor would accomplish the stated government requirements. Included in the RFP are logistic design parameters like Mean Time To Repair (MTTR) and Mean Time

Between Maintenance (MTBM) that communicate system goals to defense industry participants. The responding contractor firms must describe (often in an LSA plan) how the contractor proposes to apply the LSA process and how the systems engineering process will incorporate the functions of the LSA program (11:10-1). The contractor's response must be descriptive enough to communicate all the details of the LSA program and their applicability to total system objectives. Subsequent evaluation for contract award is based partially on past experience but primarily on how well the contractor understands and intends to implement the LSA process.

Placing LSA on contract represents the next major milestone in the series of process requirements. While the negotiated contract marks the beginning of contractor responsibility, it does not mark the beginning of the analysis process. Some form of support analysis, at least at a topical level, is usually conducted during the concept exploration phase. Upon contract award during full scale development, the contractor should be provided with any and all logistics information that defines the expected support posture.

An underlying concept of LSA is that the contractor statement of work is different for each contract. Flexibility is key when determining which LSA tasks are to be applied to meet specific needs of the program. For

example, the LSA task requirements for commercial "off-the-shelf" equipment would be much different from the tasks associated with development of new design equipment (2:4). This fundamental difference between acquisition strategies is reflected in the MIL-STD-1388-1A tasks that are applied to each LSA contract.

Despite the flexibility involved in applying LSA tasks to contracts, some activities are required regardless of the type of acquisition. The Air Force Guide For Supportability Analysis and Supportability Analysis Record suggests that support task requirements be identified by three analysis techniques: (1) detailed review of system functional support requirements; (2) failure modes, effects, and criticality analysis (FMECA); and (3) reliability centered maintenance (RCM) analysis (2:6). Failure modes and effects analysis generally tends to cause the most confusion. In the performance of the FMECA, the contractor must identify the various possible modes of failure for a piece of equipment and then determine the effect or criticality of such a failure. This kind of analysis is central to the LSA process. Without proper identification of possible failure modes, there is little chance of documenting and analyzing the support required to maintain an operational system. Of the other analysis techniques, RCM provides a systematic means of determining the feasibility/desirability of different preventative

maintenance tasks, thus highlighting maintenance problem areas for design review consideration (2:6).

After final contract award, there is a 30-45 day period during which the Air Force is required to meet with the contractor to discuss the significance of the LSA program within the contractor's systems engineering process (11:10-2). The guidance conference meeting provides industry with an opportunity to clarify Air Force support concepts and fully explain their approach to satisfying LSA program requirements. Specifically, the guidance conference provides a means of establishing initial LSA procedures and conditions under which documented results may be reviewed and validated (2:7). There is also ample opportunity to discuss how the LSA data will be passed to those authorized government agencies who request summary reports. Contractors should identify both organizational and functional management responsibilities for LSA and establish the level of indenture (work breakdown structure) to which the support analysis is to be performed. Lastly, both parties must agree to the equipment items that will initially be identified as analysis candidates. From this point forward, the contractor assumes major responsibility for the performance of LSA tasks and the generation of acceptable data products.

The last major phase of activity involves conducting the LSA program as described in the approved contract. In

this phase, primary activities include identification, quantification, and analysis of resources needed to provide cost-effective logistics support. In reality, the LSA process represents a two-component process. Initially, emphasis is placed on the gathering, analyzing, and processing of information. Later, the emphasis shifts to the management of technical efforts to produce various ILS products and services (13:3). The result is that the components are actually indistinguishable in their contribution to the integration of functional logistics disciplines (13:3). Graphically, Figure 1 shows the application of LSA is characterized by: (1) its direct impact on total logistics support for a given configuration, and (2) the feedback effect of the logistics support of the configuration as seen below (1:140).

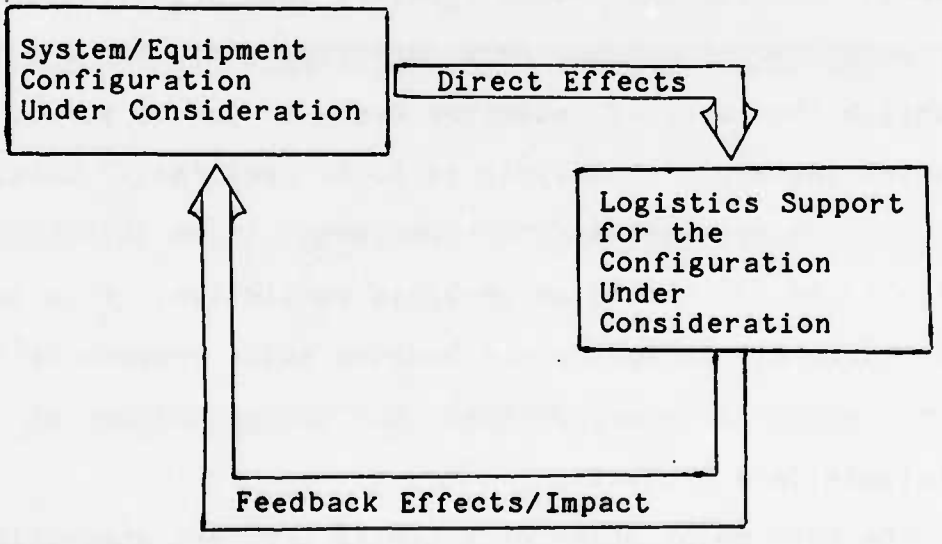


Figure 1. Logistics Support Analysis Application

Often overlooked, the single most important component in the application of the analysis process is the LSA analyst. The person responsible for performing the LSA analysis is the key component in determining what support is required to keep the system operating efficiently. A very real problem is the fact that there are not enough qualified individuals to adequately perform the tasks of the LSA process. These individuals must be sufficiently familiar with engineering to understand the technical aspects of the design/logistics system to estimate spares, support equipment, training, manpower, and maintenance required in the field (8:1). The very nature of LSA suggests that hardware design features must evolve from a detailed list of specification requirements which include logistics constraints. This task must be accomplished on an iterative basis. The real dilemma arises from a complex set of decisions about alternative design approaches that must be offered and examined throughout system acquisition. The LSA analyst is faced with the question of when should logistics influence on design cease to affect the configuration and begin to establish system support requirements. There is also the question of how the existence of incomplete data affects current trade studies that ultimately recommend future support item requirements.

Often such questions leave the program analyst agonizing over the accuracy and appropriateness are sufficient enough for early recommendation. As Michael McCarthy of Northrop Corporation suggests:

> Perhaps the most critical task of the LSA manager is to assess the relative criticality of accuracy versus timeliness for a specific analysis or trade study and to decide when sufficient data is or is not available to reach an analytical conclusion [8:2].

At some point the analyst must realize that no decision, regardless of the certainty of information, provides an opportunity to be absolutely correct. The consensus is that an analyst must be aware of the limitation of his analysis results and must communicate this information along with the recommended support suggestions. Despite original estimates, the quantitative description of the required support is likely to change many times over the life cycle of a system.

In summarizing the LSA process, it is sufficient to say that it is more than just an analysis tool; LSA represents a methodology that provides an integrated approach to the definition and quantification of a system's logistics support requirements. With the cost of system support doubling the cost of acquisition, new emphasis must be placed on recognizing logistics support as one, if not the only, prime driver in future contracting and acquisition policy. Such a policy change is a must if the

United States is to avoid the fate of rapidly increasing system costs--a price that will certainly be paid by the taxpayer. For many people the choice is clear; LSA is a requirement on all procurements and, therefore, must be accepted as the responsibility of program management for its proper application. Individuals outside of the logistics community must be held accountable. The implications of this process are significant; LSA provides a means unlike others to use design parameters in determining the actual numbers of required spares, skill requirements, technical data, and personnel. In short, the synthesis of each iteration of LSA analyses is accomplished toward the eventual achievement of one singularly important goal--cost effective support for design.

