

## Logistic Support Analysis (LSA)

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### Overview

A practical course which teaches the application and management of Logistic Support Analysis (LSA) within a System Engineering context. After a general introduction to Integrated Logistic Support (ILS) and LSA the course follows the LSA process through the system life cycle. In each phase of the life cycle the relevant theories and concepts are introduced and these are then consolidated by the performance of a series of practical exercises.

The Logistic Support Analysis Record (LSAR) is introduced early in the course and the results of the exercises will, where applicable, be related to the LSAR compilation process. Thus the training in the LSAR is fully integrated into the course and is not presented as a stand-alone topic. The course addresses LSA in accordance with Defence Standard 00-60.

A proprietary software package "EDCAS" is used as a training aid to support some of the practical exercises.

This course is aimed at LSA Practitioners and ILS Managers (ILSMs).

### Target Audience

The course is aimed primarily at LSA Practitioners and ILS or LSA Managers who require a basic understanding of the potential, the processes and the problems associated with LSA. The course is also suitable for members of support disciplines which have to interface with an ILS or LSA programme. The course will act as a comprehensive introduction to LSA and form a sound foundation upon which future development can be based.

### Objectives and Utility

The course introduces the fundamental concepts that are a pre-requisite to a genuine understanding of ILS and LSA and relates the Standards to these concepts in order to facilitate the effective application of the standards.

The delegate will understand each of the LSA tasks as defined by Def. Stan. 00-60 and will gain practical experience of the major analytical techniques used in the LSA process.

The delegate will understand the relationship of the LSAR to the LSA tasks and analytical processes and understand the key management issues as they appertain to LSA, in particular the planning process, the need for an LSA strategy and the requirement to tailor the LSA process.

It is the aim of this course to present LSA concepts in a simple logical manner and to dispel any misconceptions. The course will enable the organisation to increase their LSA effectiveness. For the Customer the effective application of LSA will result in improved system cost effectiveness, for the Contractor it will result in a quality improvement, to both their products and their service.

### The Training Process

The course begins by establishing a need for LSA. From this need a logical argument is developed for System Engineering and, that sub-set of Systems Engineering which is LSA. The LSA process is then addressed throughout the system life cycle. At each stage the relevant theory is presented and discussed, this is then consolidated through a series of practical exercises. This approach ensures that the delegate has a sound understanding of the concepts and the issues associated with LSA, for example, the difficulties involved and the size of the task.

Because the approach is logical and structured it aids recall and understanding.

Because the Standards are related to the theory, the delegates develop the ability to make a critical appraisal of the contents and the requirements of the Standards.

*It is possible to present this course to MIL-STD-1388 given prior notice.*

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## Course Programme

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### Day 01 - AM

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#### 001-S ILS Defined - Overview

A basic introduction to ILS that answers the Why, What, When, Where, Who, and How questions about ILS. The need for ILS is identified by defining the problems and potential problems that must be rectified or avoided in the future.

The module then develops a logical argument through an analysis of these problems that leads to the identification of the ILS Elements, the ILS Aims and the underlying Philosophy of ILS.

A brief overview is given of each ILS Element and the potential interactions between each element are explored. This leads to a discussion on the analytical techniques that are required in order to optimise the Total System design, i.e. the requirement for LSA.

### Day 01 - PM

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#### 002-P Systems and the Systems Engineering Concept

The concept of a "System" and its associated characteristics are discussed. The discussion will address system connectivity, emergent properties and the concept of environment from a system viewpoint.

These will all be considered in the Supportability Engineering context, the consequences of these properties, in Supportability Engineering terms, for example their effect on Support Modelling requirements, and Life Cycle Cost analysis, will be addressed.

The concept of Systems Engineering is introduced and Supportability Engineering is defined in the context of the Systems Engineering process. The aims of the Systems Engineering Process are defined. This leads in a logical manner to an expansion of the need for and the role of Supportability Engineering analysis.

The aims of Supportability Engineering analysis and its place in the Systems Engineering process are explored. The "Generic Systems Engineering" process is introduced and related to the concept of system Life Cycle Phases as a mechanism for controlling a major system development programme and for managing risk.

The concept of Life Cycle phases is related to the UK MoD acquisition process and the acquisition phases are defined in terms of their aims, processes and products.

#### 011-S Quantifying the System - An Overview

This module provides an introduction to the basic measures of Logistics and their place within Support related analyses. The aims are to raise the delegate's level of awareness of the measures whilst providing an introduction to their statistical basis, and to ensure that they have a grasp of the concepts that are a pre-requisite to an understanding of logistics.

### Day 02 - AM

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#### 003-P The Logistic Support Analysis (LSA) Process

An introduction to the Logistic Support Analysis (LSA) process. The need for LSA is discussed then the LSA tasks and the LSAR as defined by Def. Stan. 00-60 are introduced.

The delegates are given a brief introduction to parts 0, 1, 2, and 3 of the Standard, its structure and content. The tasks are discussed in the context of the System Engineering process. When applicable the relationship of the task results to the LSAR data is explained.

The analysis techniques, Failure Modes, Effects and Criticality Analysis (FMECA), Reliability Centered Maintenance (RCM), Level of Repair Analysis (LoRA) and Task Analysis are shown in the context of the LSA process.

