# Enhanced Automated Graphical Logistics Environment (EAGLE) Logistics Support Analysis Record (LSAR)

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Introduction

Enhanced Automated Graphical Logistics Environment (EAGLE) is a technologically innovative logistics toolset employing a robust central database as the repository for all logistics products developed through Logistics Support Analysis (LSA).

Research shows that over the whole life cycle of a product, the cost of acquisition is small compared to the cost of support, both in financial terms and the lost availability of assets during operations. Product Reliability and Maintainability has huge implications on the overall cost of ownership. Thus, investment in these areas will be saved many times over the lifetime of the product.

Integrated Logistics Support (ILS) is a methodology adopted by the United States Department of Defense (DoD), United Kingdom Ministry Of Defence (MOD) and many other countries. ILS defines a structured approach to logistics ensuring that all support resources necessary to operate and maintain equipment through its life are correctly identified and are consistent with the proposed product design and support environments.

The goal of ILS is to deliver the initial support package and ensure continued optimization of the support solution in response to product modifications and changes in performance requirements. Feedback from operational use and experience as well as changes in the Concept of Operations (CONOPS) will also require the existing support system to be reexamined.
The optimum support solution is determined through LSA that is a set of methods generating data and support products such as technical manuals, provisioning lists, LSA reports, training needs and all other considerations necessary to field and support the equipment. The results of LSA can be stored in a database known as the Logistics Support Analysis Record (LSAR).

EAGLE is fully compliant with the published LSAR specifications MIL-STD-1388-2B, GEIA-STD-0007, MIL-PRF-49506 and DEF STAN 00-60. It also supports the latest application of ILS principles specified by the United Kingdom MOD in DEF STAN 00-600 and JSP 886 Volume 7.

The world-class EAGLE logistics toolset is used by over 1500 logistics engineers in 60 companies across 20 countries. In addition to providing functions for the analysis and reporting of logistics support decisions, it encompasses a suite of analytical tools and utilities including the automatic generation of maintenance manuals to the requirements of ASD S1000D, MIL-STD-40051 and MIL-DTL-87929C as well as enabling online data commenting by permitted reviewers through EAGLE Web.

It is built to satisfy the most stringent customer mandated requirements and is easily configured and flexible to assist the user. It is a system designed to link the real worlds of engineering, design and production and is the only fully integrated product that ties the technical manuals directly to the engineering and LSA data.

The following gives a brief overview of the EAGLE disciplines used to manage information across more than 20 current system areas. The disciplines shown on the menu can be made available or hidden from each specific user appropriate to the their roles in the program.
EAGLE Disciplines

AdHoc

The AdHoc tool allows users to create and run queries against the complete EAGLE database and generate reports based on particular needs. User friendly screens assist in quickly producing the correct SQL query statement (without user knowledge of SQL), that can be based on any EAGLE tables and fields and includes selection and sort criteria. The query can be saved locally or to the EAGLE database for access by all users. The AdHoc tool allows direct changes to be made to the data in the results window. The results can also be saved to spreadsheets and data can be pasted into the database from spreadsheets.
Administration

Under the Administration discipline, users can customize nearly all of the EAGLE program functions. For example, system defaults can be set to predetermined or individually chosen levels. Altering these options changes the look and feel of the EAGLE user interface.

Options are available to export and import LSAR full file or change only datasets as text files or XML data exchange files. Any MIL-STD-1388-2B or DEF STAN 00-60 compliant full file can be imported into EAGLE. Output formats can be text or XML data exchange files in MIL-STD-1388-2B, DEF STAN 00-60, GEIA-STD-0007, or EAGLE proprietary formats.
EAGLE Analysis Reports

EAGLE Analysis Reports is a powerful function with the ability to detect data errors and inconsistencies by running over 100 individual analysis routines against the database. The LSAR Completion Status Report provides an indication of how much data has been recorded in the LSAR and tracks completion progress.

In short, the Administration function gives the power and flexibility to customize EAGLE’s functions to any specific user needs.
**Breakdown Structure**

The Breakdown Structure discipline presents the Logistic Support Analysis Control Number (LCN) structure of an end item graphically with a hierarchical parent-child view. The breakdown can be based on either LCNs or part application. Parts or LCNs can be moved to other locations in the structure. Many EAGLE disciplines can be accessed directly from the data selected in the breakdown.

![Breakdown Structure](image)

**Facilities**

The Facilities discipline provides functions for manipulating data related to maintenance facility considerations identified during through the LSA process. This information justifies and describes all proposed and additional facilities requirements that are indicated as a result of the operational and maintenance task analysis based on the concept of operations and maintenance policy.
Graphics

The Graphics discipline provides the ability to store and retrieve technical drawings and artwork in a variety of formats. Graphics can be associated with specific parts in the LSAR and used in the production of illustrated parts documentation.

Image Viewer is an EAGLE tool that quickly converts graphic file types to CGM and enables markup and hotspot regions to be easily added and modified. The modified graphics can be stored in the EAGLE graphics database or used with the EAGLE Publishing System (EPS) technical manual authoring environment.

LCN Maintenance

The LCN Maintenance discipline provides a method of manipulating and maintaining top level LSAR data sets used at the project level and enabling global key field changes. Some of the tables that are managed from this discipline are; the End Item Acronym Code Table (XA), LCN Indentured Item Table (XB), Commercial and Government Entity Table (XH), Item Identification Table (HA), the Part Application Provisioning Table (HG).

In addition, this discipline provides a bill of materials (BOM) import tool that fills the LSAR tables from a spreadsheet, automatically generating LCN data as necessary.
LSA Management

The LSA Management discipline provides tools to manage the LSA processes, including engineering change management, parts application life expectancy information, support equipment management information and additional task management information.

Operations Maintenance

The Operations Maintenance discipline provides functions for managing data related to the anticipated operation of the system, the environment in which the system is to be maintained, and the maintenance requirements of the system which must be met. Operational usage rates and maintenance requirements for war and peacetime are recorded with this discipline as well as reliability and interoperability requirements with associated costing data. These data elements are used in life cycle cost modeling and other calculations.

Personnel Skills

The Personnel Skills discipline tracks the description and justification of any new or modified personnel skills required to operate and maintain the product. The areas addressed are skill specialty codes, personnel skills and the identification of any unique physical or mental personnel attributes required or recommended as prerequisites for the applicable task.
Provisioning

Provisioning is the process of determining and acquiring the range and quantity of necessary spares and repair parts as well as identifying the support and test equipment required to operate and maintain equipment for an initial period of service. The Provisioning discipline provides the analyst with detailed provisioning data that assists in making crucial sparing recommendations.
The EAGLE Provisioning Analysis function is used to analyze the provisioning data in the database for a variety of missing data table entries. It creates reports to identify areas that require attention to ensure the accuracy of the provisioning recommendations.

**RMT Management**

The Reliability Maintainability and Testability (RMT) discipline is based on the methodology of performing analysis on the data in the existing LSAR using the included toolkits. From the analysis data, a new LSAR is produced as a baseline for the production of a new system. The RMT system is a response to the business need to reduce the time required to bring a new product to market with reduced costs and improved availability.
Reliability and Maintainability

The Reliability and Maintainability discipline is used to record and edit all of the information concerned with the reliability and maintainability aspects of a part including RAM characteristics, logistics considerations, reliability characteristics, war and peace requirements, failure modes and reliability centered maintenance analysis.
Reports

EAGLE produces all of the standard LSA reports defined by the specifications in addition to a nearly limitless range of custom reports that can be created and made available to all users. The Reports discipline provides a simple, yet powerful and flexible method to generate the standard reports from the LSAR. Users are assisted with the report generation by data entry windows that show the information required to run the requested report and prompt for additional optional information used to tailor the report.
Support Equipment

The Support Equipment discipline tracks data relating to support, test and training equipment. This information serves as administrative data for generating the formal Support Equipment Requirements Document (SERD) reports. This information also identifies hardware and software elements required to conduct fault isolation. In addition, the Support Equipment function can automatically generate standard LSA reports such as the LSA-070 and FORMS 9 and 603.

Task Analysis

The Task Analysis discipline is used to capture all logistics support information required to perform corrective and preventive maintenance tasks. This includes determining what spares, personnel, support equipment, task narrative and other logistics considerations are required by referencing other resources stored in the LSAR. Tasks can be associated with ASD S1000D data modules or MIL-STD-40051 work packages and the support resources and narratives are used to automatically populate the technical manual directly from the LSAR data.
LSAR task narrative text is automatically converted to XML, compliant with the chosen technical manual specification. Graphics, multimedia, hotspots and hyperlinks are easily added to the content using features of the EAGLE Publishing System technical manual authoring environment.
Tech Data Module Maintenance

The Tech Data Module Maintenance discipline provides management functions to maintain the associations between the EAGLE LSAR tasks and the EAGLE Publishing System technical manual authoring environment. LSAR task data can be released using this discipline to directly populate the technical manual data, change marks can be automatically generated and a complete release history is maintained.
Tech Manual

The Tech Manual discipline provides functions for manipulating data related to technical manual production from the LSAR data including references to test requirements documents. Various types of technical manuals can be created in virtually any format utilizing existing data in the EAGLE database. The LSA task is linked to the appropriate location in the specified manual structure. EAGLE creates structured XML from the associated LSA information that can be produced as Interactive Electronic Technical Manuals (IETM) or as legacy style PDF documents.

Another powerful feature of EAGLE is the ability to generate Illustrated Parts Breakdown (IPB) and Repair Parts and Special Tools List (RPSTL) technical data directly from the LSAR provisioning data.

Parts are selected for inclusion in the illustrated parts list from the provisioning data and the required illustrations are associated with the list. The edit function enables additional data fields to be added and the parts list order to be changed to match the illustration callout numbers. Extracting the parts data automatically populates the associated technical manual elements creating hotspot hyperlinks between the text and illustrations.
Training Analysis

The Training Analysis discipline provides functions for determining training requirements including the processes, procedures, techniques, and equipment used to train active and reserve personnel to operate and support the product. This includes individual and crew training, new equipment training, and logistics support for the training devices themselves.
Transportation

The Transportation discipline tracks transportability engineering analysis data as part of Packaging, Handling and Transportation (PHS&T) that pertains to the requirements necessary to safely and efficiently transport items around the globe.

User Reports

The User Reports discipline provides similar functionality to the AdHoc query generator, allowing users create and run queries against the complete EAGLE database, generating reports based on a particular need. User friendly screens assist in quickly producing the correct SQL query statement that can be based on any EAGLE tables and fields. The query can be saved to the EAGLE database for access by all users. The results window data can be saved to other file types. However, unlike the AdHoc discipline, the User Reports results data cannot be changed or deleted and the query is optimized to run very quickly.

Wizards

The Wizards discipline provides functions to automatically perform actions on the LSAR data including running automatic calculations, calculating quantity per end item, bulk loading of graphics files into the database and calculating LCN indenture codes.
Other EAGLE Products

ILS is applicable throughout the whole life of a project, however the focus changes as the project progresses through the Concept, Assessment, Demonstration, Manufacture, In-Service and Disposal (CADMID) phases of the product life-cycle. EAGLE has products that support every phase of the project. The following is a short overview of these. The specific product guides give a more detailed explanation of these applications.

EAGLE Toolset Overview
EAGLE Web

EAGLE Web is a completely thin-client online application that gives complete access to the EAGLE LSAR data and allows editing, inserting and deleting of data as controlled by access permissions. It facilitates review and commenting of data by external agencies and manages review responses through a web page. It provides the capability to generate standard LSA reports and AdHoc reports from the data just like the EAGLE client. The document management utility supports the storage and recall of documents and generated reports.
EAGLE Publishing System

EAGLE Publishing System (EPS) is a robust, yet intuitive environment for the authoring and management of XML data used in the production of ASD S1000D and MIL-STD-40051 electronic technical manuals. More than a decade of expertise in the generation of electronic technical manuals directly from current LSAR data has gone into the development of the EPS. Designed by users for users, it is a fast, efficient and user friendly application to produce and manage publications, either in conjunction with logistics information or authored directly and not linked to LSAR data. Content Management System (CMS) procedures are used to manage the work flow in a collaborative environment.
Maintenance Management Information System (MMIS)

The EAGLE Maintenance Management Information System (MMIS) is a computerized maintenance management system designed to integrate, manage and optimize all aspects of Performance Based Logistics (PBL) and Contract Logistics Support (CLS) programs. It uses the existing LSAR data developed during the product development as the equipment baseline and manages the product through its operational life. It has the capability to fuse data generated by repair facilities, forward depots, customers, subcontractors, and field representatives by providing a common data repository that is accessed globally.

MMIS provides essential process visibility and data transparency with easy, secure access to data over the Internet; all program personnel can view equipment status, repair status, and generate reports with nothing other than a browser. As a result, vital information is available to the office, PDAs and Web enabled cell phones in the field. A user configured dashboard provides constantly updated key data, presented in graphical formats.
Summary

EAGLE is a suite of software tools used to develop optimum logistics solutions for the operation and support of equipment throughout its lifecycle, from initial concepts to disposal.

End users are focused on availability, supportability and lifecycle costs. More than ever, long term support planning and guaranteed availability of equipment and spares is essential for deployed operations. These goals remain foremost, whether support is provided organically or through contracting for Performance Based Logistics (PBL) or Contractor Logistics Support (CLS).

Despite changes in contracting and technological advances, the basic support needs for fielded equipment have not changed. Deployed systems still need technical publications (probably interactive electronic format), spares, tools, facilities and training for their safe and effective operation and maintenance at the correct levels of the supply chain.

Equipment tracking, configuration management and timely repairs are crucial to maintaining availability and the operational effectiveness of fielded equipment. The EAGLE products provide the tools necessary to determine and generate all the support requirements and manage fielded equipment in a completely integrated environment. Data gathered and analyzed during design is directly used to produce operation and maintenance manuals. The same data is used as the basis to manage the equipment configuration, location, repair, reliability growth and more through the operational life.

More Information

Additional information about Raytheon EAGLE products and services can be found on the EAGLE website at www.raytheoneagle.com.

The Raytheon EAGLE development team is located in Tucson, Arizona USA. To ask questions, request further information or clarification, please contact the Raytheon EAGLE help desk by email at raytheoneagle@raytheon.com or call +1.520.663.6673.

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