III. Methodology

Method Justification

The analytical techniques characteristic of the LSA process involve a complex series of trade-off studies performed by contractor personnel to determine what support is required for a particular system or equipment item. Based on the contractor supplied data, the government LSA manager is required to screen informational inputs in an attempt to develop a coherent logistics strategy. This strategy involves development, procurement, and distribution of a "support package" properly suited to meet the life cycle needs of a weapon system and its corresponding personnel. As such, it would stand to reason that one of the individuals most familiar with the ultimate objectives and success of the LSA process is the person charged with the responsibility for its day-to-day application. In the majority of cases, the responsible logistics managers are assigned to the offices of the Deputy Program Manager for Logistics (DPML) or to the Integrated Logistics Support Management (ILSM) group within the appropriate program offices. Within the acquisition community, the "front-line" LSA program manager is often uniquely qualified to make a valid assessment of LSA process or program effectiveness because of continuous involvement and actual management responsibility for the process. Along with the organizations responsible for

initial operational test and evaluation and those who ultimately maintain/support the weapon system, the LSA manager must also give great attention to assessing the merits of a support program. Evaluation of LSA program effectiveness in often based upon objectives established by the original logistics support manager. Support decisions made throughout the years will be based upon the foundation laid by this individual.

Measurement Instrument

Characteristics of the LSA process have led to selection of the survey instrument as a means of collecting the required research data. Notwithstanding various interview techniques, a survey represents a direct approach to collecting the reported attitudes of a selected group of LSA managers. Although the survey technique is dependent upon the verbal or written response, its versatility provides an avenue for collecting information on opinion and behavior. This fact alone provides flexibility for the survey to be used as a valuable measuring instrument. The survey however, is not without its shortcomings. A major disadvantage of a survey approach is the lack of feedback the respondent receives when answering questions. In the event the respondent is either confused by, or does not understand a question, there is no means by which to clarify the issue with feedback from the person issuing the survey. Additionally, there are inherent limitations in

using rigid sets of survey questions that can not be altered after survey issuance. These shortcomings are not necessarily shared by other techniques (for example, the interview method), but each technique does have its own unique set of disadvantages. These disadvantages must be carefully weighed in selecting and developing the appropriate data collection strategy. For the purposes of this study the survey technique was selected because of limitations on the amount of data collection time, the fact that each survey is exact and asks the very same questions of every participant (unlike the interview technique), and because surveys appear to be less intimidating than verbal interviews.

Sample/Population

Due to logistical difficulties involved in collecting research data from remote locations and the limitations placed upon TDY funding for student travel, this study has been limited to the ASD community at Wright-Patterson AFB. The target population was much more clearly identifiable due to this researcher's access to the Wright-Patterson community and his familiarity with ASD organizational structure. Potential survey candidates were identified and selected from base activities responsible for logistic support issues within the ASD program offices. According to the Air Force Acquisition Logistics Center (AFALC) computer records, there were 93 identifiable DPML or ILSM

offices distributed throughout ASD. Within these offices, the LSA manager is operationally defined as the individual(s) responsible for management and implementation of LSA activities throughout the acquisition cycle of a DOD system. Sampling for this research was based upon a rather straightforward approach. Since cost was not a significant factor in the selection of larger and larger sample sizes, selection strategy was based primarily upon selecting as many study participants as could be identified from the existing data base. This sampling technique was used to identify 34 candidates from the various offices responsible for logistics support analysis on ASD programs. The selection technique also has the added benefit of achieving a representative sample of the population which exemplifies many of the possible phases in the acquisition cycle. This selection of programs ranging from early development to the latter stages of production reflect a direct sampling plan that helps to minimize the influence of one particular phase on the final conclusions that result from the data. While other selection techniques like straight-line or weighted methods might suffice, the objectives of this research are as readily served by the above procedure.

Data Collection

The survey instrument provided in the appendix to this document is primarily based upon an existing questionnaire obtained from the AFALC Guide for Supportability Analysis

and Supportability Analysis Record. From this guide, questions concerning the contractual applications of LSA, previous training and experience in LSA, and recommendations for improvements were used to provide the survey's foundation. Additional questions about rank/grade, official position title, and status as an LSA point of contact provided the much needed demographic information. The general structure of the survey was arrived at based upon a compromise between the researcher's desire to answer certain basic questions, and the expert opinion of AFALC staff members. Conscious of advisor input, the decision to include or exclude questions along with the effort to determine their sequence resulted from the same compromise process. As for survey administration, the survey packages are to be sent to each of the candidates identified for the sample group. The very structure of the survey requires each survey participant respond with his or her recommendations for adequate measures of LSA process and program effectiveness. Because of the flexibility for each participant to respond as he or she pleases, there is a possibility for dispersion in the responses. To prevent problems in this area, the questionnaires will each be screened and the answers placed in categories to be analyzed in groups. Group categories will be established upon receipt of the survey data. From this categorization, it is possible that the observed

trends in the data will provide the proper evidence to establish general patterns and offer final conclusions. In any event, such issues shall be addressed in the latter stages of the research effort.

IV. Findings and Conclusions

Introduction

This section represents a summary of the collective results of the thesis research process. The text is divided into five sections, each corresponding to a particular research question identified in the introduction (Chapter One). The proposed research question will be presented in each section along with actual survey results in categorized form. Of the original 34 survey packages that were sent out to participating ASD offices, a total of 25 completed surveys were returned for a 73.5% response rate. The raw data from all surveys is contained in Appendix B. Of the 25 survey forms returned, there were several which had one or more measurement questions that were either incomplete (the individual failed to respond with the correct number of answers) or entirely disregarded. For this reason, it is apparent the summary information may contain data which represents a total of less than 25 survey responses per category. In this case, all deductions and the accompanying conclusions are based upon some percentage of the actual number of responses, not on the number of possible responses.

Research Question One

CAN LSA PROCESS EFFECTIVENESS BE MEASURED?

The initial basis for this research centered around a genuine attempt to determine whether LSA process effectiveness could accurately be measured. Regardless of subsequent research findings, the primary concern was to survey LSA management opinion and verify the measurability of process effectiveness. Without data to support the measurability assumption, little incentive would exist to press forward with additional research concerning the inputs to and results of effectively structured and managed LSA programs.

Targeting the measuring instrument at only those individuals responsible for managing the LSA process, survey question 28 was particularly structured to collect data corresponding to the above research question.

> After close scrutiny, do you believe the effectiveness of your LSA program could be measured in either quantitative or qualitative terms?
>
> a. no
>
> b. yes

Statistical inference, the process of making judgment about a population based upon examination of a sample was the basis used for modeling the measurement question for analysis. The decision was made to model question 28 after a binomial distribution, and structure the model upon three major assumptions:

1. Each survey is independent of each other. (Collusion in the survey responses would not be an expected pattern for this experiment.)

2. The outcome for this question can be limited to one of two responses (yes or no).

3. The probability of a yes or no response is constant for each individual survey.

Each of these assumptions were necessary to properly conduct a binomial experiment.

For the purposes of this research, a hypothesis testing approach was deemed appropriate. As part of the hypothesis testing approach, the researcher is required to establish a decision criterion for the population and its constraint, by which subsequent data will be measured. The basic decision criterion established that the majority (greater than 50%) of the survey sample would have to respond with a "yes" response in order to conclude that LSA process effectiveness can be measured in qualitative or quantitative terms. In addition, a null and alternative hypothesis must be determined for the experiment. The null (denoted by H_o) is the hypothesis assumed to be true until there is sufficient evidence to the contrary. The alternative (denoted by H_a) is the hypothesis the researcher would prefer to conclude. Using the 50% constraint of the decision criterion, the null hypothesis stated that the probability of collecting information to support the premise of process effectiveness measurability was less than or equal to 50%. The alternative suggests the probability of collecting the same information is greater than 50%.

(H_o) $p \leq .50$ (H_a) $p > .50$

In the binomial distribution, X is defined as the random variable number of successes or "yes" responses to the questionnaire. To interpret the data collected, the researcher must first determine a level of significance for the particular analysis test. By selecting a level of significance ($\alpha = .15$), the researcher defines the confidence level he intends to be satisfied with. In this case, selecting an α of .15 corresponds to a confidence level defined as (1-.15) which means that those conducting the research can be <u>eighty-five percent</u> sure that the conclusions based on sample observation are correct. With all assumptions/constraints defined, the hypothesis test may now be conducted.

Statistical Test

The appropriate test is to reject the null hypothesis for the defined significance level value if:

> The probability of the random variable X being greater than or equal to the observed number of "yes" responses (given a sample of 25 and a probability of .50) is less than the significance level value

EXAMPLE: $P\{ X \geq 16 \mid 25, .50 \} < .15$

This is equivalent to...

$1-p(X < 15)$

Using the A.2 table of Cumulative Probabilities from the Meek and Turner text, Statistical Analysis For Business Decisions, the above equation equates to...

$1-.8852 = .1148$

Comparing the computed value of .1148 to the significance level of .10, we find that $.1148 < .15$, and, therefore, we are required to reject Ho (the null hypothesis).

Conclusion

The results of the hypothesis testing suggest there was sufficient evidence in the sample to reject the null hypothesis and conclude that the probability of supporting the premise of process effectiveness measurability was greater than 50%. This actually means that the majority of LSA managers in ASD do believe that LSA process effectiveness can be measured in qualitative or quantitative terms. In regard to the research at hand, this is a significant statement because much of the subsequent analysis will be based upon the fact that LSA process effectiveness can indeed be measured.

If, however, we choose not to believe the results of the statistical test, we must conclude the sample used was so extreme that it does not represent the population at large. A new sample would have to be collected and the test repeated. With a limited ability to radically restructure the sample group, and no evidence of a uniquely different sample, the conclusion remains unchanged. The majority of LSA program managers in ASD believe in the measurability of LSA process effectiveness.

Research Question Two

WHAT LEVEL OF EFFECTIVENESS CAN BE ASSIGNED TO THE LSA PROGRAMS SURVEYED IN ASD?

Subsequent to the question of whether LSA process effectiveness can be adequately measured, a secondary issue exists pertaining to what levels of effectiveness should be associated with various LSA programs within ASD. If it can be proven that the LSA process can be measured and that there is an uncommonly high percentage of successful (high level of effectiveness) programs within ASD, further research might provide the specific predictors needed to model the effectiveness process. There is great value in having the capability to formulate the effectiveness issue into a logistics equation or model into which predetermined factors are placed to predict an overall level of effectiveness for an emerging LSA program.

Research to explore this idea centered around systematically collecting data on program levels of effectiveness. The objective was to determine what level of effectiveness each program manager associated with his particular program. Each survey participant was required to answer question 36 by rating the overall level of effectiveness on their particular program, based upon individual criteria used to structure the original program. Surprisingly enough, the range of responses to question 36 was quite wide among the four possible responses provided. Results of the survey are summarized below.

SURVEY QUESTION: Based on the four criteria you cited in question 29, how would you rate the level of effectiveness for your particular LSA program(s)?

TABLE I

Summary of Program Effectiveness Ratings

QUESTION RESPONSES	NUMBER	%
a. exceeding expected performance	1	04
b. meeting expected performance	14	56
c. falling behind expected performance	5	20
d. far behind expected performance	1	04
e. DID NOT RESPOND TO THE QUESTION	4	16

Summarized in the data above, 84% of the people who returned surveys responded to the question on program level of effectiveness. With four participants choosing not to respond to the question, 72% of those who responded reported their programs were currently exceeding or meeting predetermined levels of performance. This statistic is much higher than would be expected, especially in light of widespread criticism that suggested the majority of LSA programs currently managed within ASD are in fact not meeting predetermined levels of performance. Of the remaining responses, 24% suggested that the programs were behind expected performance. This number was surprisingly low given the original assumptions stated above. Lastly, those choosing not to respond represented only 16% of the returned surveys.

Conclusion

To avoid control of the research results by program office management staffs, the surveys were sent directly to the study participants and returned anonymously by mail. Because of this, it is safe to assume the survey responses were not influenced by the coercion of management staff members but represent the actual opinions of each participant. The fact that only 24% of those surveyed reported their programs at a level below expected performance suggests that the vast majority of LSA programs are measuring up to expected levels of performance. This,

combined with the fact that program managers generally believe in the measurability of process effectiveness, tends to make plausible the concept of a set of commonly shared effectiveness predictors among successful ASD programs. Thus, if we agree LSA process effectiveness can be measured, and if the majority of programs surveyed are above or at expected levels of performance, it is reasonable to conclude these programs may share a common group of factors from which process effectiveness can accurately be measured. If this is correct, it is only a matter of further research before these commonly shared predictors are identified, analyzed, and quantified into unique measurement elements. The natural extension here is to identify those factors most commonly reported as being attributable to program effectiveness and to analyze them for underlying trends. This is accomplished in the following section, research question three.

Research Question Three

WHICH FACTORS CAN BE IDENTIFIED THAT MAY AID IN MEASURING INCREASED LEVELS OF LSA EFFECTIVENESS?

Unlike the other four research questions, this question was designed entirely to provide qualitative research data for this study. The simplest way to collect data on predictors of LSA effectiveness is to ask for a listing of those factors of merit. The measurement question used to provide this data (survey question 29) deviated from the norm by requiring each participant to respond by listing as

many as four factors which contributed to overall measurement of LSA process effectiveness. The purpose of this technique was to determine if program managers consistently reported many of the same effectiveness factors. Answers to this question obviously lead us closer to solving the problem of analyzing and measuring the relative success of the LSA process. For example, by correctly identifying the factors (predictors) that contribute to measurement of effectiveness, we could resolve many of the difficulties involved in structuring a model to predict LSA process effectiveness. With such an analytical model, one might quantify the input predictors, run a simulated analysis of the variables and constraints, and offer projections of program success at given intervals. There is certainly great value in having this capability.

Originally, the intent of this research had been an attempt to define the parameters necessary to construct actual predictors, for input into an LSA effectiveness model. However, because of the time constraints involved and the enormity of the task, there was insufficient time to perform a detailed analysis of each of the survey-reported factors. Therefore the primary task was to collect and list each of the response types provided by the survey participants. Since eighty percent of those involved in the study responded, it was safe to assume there would be a wide range of valid responses. Each response was analyzed for

content and the factors separated into one of seven general categories: Analysis, LSA Data, Organizational Dynamics, Scheduling, Process Mechanics, Contractor Support, and General Support. Categorizing the inputs made it possible to better understand the relationships among factors. In fact, within various categories, there were several factors which received multiple responses, giving further credence to the concept of generally accepted measures of merit. These results are contained in Table 2 at the end of this section.

Each category was labeled based on the general characteristic of the factors separated into that particular group. For example, if the factors of one group all suggested the importance of various government analyses techniques, that category was labeled Analysis. If the factors specifically dealt with enhancing the LSA process itself, that category was labeled Process Mechanics. There were three categories (LSA Process Mechanics, LSA Data, and Analysis) that received by far the greatest concentration of responses. These three categories were considered most significant because they were cited most often in the surveys, they were more clearly articulated, and they could be most easily related to the LSA Analysis Process. Clearly these factors would be first choice for further study based on the above criteria.

In the Process Mechanics category, the responses all contributed to enhancements of the LSA process itself. The responses ranged from the impact design factors have on LSA to the need for developing a requirements baseline. The LSA Data category represented various data output products which result from the analysis process. The participants generally suggested that improvements were needed in the areas of data validity, accuracy, and accessibility in order to have a positive impact on process effectiveness. The Analysis category, however, was quite different from the other two categories. Program managers cited a wide range of support analysis techniques they considered crucial in determining LSA process effectiveness. Survey responses identified deficiencies in analytical techniques ranging from Failure Modes and Effects Criticality Analysis (FMECA) to Reliability Centered Maintenance (RCM). Clearly, these appear to be factors which could be used to measure final levels of LSA effectiveness.

