ABSTRACT:

The Logistics Support Analysis (LSA) is the primary tool used to merge logistics engineering concerns into a systems engineering design approach. While the principal goals of the LSA are met by the time equipment deployment begins, there remains a need to maintain parts of the LSA database throughout the remainder of an item's life cycle and a need to consider expanding the coverage of the current database. The benefits to be realized include an improved ability to plan, program, and budget for a system's logistics support, modification, and replacement.

INTRODUCTION:

The systems engineering process provides a logical structure for those activities needed to transform an operational need into a system description and a preferred system configuration. The process facilitates the integration of the many engineering disciplines and gives each discipline the ability to influence a system's design. Logistics engineering is conducted within the mainstream system engineering effort. The primary tool used to integrate logistics support considerations into the design process is the Logistics Support Analysis (LSA). (Ref 1; Ref 2, p. 2)

The LSA is not a single analysis. It is a composite of systematic analyses. The set of all documentation produced as a result of system design efforts and the LSA analyses is referred to as LSA documentation (LSAD). The LSAD is not to be confused with the LSA database. The database consists only of that data captured and controlled in accordance with MIL-STD-1388-2. The LSA database synthesizes the logistics impacts of reliability, repair level, provisioning, life cycle, and other design decisions and is the single data source used to produce the LSA reports (i.e., the LSA Records).

The LSA process is the accepted tool for documenting support requirements and influencing the supportability of a design. Yet despite the successes of the process, additional efforts are needed to improve the utility of the database after system deployment. The current database does not support the goal that the LSA process be conducted through all phases of the system/equipment life cycle. (Ref 2, p. 1-2; Ref 3; Ref 5, p. 1; Ref 6, p. 1; and Ref 8, p. 1, 101)

The remainder of this paper addresses the advantages of using the LSA process throughout the life cycle of a system and recommends changes to the LSA data collection and evaluation effort to improve the utility of the database.
THE VALUE OF THE LSA DATABASE AFTER SYSTEM DEPLOYMENT:

There are a number of benefits to be realized in maintaining the LSA database throughout the life cycle of equipment. The following are several of the advantages.

First, maintaining the database gives agencies the ability to benchmark the performance of a system at any point in its life cycle and to track subsequent changes in performance against the benchmarks. A maintained LSA database provides provisioning, reliability, maintainability, cost, and other benchmarks against which the performance of a system can be judged. Trend analyses performed against the benchmarks provide the information needed to plan, program, and budget for the operation and support of a system. (Ref 2, p. 94)

Second, maintaining the LSA database provides agencies a data source for confirming and simplifying future studies. Many post-deployment studies conducted under Subtasks 501.2.5 and 501.2.6 of Reference 2 will require a greater degree of effort if a current LSA database is not available. Updates to reliability analyses, life cycle cost estimates, and the provisioning requirements needed to sustain equipment are relevant to those post-deployment efforts dealing with planned buys of replenishment spares and evaluations of system modifications. A need to use the LSA database to support such efforts has been established. (Ref 8, p. 65 and Ref 9).

Third, as a repository of design information, the LSA database can help agencies find deficiencies in their analysis processes and algorithms. Levels of equipment performance are traceable to decisions documented in the LSA database. If faulty analyses result in inadequate support after deployment, then agencies may be able to track the LSA data and affect changes in Reliability Centered Maintenance, Repair Level Analysis, etc. models and algorithms that support the LSA process. The LSA database can function as an important source of feedback, if it is maintained.

Finally, maintaining the LSA database provides the data needed to determine the technical and operational specifications for new systems. By maintaining database information, the desired operational values can be linked to technical values previously achieved during system testing and to current levels of system performance in a field environment. Agencies should not have to rely on RADC parameter translation guides (Ref 10) to establish technical design requirements for new systems when similar systems already exist. Not all of the data that comes out of the LSA process is needed after system deployment. However, with the exception of that narrative data which evolves into the technical orders, the LSA database needs to be maintained as the single, integrated database for all of the engineering disciplines involved in the supportability of a system if the described advantages are to be fully realized.

CHANGES RECOMMENDED TO IMPROVE THE UTILITY OF THE CURRENT LSA DATABASE:

One of the objectives of the LSA process is to provide for the traceability of requirements. LSA data was to be based on, and traceable to, other system engineering data. Design and
performance data was to be captured and used as an audit trail in support resource planning, design tradeoff study inputs, and LSA documentation preparation. (Ref 2, p. 2). The following may be some of the existent data deficiencies perceived by users of the LSA database.

First, the current database only provides a "snap shot" of the supportability of a system at the time of deployment and does not monitor the subsequent evolution of a system. While a number of Logistics Management System Modernization Programs are under way to improve and interface the various post-deployment data systems, there is no current effort aimed at integrating LSA data. (Ref 7) In addition, any plans formulated to integrate the LSA database could not provide the additional data that would be needed to satisfy life cycle tracking requirements of an LSA database.

Second, the LSA database has been set up to only record the latest provisioning data. As support decisions are made, results of the decisions are superimposed over designer recommendations. In so doing, the current database promotes a continuation in the finger pointing exercise that follows the fielding of new systems. The present database has limited use in identifying whether supportability deficiencies lie with analysis algorithms and processes or with the superimposed decisions of support groups. The database needs to be expanded to record both a designer's recommendations and the support decisions.

Finally, the database has not been set up to facilitate the updating of analyses after system deployment or to provide the feedback information that is needed to evaluate the processes and algorithms of those analyses. The LSA database needs to be expanded to add that data which is used to compute the reliability, maintainability (R/M), and availability parameters and to track the modeling, use, and environmental assumptions that affect allocations, predictions, and test plans. "Each equipment development contract has unique R/M requirements and data reporting procedures. Additionally, each contractor organization and contracting agency has different policies concerning the amount of detail required, allowable assumptions and archiving or maintenance of R/M data." (Ref 10)

To a large extent, achieving these kinds of improvements does not require that agencies create new data systems. The added data could be captured and evaluated using systems described in Reference 7 simply by using such systems during operational testing. For example, incorporating the Product Performance System's data element definitions, and reporting criteria into the LSA database/process would provide the data and evaluation consistency that is needed between pre- and post-deployment operational testing. Moving the use of the Product Performance System into the operational testing phase of a program would satisfy requirements that meaningful and measurable R/M parameters "be traceable throughout the weapons system life-cycle, including developmental testing, operational suitability testing, and operational use." (Ref 4) Adding the R/M assumptions to this database would then provide the additional data needed to also ensure that post-deployment predictions, allocations, and test plans are also both consistent and traceable over time.
SUMMARY:

The Logistics Support Analysis (LSA) is the primary tool for integrating logistics concerns into a system's design. While the principal goals of the LSA are met by the time equipment deployment begins, there still remains a need to maintain parts of the LSA database. In addition, we need to give consideration to increasing LSA database coverage. Acquiring the additional data and maintaining the database throughout a system's life cycle should provide agency's a number of realizable benefits. The benefits to be realized include an improved capability to plan, program, and budget for system support, modifications, and replacement and an ability to obtain the feedback needed to improve LSA analysis and process tools, and the performance of fielded systems.

To be truly effective, the LSA database must become the common, integrated database that serves user needs from the inception of a system to its retirement.

REFERENCES:


