Logistics Support Analysis Process

The LSA process is tailored in accordance with the maturity of the system/equipment design. The LSA provides a foundation for the Integrated Logistics Support (ILS) program by generating source data and maintenance plans, which will direct other ILS elements such as training, technical publication and provisioning. The source material will be identified during the development of a maintenance philosophy through the implementation of the LSA itself. The maintenance philosophy should adopt and concur with the program maintenance concept and ensure that supportability requirements are considered and incorporated into the design of an equipment/system. The diagram (below) illustrates a generic LSA process and its analyses that are normally conducted.

Specific inputs to the LSA process need to be considered on a program by program basis and typically include:

- **LSA Plan** - Documents what tasks are going to be completed and when and by whom. This document could be a subset to a program ILS Program Plan.

- **Supportability Issues** - Supportability requirements, constraints and recommendations.

- **Customer data** – Would include a Use Study, the Maintenance Concept and required LSA type data elements.

- **Subcontractor Data** – Would include LSA and RAM analysis, LSA type data elements, drawings (assembly/ICD), product maintenance recommendations, etc.

- **Engineering Data** - May include FMEA/FMECA, maintainability data, hardware breakdowns, drawings (assembly/ICD), product specifications, etc.

Prior to commencing the LSA, some prerequisite tasks would be implemented. These activities could include supportability concept evaluation and depending on the specific program requirements could also include an undertaking to ensure that program requirements and objectives will be assessed and addressed.

An LSA Plan, or other planning method, depending on the program requirements, is typically developed to consolidate applicable program requirements and objectives. The LSA plan would detail the effort required to ensure that the program requirements will be addressed. The plan would include the scheduling of LSA activities and how they align with the program master schedule milestones such as the Preliminary and Critical Design Reviews.
LSA PROCESS
- LSA Plan
  - Task Selection
  - Scheduling/WBS
  - Logistics Software Definition
  - Interface
  - Engineering Support Definitions

Supportability Drivers
- Requirements
- Constraints
- Recommendation

LSA Candidates
- LCN Structure
- Functional Analysis
- FMEA/ FMECA

Customer Input
- Program Requirements
- Program Technical Specification
- Program Statement of Work
- USE Study & Support Modeling Data

Customer LCC Data
- Man Power, Inventory, Logistical Delay Time etc.

Reliability and Maintainability Engineering
- Subcontractor/Vendor Support/Data
- Reliability Developed FMECA
- Vendor FMECA Data
- Rel. Calculation: wearout failure
- Vendor Product PM Data
- Support Constraints/Policy
- RAM Data: MTTR, MTBF etc.
- Vendor Repair Cost Data
- Maintainability Data e.g. MTTR, BIT
- Vendor Maintenance Data

LSA Reports
- ILS Elements
  - Training
  - Technical Publications
  - Spare Modeling
  - Facilities
  - STTEL
  - Provisioning

Detailed Maintenance Task Analysis
- CM/PM Task Identification
- Economical Level of Repair Analysis
- Prelim. CM/PM Task Identification
- PM Tasks
- RCMA
- CM Tasks

Iterative Process
Program Engineering
The LSA is generally conducted in alignment with the engineering activity and will receive input data and analysis from subcontractors, vendors, engineering and the customer.

The subcontractor could be required to develop a partial LSA (supporting analysis) or the implementation of a full LSA program. In addition, each subcontractor would be required to furnish supporting data pertaining to the actual hardware supplied. This will generally be product related data and includes unit cost, depot repair costs, etc.

Engineering data could be obtained from several sources. This may include product specifications, engineering drawings, hardware breakdown structures, and possible complimentary analyses by other specialty engineering groups (such as the FMECA).

The customer would supply a Use Study document. Contained within this document would be specific cost data elements pertaining to the customer organization. This data would be used to facilitate the completion of analyses such as the ELORA.

**Logistic Support Analysis**

Depending on the specific LSA requirements identified for the program, the Logistic Engineer (LE) would perform the following typical tasks:

- **Review the program LSA Plan** or other planning method to obtain an understanding of what analyses are to be performed and by whom and when. The tasks to be performed would be clearly listed and described in the LSA Plan. Of importance is the Logistic Support Analysis Record (LSAR), which is used to document and record the results of the LSA activity. The LSA Plan will identify which LSAR database will be used for a given program.

- **Identify the sources of the input data** required for the LSA. Typically the Statement of Work (SOW) will indicate which data elements are to be populated within the LSAR database. This can also be achieved by using the form 1949-3 of MIL-STD-1388-2B.

- **Develop a Logistic Control Numbering (LCN) system** and identify LSA candidates. Appendix C of MIL-STD-1388-2B provides information on developing a LCN system.

- **Identify the functions** of the end item equipment. The guidelines for this task are identified in MIL-STD-1388/1A, task 301.

- **Conduct a FMEA (or FMECA)**. This task is usually conducted to MIL-STD-1629, task 101. Data would be supplied from Engineering and each of the subcontractors supplying
hardware. This data could be in the form of drawings (i.e., block diagrams, schematics, functional description, etc.). The results of the FMEA can be recorded in the LSAR.

**Perform a RCMA.** The RCMA is conducted on each of the failure modes, as identified in the FMEA, to develop a maintenance program (preventative) to realize the inherent safety and reliability levels of the end item under analysis. (MIL-STD-2173 and MSG-3 provide detailed instructions on how to conduct an RCMA). Wearout life characteristics and subcontractor recommended schedule maintenance frequency might be reviewed and acted upon as part of the RCMA effort.

**Summarize the preliminary CM/PM tasks.** Following the FMEA and RCMA, the LE shall summarize all identified CM/PM tasks for the end item equipment. The LE will generate a maintenance task code against each CM/PM task. (MIL-STD-1388/2B may be used as a reference).

**Perform an ELORA.** The ELORA is used to evaluate each of the previous identified maintenance actions to determine the most cost effective level of repair or discard of repairable items. Generally, the ELORA is conducted by running mathematical models with redefined algorithms (MIL-STD-1390 provides guidelines) using the subcontractor's product cost data and the customer's cost data pertaining to their maintenance operational support costs for their organization. The results of the ELORA will be reflected in the LSAR and as a final step (if required) by the assignment of a Source, Maintenance and Recovery (SMR) code. MIL-STD-1388/2B provides instructions on how to develop and assign SMR codes. Due to supportability constraints and/or current customer maintenance policies and practices the repair/discard of a particular hardware item, at a specified maintenance level, may be predetermined regardless of an epitomized cost rational.

**Summarize all required CM/PM tasks.** This is achieved by modifying previously assigned maintenance task codes as a result of possible recommended changes due to the ELORA.

**Source, Maintenance and Recovery (SMR) Code**

After the completion of the ELORA process, an SMR code is assigned to each identified CM (and PM) task. The SMR code is a six-digit alpha code that summarizes how an item is sourced, where it is removed and repaired and its recovery option. The interpretation of the SMR codes is presented in the following table.
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>MAINTENANCE</th>
<th>RECOVERABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>REMOVE/REPLACE</td>
<td>REPAIR</td>
</tr>
<tr>
<td>1ST POSITION</td>
<td>2ND POSITION</td>
<td>3RD POSITION</td>
</tr>
<tr>
<td>P</td>
<td>PROCURE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>Stocked</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Insurance Buy</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Cure-Date Item</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Initial Outfitting</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>AMSE/Stocked</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>AMSE/ Not stocked</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>Sustained Support</td>
</tr>
<tr>
<td>K</td>
<td>Repair Kit Component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Depot</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>1/2 level kit</td>
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<tr>
<td></td>
<td>B</td>
<td>Both Kits</td>
</tr>
<tr>
<td>M</td>
<td>Manufactured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>1st Line</td>
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<td></td>
<td>F</td>
<td>2nd Line</td>
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<tr>
<td></td>
<td>H</td>
<td>2nd Line*</td>
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<tr>
<td></td>
<td>G</td>
<td>Navy Use Only</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Depot</td>
</tr>
<tr>
<td>A</td>
<td>Assemble</td>
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<tr>
<td></td>
<td>O</td>
<td>1st Line</td>
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<td></td>
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<td>H</td>
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<td></td>
<td>D</td>
<td>Depot</td>
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<td>X</td>
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<tr>
<td></td>
<td>A</td>
<td>Replace NHA</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Salvage or requisition</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Drawings only</td>
</tr>
</tbody>
</table>

Table: SMR Codes (Source Maintenance Recovery)
Logistics Support Analysis Record

The Logistics Support Analysis Record (LSAR) is associated with either MIL-STD-1388/2B and/or DEF-STD-060. As part of the Logistic Support Analysis (LSA) certain tasks are undertaken and their results are entered into the LSAR. The LSAR is a relational database and if developed and maintain correctly, it can provide a powerful database tool to the user.

The LSAR is a Logistics Engineering tool and is populated with various logistical and RAM data. The logistical data will include all of the data associated with both corrective and preventative maintenance tasks. The items required to support each maintenance task will also be identified. This would normally include spare parts, tools and support equipment (standard and special) and personnel.

The results of the LSA tasks will determine whether or not an item is repaired or discarded. This will allow for a Maintenance Task Analysis to be conducted. The LSA results, detailing all the support resources needed to conduct the identified CM/PM tasks, are generally presented in a Maintenance Plan.

ILS output reports could be made available from the LSAR database. The following are examples of the LSAR standard reports, which can be furnished using a validated MIL-STD-1388 database:

- LSA 023 Maintenance Plan Summary
- LSA 024 Maintenance Plan
- LSA 036 Provisioning Requirements
- LSA 070 Support Equipment Recommendation Data (SERD)
- LSA 074 Support Equipment Tool List
- LSA 076 Calibration and Measurement Requirements Summary (CMRS)
- LSA 126 Hardware Generation Breakdown Tree