Excluding the Scheduling category, the other three categories seemed less significant as valid predictors based on the criteria of frequency, clarity, and direct relevance of the responses provided. In the category of Organizational Dynamics, the responses related to areas within the organizational structure that could be altered to affect the LSA process. These factors involved such deficiencies as lack of management control over logistics

support and ineffective information flow. Factors identified under the General Support category were the miscellaneous items suggested as general improvements to the Logistics Supports Analysis process. For example, a properly delivered support system and the timeliness of support actions both contribute to an effective weapons system support posture; this, of course, is the desired result of the process. But it is almost impossible to measure while the process is underway. Lastly, the category of Contractor Support typically represented those factors under defense contractor control that generally contribute to the success or failure of the LSA process. Contractor translation of LSA parameters and the internal organization structure are factors often outside the scope of government influence. These factors have a tremendous impact of the eventual outcome of the program. Further research will have to be performed to determine which process effectiveness factors are within the confines of defense contractor control, and which factors significantly impact the success of the entire LSA process.

Conclusion

Of all categories, Scheduling is possibly the easiest source of measurement predictors to quantify. It is not difficult to link such things as milestone dates and functional work-around plans to structured management goals. The successful completion of an LSA objective on or before

the scheduled milestone date can be tied directly to proper application of the LSA process. The same is true for a properly implemented work-around plan for management problems. Effective analysis of the suggested factors could result in a quantitative evaluation technique to be applied in the achievement of LSA management objectives. The level of process effectiveness could be based upon a rating scheme that applies a negative score to both late and extremely early completion of various sub-tasks. Related sub-tasks would be grouped and related to the achievement of overall objectives. The result of such research would be a mathematical model to be used in the actual measurement of LSA process effectiveness as related to the ASD program structure.

In the Analysis category, fifty-five percent of the identified factors represent redundant responses. The effectiveness of any LSA program is significantly impacted by the different analyses used to provide the input data. As such, determining a measurable link between the completeness of an analysis technique and actual program results is the kind of relationship needed to identify the quantitative measurement factors in this area.

More significant is the fact that seventy-five percent of all factors under the LSA Data category are multiple responses. Overwhelmingly, the LSA managers suggest that data and related data products are the primary concern

regarding measurement of process effectiveness. The need for consistency among the various LSA output products was a recurring theme in many of the surveys. This suggests a need for a single standardized logistics data base of information. There are obvious benefits in this single source of data. A measurement instrument must be developed to include those data characteristics which can be directly related to the quality of information provided. By doing so, the researcher produces an overall measure for LSA Data that directly contributes to process effectiveness.

TABLE II

Factors Contributing to LSA Effectiveness

SCHEDULING (2 factors)

Adhering to milestone schedules

Adopting functional work-arounds

ANALYSIS (11 factors)

Maintenance Task Analysis (2)

Provisioning Analysis (2)

Support Equipment Requirements Analysis (2)

Failure Modes and Effects Criticality Analysis

Use Study/Technical Analysis

Reliability Centered Maintenance Analysis

Network Repair Level Analysis

Early Fielding Analysis

ILS Resource Analysis (2)

Task Performance Analysis (2)

Alternatives Evaluation Analysis (2)

ORGANIZATIONAL DYNAMICS (4 factors)

Organizational Interfaces

Information Flow

Management Attention (2)

Internal Communications

LSA DATA (8 factors)

Accessibility of Data (2)

Accuracy of Data (3)

Consistency Between Documents (2)

Volume/Quantity of Data (2)

Data Management Discipline

Validity of LSAR

Availability of Review Teams (2)

Currency/Quality of Data (3)

CONTRACTOR SUPPORT (3 factors)

Parameter Implementation

Organizational Structure

DCAS Interface

PROCESS MECHANICS-LSA (10 factors)

Influence on Design

Requirements Baseline

LSA Plan Quality

Coherent Management Program (2)

Maintenance Concept Definition

Reliability/Provisioning Factors (2)

Task/Skill Analysis

LSA Program Intent

WBS Involvement

Design Synthesis Process

GENERAL SUPPORT (2 factors)

Support System Delivery (2)

Timeliness of Action

Research Question Four

WHAT PERCENTAGE OF PARTICIPATING LSA PROGRAM MANAGERS SEEM QUALIFIED TO MAKE JUDGMENT ON THE ISSUE OF EFFECTIVENESS?

The aforementioned research questions are all based upon the premise that those people responding to the survey are qualified to make judgment about the LSA process. At issue here is the fact that the analysis of the data, and any corresponding conclusions, are the result of inputs and recommendations offered by those individuals selected for the sample group. Should a significant portion not be qualified to respond, results of the entire research might be altered or skewed. Possible lack of respondent qualification provides an unwanted source of bias, resulting in the possibility of unsubstantiated conclusions or recommendations. Restricting the amount of bias introduced into the study provides the researcher with the ability to assess the results and offer a more accurate summary of the facts as they exist. To establish a reference point for the concept of the qualified survey participant, several assumptions were made about the necessary requirements. The first assumption was the requirement for the participant to have completed at least one formal LSA training course. To qualify, the individual had to have one government offered course (i.e. a professional continuing education course), an LSA course offered as a part of a civilian education program, or an alternate category which qualifies as formal

LSA training. Secondly, there was a requirement for previous experience in the role of LSA program manager/support analyst. For this experiment, an arbitrary value of 12 months previous experience was selected as the deciding factor for qualification. Lastly, the assumption was made that it would be difficult to properly function as an effective program manager without being adequately familiar with the appropriate DOD and Air Force regulations or military standards concerning the procedures for proper application of the LSA process. Familiarity with these documents represents the final criterion for qualification as an LSA program manager capable of responding to this survey.

The following survey questions were selected as corresponding to the broad issue of program management qualification mentioned above:

a. Have you had any formal training and/or education in the area of LSA, the LSA Record, or the application of the LSA process? (question 7)

b. How effective was the formal education or training in helping you to improve management of the LSA process on your particular program(s)? (question 8)

c. How many months have you managed or worked in direct support of LSA on this or any other program? (question 5)

d. Are you familiar with the primary guidance documents on the subject of LSA program management? (question 14)

e. How would you describe your qualifications to make decisions or apply judgment to rate effectiveness of LSA within your program? (question 10)

These questions were used as the basis for development of a weighted grading scheme which could be used to quantify the qualifications of each individual survey participant against an objective set of criteria. After detailed review of several weighting schemes, the following factors and weighted values were assigned:

1. Completion of formal training/education (.10)
2. Reported effectiveness of formal training (.10)
3. Reported previous LSA experience (.35)
4. Reported familiarity with government documents (.10)
5. Self-reported level of qualification (.35)

The weighted values were assigned based upon a determination that previous LSA experience and self-reported qualification were the two most important factors in assessing an individual's overall qualification. The other three factors were less important than the first two, but were considered equally important among themselves. By this distribution, a total weight of 1.00 (which is 100 percent) was allocated to the appropriate factors. Each survey participant was rated against the above factors by multiplying the score (1 or 0) received for appropriate survey responses by the weight factors. In this scheme, 1 equates to a "qualified" response, while 0 equates to a "not qualified" response. For example, on survey question 7 (formal education) the appropriate response for a qualified individual would be an a, b, or d. These responses represent the fact that the

respondent has had some form of formal LSA education (government, civilian, etc.). The only non-qualifying answer in this case would be a response of c, "... I have never had any formal education." The appropriate "qualified" and "not qualified" responses are listed for each question in Table III. There may be some confusion as to how, in training effectiveness (survey question 8), a participant who did not respond to the question may still receive 1 point for a "qualified" response. You must remember that, if the individual replied that he had not received any formal training in question 7, he certainly would not be required to comment on the effectiveness of such training in question 8. In this case, a non-response was classified as a "qualified" answer.

The next step involved determining a cut-off level for the total computed score to differentiate the "qualified" from the "not qualified" program managers. Those respondents with a total computed score of .65 or greater were judged as being qualified LSA program managers. The .65 cut-off value is significant in that a respondent must be qualified in at least one of the two major factors (previous experience or self-reported rating) before he may receive an overall rating of qualification. In addition, if qualified in only one of the two major factors, he must be qualified in all of the remaining three areas to achieve the minimum .65 cut-off value. This stringent requirement made

it possible to select only those participants with the highest of qualifications for a "qualified" rating. The greater the percentage of "qualified" survey respondents, the lower the amount of bias introduced into the study. A composite of all returned surveys is provided in Table III with a summary of the responses to each of the five survey questions.

Conclusion

After compiling all of the data, 18 of 25 survey respondents (72%) were scored as "qualified" LSA program managers. More significant was the fact that six additional participants could have easily been rated as fully qualified if the cut-off value had been set at .55 rather than .65. This ten percent difference would have meant the respondent needed to be qualified in one of the major factors and two of the three additional factors in order to achieve an overall "qualified" rating. This is significant in terms of credibility because it means that 96% of the survey respondents fall within an "essentially qualified" range. The corresponding conclusion is that a very high percentage, at least 72% but possibly more, of the program management opinions found in this study represent valid data input and a proper source of information for assessing the characteristics of the LSA process. Assuming this is a representative sample, the opinions confirmed in this survey are generally characteristic of the entire ASD population of LSA program managers.

TABLE III

Composite Summary of Qualification Data

Category	Question Response					Qualified Answers		Points	
	A	B	C	D	N/A	Q	N/Q	[1]	[0]
Formal Training	8	2	13	2	0	a,b,d	c	12	13
Training Effectiveness	4	5	1	1	14	a,b	c,d	23	2
	≥12mo.			<12mo.					
Previous LSA Experience	16			9		≥12	<12	16	9
Regulation Familiarity	5	20	0	0	0	a,b	c,d	25	0
Self-Reported Qualification	10	11	3	1	0	a,b,c	d	24	1

Research Question Five

HAVE INDIVIDUAL PROGRAM REQUIREMENTS BEEN EFFECTIVELY TAILORED AND LEVIED AGAINST THE APPROPRIATE CONTRACTORS?

The fifth and final research question revolves around one last issue of concern. Imagine that it is determined that LSA process effectiveness can be adequately measured. However, the ASD programs being measured are consistently rated at low levels of effectiveness. What factor(s) contribute to low program effectiveness? If the study data shows that low levels of overall process effectiveness are neither the result of program manager qualifications nor procedural requirements, it may be proper to assume that other factors are responsible. Past evidence suggests that proper application of LSA program requirements might be a factor of importance. To test the question of general requirements applications and the related issue of requirements application on sub-contractor and vendor contracts, three related survey questions were selected to provide measurement information. Each survey question is constructed with a possible response of yes or no and is reprinted below:

a. Have the requirements for LSA been appropriately tailored to meet the specific needs of your program? (question 16)

b. Is there a need for additional requirements tailoring on this LSA program? (question 17)

c. Do you feel the requirements of your LSA program have been appropriately levied against subcontractor or vendors? (question 18)

Although each survey participant was required to answer each of three measurement questions, a few individuals apparently chose not to respond. Results of the participant responses are summarized in the table below.

TABLE IV

Summary of Requirements Application

Survey Question	NO	YES	NO RESPONSE
16	1	23	1
17	10	13	2
18	3	21	1

Conclusion

The true purpose of the test was to determine if there were clearly identifiable trends in the area of overall program effectiveness. Of those who responded, 96% reported that the original LSA requirements levied on contract were sufficient to meet the needs of their particular programs. As such, only one individual chose to report that original requirements were inadequate. This fact is even more significant since this same individual still rated the overall program as meeting expected levels of performance (question 36). Overwhelming evidence suggests that, while original LSA requirements are being correctly applied in ASD programs, there appears to be little, if any, correlation with levels of program effectiveness. As such, the evidence suggests no causal link.

with levels of program effectiveness. As such, the evidence suggests no causal link.

On the issue of additional requirements tailoring, the responses seemed nearly evenly divided. Forty-three percent of the respondents reported there was no need for additional tailoring during the program's life cycle; fifty-six percent suggested that additional tailoring was indeed necessary. Given a general pre-survey assumption that low program effectiveness is directly attributable to a lack of requirements tailoring, one might assume that most individuals reporting a need for additional tailoring would also report their programs as being below expected performance. This was not the case. The majority of respondents who reported the need for additional requirements also suggested that their programs either met or exceeded expected levels of performance. Once again, the expected results did not prove to be true, and a causal link could not be offered as a contributing factor toward low levels of program effectiveness.

The last issue of requirements appropriately levied against sub-contractor/vendor contracts appears to be more subtle. Why should there be concern for requirements application at the contractor level? Since much of the LSA equipment and trade-off analysis is conducted at contractors sites, the potential for inadequate requirements application at the contractor level could have a tremendous impact on

the success of the LSA process. Rather than avoiding the issue, this research was purposely constructed to try to confirm or deny the existence of such a relationship. Of those who responded, 88% felt program requirements had been appropriately levied against subcontractors and vendors; 13% voiced an opposite opinion. The results suggest that proper application of LSA program requirements on sub-contractors and vendors is not a disrupting factors in the LSA process. Moreover, the facts actually suggest that inadequate requirements application is a "non-issue". Program managers overwhelmingly stated that LSA program requirements had been applied correctly on their particular programs. This may be the result of a general unwillingness of the managers to admit failure; however, there is no evidence to support this premise.

V. Recommendations

The preceding research effort has been a valuable learning experience. The same or similar survey research should be conducted within the U.S. aerospace defense contractor community. The defense contractor is a vital link in the support analysis process, and the opinions of their management organization would be critical in any plan for improvement of the process as it now exists. The same survey instrument should be used to allow for a direct comparison between specific participant responses. Statistical analysis of these two supposedly disparate populations could later identify major differences (if any) between government and contractor management opinions about the LSA process. Regardless of the survey instrument used, the value of tapping this unused resource is enormous.

The research relating to research question four involved determining a set decision criteria to establish qualifications for the participating LSA program managers. Of those individuals rated "not qualified" to participate in the preceding effort, 100 percent were found deficient in either the category of formal training or previous experience. Although limited in scope of study, a need exists for a formal government program to recruit, educate, and train logistics/support analysts to manage LSA development programs. Efforts should emphasize identification of those candidates most susceptible to

logistics training (i.e. managers with acquisition or logistics backgrounds). The Air Force should develop an education program that is capable of producing efficient and cost effective LSA program managers. The directorate of Logistics Support Analysis (Air Force Acquisition Logistics Center) is central to this issue and should be key in the development process.

This research determined that LSA process effectiveness can indeed be measured. Now more specific research should be conducted to analyze the factors identified in research question three to determined exact and quantifiable relationships between these input factors and measures of LSA process effectiveness. This difficult task may ultimately result in development of a computer model for determining process effectiveness. As a point of departure, it is recommended that the researcher begin by examining the three most significant groups of factors because of their frequency, clarity, and relevance. An effort to determine interrelationships among factors would be most productive in these areas. However, research should not be limited to these factors alone, analysis of other identified factors may prove to be profitable. More precise opinion questions should be constructed to measure relative priority and exact differences among factors; this is necessary for more conclusive results. The results of this research would represent a decisive step in modeling process effectiveness,

while understanding the determinants of overall LSA program success.

Within AFALC, an office should be established to initiate, coordinate, and sponsor logistics research efforts, specifically for Logistics Support Analysis. Emphasis should be placed on injecting the responsibility for such activities into the mainstream of Air Force Systems Command research and development projects for the design of future weapon systems.

Notwithstanding current efforts, new enthusiasm must be generated for supporting the research and analysis of controversial logistics issues which are now affecting the Air Force's world-wide support posture. Funds should be set aside to sponsor both continuing graduate academic research, and to provide the impetus for defense contractor study contracts. While it may be more cost effective to sponsor in-house study efforts, a vast resource of logistics expertise resides within the civilian community and remains largely untapped.

SAMPLE COPY

Appendix A: Survey of Opinion

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE ACQUISITION LOGISTICS DIVISION (AFLC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

REPLY TO ATTN OF: PTA

SUBJECT: Survey of Logistics Managers

TO: See Distribution

1. The personnel identified on the enclosed attachment 1 have been selected to participate in an ASD-wide survey for logistics related information. Each individual is requested to read the attached survey (Atch 2) and respond to each of the questions provided.

2. Response to this AFALC survey will provide a valuable source of data from which we may expand limited general knowledge of the Logistics Support Analysis process. Since the results of this survey are to be used primarily for academic purposes, a policy of nonattribution will apply.

3. All survey designees are encouraged to return their completed survey packages no later than 11 May 1984. Responses should be sent to AFALC/PTA with attention to Mr. Charlie Walker. Should questions arise, please contact Mr. Walker (53754) or 1st Lt Paul Woodland (54437). Your support is crucial to the success of this data gathering effort and is greatly appreciated.

FOR THE COMMANDER

KENNETH L. MORRIS
Acting Director, Logistics Support Analysis

2 Atch
1. Distribution List
2. Survey

SURVEY OF OPINION

The following series of questions represent a survey of opinion and are to be used for academic purposes only. This is an attempt to collect information on the attitudes of those people responsible for the management of the Logistics Support Analysis process. Summary reports based upon individual inputs will not be used as an administrative tool or corrective device. A policy of nonattribution will apply for the purposes of this study. Please feel free to answer each question to the best of your ability and return your questionnaires promptly. Your support is greatly appreciated.

SURVEY QUESTIONS

1. Please list your specific job title or position. (optional)

2. Circle the appropriate rank or grade level you presently hold.

a. O-1 to O-3
b. O-4 to O-5
c. O-6 and above
d. GS-7 to GS-11
e. GS-12 to GS-13
f. GS-14 and above
g. Other _____

3. How long have you been assigned in your current position?

a. less than 1 year
b. 1-2 years
c. 2-3 years
d. 3-4 years
e. more than 4 years

4. Are you considered a Logistics Support Analysis (LSA) "point-of-contact" or "focal point" for your office?

a. yes
b. no

5. How many months total have you managed or worked in direct support of LSA on this or any other program?

_____

6. Which individual is also qualified to respond to questions about the LSA process in <u>your</u> office?

a. _____ (please name)
b. I am most qualified to respond
c. There is someone in this organization but in another office who is also qualified to answer. (Please name and provide office symbol)

7. Have you had any formal training and/or education in the area of LSA, the LSA record, or the application of the LSA process?

a. Yes, in a government offered or sponsored course. (Please list)

b. Yes, in a civilian education program (not related to or sponsored by the government). (Please list)

c. No, I have never had any formal training or education regarding the subject of LSA.

d. Other category of education. (Please explain)

8. How effective was the formal education or training in helping you to improve management of the LSA process on your particular program(s).

a. very effective
b. marginally effective
c. neither effective nor ineffective
d. not effective

9. What suggestions do you have in improving the LSA education process?

10. How would you describe your qualifications to make decisions or apply judgment to rate the effectiveness of LSA within your program?

a. fully qualified
b. somewhat (adequately) qualified
c. marginally qualified
d. not qualified

11. Which of the following job categories apply to you (choose the most applicable answer).

a. I am an AFSC resource assigned directly to an ASD program.
b. I am an AFLC resource assigned directly to an ASD program.
c. More specifically, I am an AFALC resource assigned to an ASD program. (AFALC is considered a joint-command unit.)
d. Other (please explain).

12. If you have more than one job responsibility, which of the following statements is most correct?

a. I am responsible for more than one program, but the responsibility falls primarily within the functional area of LSA.

b. I am responsible for more than one program, but the responsibility falls primarily outside the LSA functional area.

c. I am responsible for several functional areas (including LSA), all under the same program.

13. Is the job position listed in Question 1 your only responsibility?

a. yes
b. no

14. Are you familiar with the primary guidance documents on the subject of LSA program management? For example, MIL-STD-1388-1 or 1388-1A, AFALD's Guide for Supportability Analysis and Supportability Analysis Record, and DARCOMP 750-16.

a. Only MIL-STD-1388-1 or 1388-1A.
b. At least familiar with two of the above documents.
c. I am not familiar with the above documents; however, I am familiar with others. Please list:

d. I am not familiar with any published LSA guidance documents.

15. Which of the above listed documents have been applied to your program contract? Please Identify:

16. Have the requirements for LSA been appropriately tailored to meet the specific needs of your program?

a. no
b. yes

17. Is there a need for additional requirements tailoring on this LSA program?

a. no
b. yes

18. Do you feel the requirements of your LSA program have been appropriately levied against sub-contractors or vendors?

a. no
b. yes

19. Have you had any contact and/or written communication with the AFALC's Directorate of Logistics Support Analysis (AFALC/PTA)?

a. no
b. yes

20. I spend the following percentage of my working hours on LSA program related issues.

a. 100%
b. 75-99%
c. 50-74%
d. less than 50%

21. Which phase of the "typical" acquisition cycle would you say your program most closely corresponds to?

a. conceptual
b. demonstration/validation
c. full-scale development
d. production/deployment

22. Does a published LSA plan exist for your program(s)?

a. No
b. Yes, but it has not received government approval.
c. Yes, there is an approved LSA plan.

23. Are the prime contractor(s) required by the statement of work to provide you with various LSA data products?

a. No
b. Yes, the program office has since received a portion of the required data products.
c. Yes, but the program office has not received any of the required data products.

24. Is there a contractual requirement and/or a plan to validate and verify LSA data submitted to the government?

a. no
b. yes

25. Are you personally satisfied with the type and degree of accuracy of the data submitted for program office review or reviewed at the contractor's facility.

a. No
b. Yes, but I am only satisfied with the type of data being supplied.
c. I am only satisfied with the accuracy of the supplied data.
d. Yes, I am satisfied with both the type and degree of accuracy.

26. Have government reviews of LSA data acceptability been conducted since the initial review of the contractor's proposal?

a. No. Reviews have not been conducted since the initial review of proposals.
b. Neither a review of the contractor's proposal or the LSA data has been conducted.
c. Yes, at least one review of LSA data acceptability has been conducted.

27. Briefly, how would you define the term "effectiveness" as it applies to the LSA process?

28. After close scrutiny, do you believe the "effectiveness" of your LSA program could be measured in either quantitative or qualitative terms?

a. no
b. yes

29. Please identify four factors which you feel are key in making a quantitative or qualitative assessment of LSA process effectiveness. This may be "overall effectiveness" or "effectiveness within specific functional areas of the LSA process.

30. Could the above factors be used to predict the level of effectiveness for most LSA programs.

a. no
b. yes

31. Could LSA effectiveness be appropriately modeled as a measure of various predictors or input factors?

a. no
b. yes (If so, how might the model be defined or structured?)

32. How would you conclude the following sentence?

In my office, LSA program or process effectiveness is based on the following criteria:

33. Is your program engineering office a "partner" in the application and management of the LSA process? If yes, briefly explain how.

a. no
b. yes

34. Do other program functional offices interface with or use available LSA information/ data products. Examples of functional offices would be manufacturing, projects, configuration control, other logistics offices, data management, etc.

a. no
b. yes (How is this accomplished? Briefly explain)

35. Has the lack of involvement by other functional offices been detrimental to the effective application of LSA?

a. no
b. yes - Why?

36. Based on the four criteria you cited in question 29, how would you rate the level of effectiveness for your particular LSA program(s)?

a. exceeding expected performance
b. meeting expected performance
c. falling behind expected performance
d. far behind expected performance

37. Are there any specific factors which have led to this level of LSA effectiveness?

38. Can you identify any factors that have detracted from the LSA program's effectiveness?

39. How might the above factors be brought within the confines of your control so that improvements to the LSA process may be accomplished?

40. Identify any factors within the LSA process that are purely outside of your control, and therefore affect your ability to manage the program.

41. Do you feel the effectiveness of the LSA process, as applied to your program, could be measured by someone in addition to yourself?

a. no
b. yes (Please identify the category or categories of individuals who would be qualified to make this determination.)

42. Do you feel the input of individual LSA managers has or will contribute to the overall knowledge base of LSA information and eventually lead toward a means of determining LSA effectiveness?

a. no
b. yes
c. I prefer not to answer this question

43. Has this survey process provided you with any ideas as to how you might determine the effectiveness of your LSA program more efficiently?

a. no
b. yes

Appendix B: Summary of Data Responses

SURVEY OF OPINION

The following series of questions represent a survey of opinion and are to be used for academic purposes only. This is an attempt to collect information on the attitudes of those people responsible for the management of the Logistics Support Analysis process. Summary reports based upon individual inputs will not be used as an administrative tool or corrective device. A policy of nonattribution will apply for the purposes of this study. Please feel free to answer each question to the best of your ability and return your questionnaires promptly. Your support is greatly appreciated.

* The number of individual responses are included in the parentheses

SURVEY QUESTIONS

1. Please list your specific job title or position. (optional)

2. Circle the appropriate rank or grade level you presently hold.

(4) a. O-1 to O-3
(2) b. O-4 to O-5
(0) c. O-6 and above
(2) d. GS-7 to GS-11
(16) e. GS-12 to GS-13
(0) f. GS-14 and above
(1) g. Other _____

3. How long have you been assigned in your current position?

(8) a. less than 1 year
(7) b. 1-2 years
(3) c. 2-3 years
(2) d. 3-4 years
(5) e. more than 4 years

4. Are you considered a Logistics Support Analysis (LSA) "point-of-contact" or "focal point" for your office?

(22) a. yes
(3) b. no

5. How many months total have you managed or worked in direct support of LSA on this or any other program?

Less than 12 months (9) Greater than 12 months (16)

6. Which individual is also qualified to respond to questions about the LSA process in your office?

(10) a. _____ (please name)
(11) b. I am most qualified to respond
(1) c. There is someone in this organization but in another office who is also qualified to answer. (Please name and provide office symbol)
(3) N/A

7. Have you had any formal training and/or education in the area of LSA, the LSA record, or the application of the LSA process?

(8) a. Yes, in a government offered or sponsored course. (Please list)

(2) b. Yes, in a civilian education program (not related to or sponsored by the government). (Please list)

(13) c. No, I have never had any formal training or education regarding the subject of LSA.

(2) d. Other category of education. (Please explain)

8. How effective was the formal education or training in helping you to improve management of the LSA process on your particular program(s).

(4) a. very effective
(5) b. marginally effective
(1) c. neither effective nor ineffective
(1) d. not effective
(14) N/A

9. What suggestions do you have in improving the LSA education process?

10. How would you describe your qualifications to make decisions or apply judgment to rate the effectiveness of LSA within your program?

(10) a. fully qualified
(11) b. somewhat (adequately) qualified
(3) c. marginally qualified
(1) d. not qualified

11. Which of the following job categories apply to you (choose the most applicable answer).

(3) a. I am an AFSC resource assigned directly to an ASD program.
(2) b. I am an AFLC resource assigned directly to an ASD program.
(18) c. More specifically, I am an AFALC resource assigned to an ASD program. (AFALC is considered a joint-command unit.)
(2) d. Other (please explain).

12. If you have more than one job responsibility, which of the following statements is most correct?

(9) a. I am responsible for more than one program, but the responsibility falls primarily within the functional area of LSA.

(2) b. I am responsible for more than one program, but the responsibility falls primarily outside the LSA functional area.

(13) c. I am responsible for several functional areas (including LSA), all under the same program.

(1) N/A

13. Is the job position listed in Question 1 your only responsibility?

(16) a. yes

(8) b. no

(1) N/A

14. Are you familiar with the primary guidance documents on the subject of LSA program management? For example, MIL-STD-1388-1 or 1388-1A, AFALD's Guide for Supportability Analysis and Supportability Analysis Record, and DARCOMP 750-16.

(5) a. Only MIL-STD-1388-1 or 1388-1A.

(20) b. At least familiar with two of the above documents.

(0) c. I am not familiar with the above documents; however, I am familiar with others. Please list:

(0) d. I am not familiar with any published LSA guidance documents.

15. Which of the above listed documents have been applied to your program contract? Please Identify:

16. Have the requirements for LSA been appropriately tailored to meet the specific needs of your program?

(1) a. no

(23) b. yes

(1) N/A

17. Is there a need for additional requirements tailoring on this LSA program?

(10) a. no

(14) b. yes

(1) N/A

18. Do you feel the requirements of your LSA program have been appropriately levied against sub-contractors or vendors?

(3) a. no

(21) b. yes

(1) N/A

19. Have you had any contact and/or written communication with the AFALC's Directorate of Logistics Support Analysis (AFALC/PTA)?

(1) a. no

(22) b. yes

(2) N/A

3

20. I spend the following percentage of my working hours on LSA program related issues.

(3) a. 100%
(5) b. 75-99%
(3) c. 50-74%
(13) d. less than 50%
(1) N/A

21. Which phase of the "typical" acquisition cycle would you say your program most closely corresponds to?

(2) a. conceptual
(5) b. demonstration/validation
(11) c. full-scale development
(3) d. production/deployment
(4) N/A

22. Does a published LSA plan exist for your program(s)?

(3) a. No
(4) b. Yes, but it has not received government approval.
(16) c. Yes, there is an approved LSA plan.
(2) N/A

23. Are the prime contractor(s) required by the statement of work to provide you with various LSA data products?

(1) a. No
(16) b. Yes, the program office has since received a portion of the required data products.
(8) c. Yes, but the program office has not received any of the required data products.

24. Is there a contractual requirement and/or a plan to validate and verify LSA data submitted to the government?

(3) a. no
(22) b. yes

25. Are you personally satisfied with the type and degree of accuracy of the data submitted for program office review or reviewed at the contractor's facility.

(7) a. No
(2) b. Yes, but I am only satisfied with the type of data being supplied.
(1) c. I am only satisfied with the accuracy of the supplied data.
(9) d. Yes, I am satisfied with both the type and degree of accuracy.
(6) N/A

26. Have government reviews of LSA data acceptability been conducted since the initial review of the contractor's proposal?

(5) a. No. Reviews have not been conducted since the initial review of proposals.
(0) b. Neither a review of the contractor's proposal or the LSA data has been conducted.
(18) c. Yes, at least one review of LSA data acceptability has been conducted.
(2) N/A

27. Briefly, how would you define the term "effectiveness" as it applies to the LSA process?

28. After close scrutiny, do you believe the "effectiveness" of your LSA program could be measured in either quantitative or qualitative terms?

(4) a. no
(18) b. yes
(3) N/A

29. Please identify four factors which you feel are key in making a quantitative or qualitative assessment of LSA process effectiveness. This may be "overall effectiveness" or "effectiveness within specific functional areas of the LSA process.

SEE TABLE 2

30. Could the above factors be used to predict the level of effectiveness for most LSA programs.

(3) a. no
(15) b. yes
(7) N/A

31. Could LSA effectiveness be appropriately modeled as a measure of various predictors or input factors?

(4) a. no
(6) b. yes (If so, how might the model be defined or structured?)
(15) N/A

32. How would you conclude the following sentence?

In my office, LSA program or process effectiveness is based on the following criteria:

33. Is your program engineering office a "partner" in the application and management of the LSA process? If yes, briefly explain how.

(13) a. no
(9) b. yes
(3) N/A

34. Do other program functional offices interface with or use available LSA information/ data products. Examples of functional offices would be manufacturing, projects, configuration control, other logistics offices, data management, etc.

(11) a. no
(12) b. yes (How is this accomplished? Briefly explain)
(2) N/A

35. Has the lack of involvement by other functional offices been detrimental to the effective application of LSA?

(10) a. no
(13) b. yes - Why?
(2) N/A

36. Based on the four criteria you cited in question 29, how would you rate the level of effectiveness for your particular LSA program(s)?

(1) a. exceeding expected performance
(14) b. meeting expected performance
(5) c. falling behind expected performance
(1) d. far behind expected performance
(4) N/A

37. Are there any specific factors which have led to this level of LSA effectiveness?

38. Can you identify any factors that have detracted from the LSA program's effectiveness?

39. How might the above factors be brought within the confines of your control so that improvements to the LSA process may be accomplished?

40. Identify any factors within the LSA process that are purely outside of your control, and therefore affect your ability to manage the program.

41. Do you feel the effectiveness of the LSA process, as applied to your program, could be measured by someone in addition to yourself?

(5) a. no
(20) b. yes (Please identify the category or categories of individuals who would be qualified to make this determination.)

42. Do you feel the input of individual LSA managers has or will contribute to the overall knowledge base of LSA information and eventually lead toward a means of determining LSA effectiveness?

(3) a. no
(15) b. yes
(3) c. I prefer not to answer this question
(4) N/A

43. Has this survey process provided you with any ideas as to how you might determine the effectiveness of your LSA program more efficiently?

(17) a. no
(8) b. yes

Bibliography

1. Blanchard, B. S. 1981. Logistics Engineering and Management (Second Edition). Englewood Cliffs NJ: Prentice-Hall, Inc.

2. Directorate of Logistics Support Analysis, Air Force Acquisition Logistics Division. Guide for Supportability Analysis and Supportability Analysis Record. Wright-Patterson AFB OH, July 1982.

3. Fulford, Ramona. "Narrative Justification for the Society of Logistics Engineers Field Awards in Logistics Support Analysis." Unpublished paper, 1983.

4. Harrison, Gerald L. "The Acquisition Logistician: A Case for New Education Programs in Logistics," Logistics Spectrum, Spring 1981, 9-14.

5. Knox, Captain John A., USAF, and Captain Thomas N. Thede, USAF. "A Survey of Logistics Support Analysis Implementation Within Aeronautical Systems Division System Program Offices." Unpublished master's thesis. LSSR 101-83, AFIT/LSH, Wright-Patterson AFB OH, September 1983.

6. Logistics Support Analysis. Military Standard 1388-1. Washington: Government Printing Office, 15 October 1973.

7. Logistics Support Analysis. Military Standard 1388-1A. Washington: Government Printing Office, 11 April 1983.

8. McCarthy, M. W. "Developing Tomorrow's Logistics Support Analysts," presented to the American Defense Preparedness Association, November 1983.

9. Plata, E. F. "Logistics Support Analysis: Its Purpose and Scope," Logistics Direction, January 1980, 18-21.

10. U.S. Department of Defense. Acquisition and Management of Integrated Logistics Support for Systems and Equipment. DOD Directive 5000.39. Washington: Government Printing Office, 17 November 1983.

11. U.S. Department of the Air Force. Acquisition Logistics Management. AFLC/AFSC Pamphlet 800-34. Washington: Government Printing Office, 12 August 1981.

12. Weapon System Acquisition Process in the U.S. Air Force. Akman Associates, Inc., 1 March 1983.

13. Weinstein, I. and E. Plata. "LSA - A Major Tool at Westinghouse," Logistics Direction, September 1982, 2-6.

VITA

Captain Paul S. Woodland was born February 27, 1958 at Kirkland AFB, New Mexico. As a member of an Air Force family, he has lived in several locations across the U.S. and oversees, most recently locating in Lancaster, California. A 1976 graduate of Desert High School, (Edwards, California), he went on to accept an appointment at the United States Air Force Academy. After completion of the four year curriculum, Captain Woodland was commissioned Second Lieutenant in the Air Force with a Bachelor of Science Degree. Initially assigned to the Air Force Acquisition Logistics Division (AFLC), Lieutenant Woodland served as the Integrated Logistics Support Manager(ILSM) ensuring supportable/maintainable designs were included in development of future Air Force weapon systems. Most recently he served as Program Manager for the Logistics Support Analysis Program in the B-1B System Program Office. Captain Woodland was selected to attend the Air Force Institute of Technology (Wright-Patterson AFB) from June 1983 to September 1984. The graduate studies program culminated in a Masters of Science Degree in Systems Management.

Permanent address: 44000 N. 27th St West
Lancaster, California 93534

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT: Approved for public release; distribution unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): AFIT/GSM/LSY/84S-32	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION: School of Systems and Logistics; 6b. OFFICE SYMBOL (If applicable): AFIT/LS	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code): Air Force Institute of Technology, Wright-Patterson AFB, Ohio 45433	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: Air Force Acquisition Logistics Center; 8b. OFFICE SYMBOL (If applicable): AFALC/PTA	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State and ZIP Code): Wright-Patterson AFB, Ohio 45433	10. SOURCE OF FUNDING NOS. — PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT NO.
11. TITLE (Include Security Classification): See Box 19	
12. PERSONAL AUTHOR(S): Paul S. Woodland, Captain, USAF	
13a. TYPE OF REPORT: MS Thesis; 13b. TIME COVERED: FROM _____ TO _____	14. DATE OF REPORT (Yr., Mo., Day): 1984 September; 15. PAGE COUNT: 83
16. SUPPLEMENTARY NOTATION	Approved for public release: IAW AFR 190-17. LYNN E. WOLAVER 14 Sept 84 Dean for Research and Professional Development Air Force Institute of Technology (AIC)
17. COSATI CODES — FIELD: 15; GROUP: 05; SUB. GR.:	18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number): Logistics Support Analysis Effectiveness

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Title: A SURVEY OF EFFECTIVE MEASURES IN THE LOGISTICS SUPPORT ANALYSIS PROCESS

Thesis Chairman: William A. Dean

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION: UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL: William A. Dean	22b. TELEPHONE NUMBER (Include Area Code): 513-255-5023; 22c. OFFICE SYMBOL: AFIT/LSY

DD FORM 1473, 83 APR — EDITION OF 1 JAN 73 IS OBSOLETE.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

This ~~investigation~~ thesis was a general attempt to determine if Logistics Support Analysis (LSA) process effectiveness could be measured with the confines of the Aeronautical Systems Division. Surveys of opinion were sent to LSA program managers representing several program offices and general attitudes were collected in response to forty-three measurement questions. Response packages were returned by sorted, categorized, and analyzed, against a background of five major research questions, ranging from the measurability of LSA process effectiveness to the predictive factors contributing to increased levels of overall effectiveness.

Results from the study clearly indicate a preponderance of evidence suggesting that LSA process effectiveness is indeed measurable. While this is clearly the first significant step in modeling the effectiveness issue, the research goes on to identify accepted predictive factors to be used in program assessment. Several categories of factors were examined and offer a point of departure for indepth variable analysis. Finally the study investigates the qualifications of individual program managers and suggests criteria for more precise measurement. Success of the research lead to detailed conclusions and recommendations for areas requiring future emphasis.

END

FILMED

1-85

DTIC

7

(11) b. I am most qualified to respond
(1) c. There is someone in this organization but in another office who is also qualified to answer. (Please name and provide office symbol)
(3) N/A

(AFALC is considered a joint-command unit.)
(2) d. Other (please explain).

2

sub-contractors or vendors?

(3) a. no
(21) b. yes
(1) N/A

19. Have you had any contact and/or written communication with the AFALC's Directorate of Logistics Support Analysis (AFALC/PTA)?

(1) a. no
(22) b. yes
(2) N/A

3

(0) b. Neither a review of the contractor's proposal or the LSA data has been conducted.
(18) c. Yes, at least one review of LSA data acceptability has been conducted.
(2) N/A

27. Briefly, how would you define the term "effectiveness" as it applies to the LSA process?