#### 012-P The Logistic Support Analysis Record (LSAR)

There are many misconceptions about the LSAR. This module provides the delegate with an introduction to the LSAR and the reasons for it, what it can do and more importantly what it cannot do.

The structure of the database is given in overview.

The module is designed to provide the delegates with a basic level of knowledge and understanding to enable them to make sensible decisions as to whether an LSAR is required and if so, its type and the data elements required to be completed on their project.

## Day 02 - PM

### 004-P LSA During the Concept Phase

The objectives of the Concept Formulation / Pre-Concept Phase are defined and related to the LSA process.

The roles of the Use Study and Comparative analysis are examined.

The requirement for and the nature of the LSA Strategy is discussed.

### 013-P The LSA Tasks - Introduction & the 100 Series

This module gives a comprehensive overview of each LSA task as defined by Def. Stan. 00-60. This is a reference module and will not be presented as a single unit. Each task will be referred to during the appropriate core module, as the LSA process through the life cycle is presented. The material on the LSA tasks has been collated in this manner in order to make it easier to manage and to make it easier to use as a reference source.

Each task is discussed in detail and supporting concepts are introduced where necessary. The aim is to explain the underlying concepts. Where appropriate the task is related to the LSAR and the relevant tables and data fields.

### 005-P LSA During the Assessment Phase - Part 1

This module concentrates on the process of developing a set of supportability requirements.

The roles of the Use Study and the Baseline Comparison System in the process are discussed in depth. The objectives of the Feasibility / Concept Exploration Phase are defined.

The requirement to consider standardisation approaches and the potential Supportability benefits that may accrue through the use of new and emerging technologies are explained.

The structure and content of a typical Use Study is presented in outline. The delegate is shown when and where there is a relationship between the outputs of these process and the data in the LSAR. The process of developing an LSA strategy into an effective plan is explained.

## Day 03 - AM

### 014-P The LSA Tasks - The 200 Series

The module describes each of the tasks which make up the 200 Series. Each tasks is described in detail and related to the Systems Engineering Process.

## Day 03 - PM

### 006-P LSA During the Assessment Phase - Part 2

This module concentrates upon the design influence aspects of the LSA process.

The objectives of the Project Definition / Project Definition and Risk Reduction Phase are defined. The following LSA techniques are introduced during this lesson and, where necessary, expanded upon in other modules:

- Reliability Prediction.
- Maintainability Prediction.
- FMECA.
- Fault Tree Analysis (FTA).
- Reliability Block Diagrams (RBDs).
- Reliability Centered Maintenance (RCM).
- Level of Repair Analysis (LoRA).
- LSA Candidate Selection.
- High Level Task Analysis.
- The Trade Off and Optimisation Process.

### 015-P The LSA Tasks - The 300 Series

The module describes each of the tasks which make up the 300 Series. Each tasks is described in detail and related to the Systems Engineering Process.

## Day 04 - AM

### 018-P FMECA

In order for the Analyst to fully appreciate the reason for and the requirements of a Failure Modes and Effects Analysis (FMEA) and Criticality Analysis (CA) it is necessary to fully understand the principles behind these techniques. The process of carrying out a FMECA can be split into two distinct operations, i.e., compiling a FMEA and then attaching a CA to these results. When combined they form what is commonly known as a FMECA. This module identifies the details of an FMECA in relation to the nature of failures, introduces a structured method of data recording and shows the delegate how to interpret this information once collected. After all, information is of little use if it is ignored or misinterpreted.

Once relevant information has been documented and assessed it may be necessary to grade this in order to focus the analysis in areas of greatest need, a Criticality Matrix can be used for this task. This module introduces this Matrix and shows how it can be used to priorities the analysis process.

### 019-P Reliability Centered Maintenance (RCM) - An Overview

Reliability Centered Maintenance (RCM) is a much misunderstood topic. It is a title which is often misapplied to any process that results in a maintenance schedule. Additionally RCM is considered by many to be a simple "box filling" exercise, yes / no answers, and a hindrance to more important things.

This course will dispel these and other misunderstandings. The module develops the argument for RCM and the benefits and strengths of the technique become very apparent.

This module explains the aims of RCM, i.e. to improve Safety, operating performance, operational availability and cost effectiveness and achieve the inherent Reliability imbedded within an equipment.

The manner in which this achieved and how this differs from past approaches is addressed. The role of RCM as an integral part of Logistic Support Analysis (LSA) is discussed.

## Day 04 - PM

### 020-P Through Life Costing Techniques

This module introduces the delegates to the basic concepts of Life Cycle Costing [LCC] that are a pre-requisite to understanding the trade-off process and Level of Repair Analysis (LoRA) in particular.

The module has a "Popular Science" style.

### 048-S Level of Repair Analysis (LoRA) - An Introduction [COMA]

This module introduces the basic concept of LoRA as a sub-set of the Supportability Analysis tool set.

The use of LoRA to influence the design of both the Mission System and the Support System is addressed.

The mechanism whereby LoRA influences LCC and design are explained (these are addressed throughout many of the LSA topics and exercises).

The philosophy of Concept Of Maintenance Analysis is introduced and its relationship to LoRA.

### 047-P Lines and Depths of Maintenance

The module commences with a discussion of the reasons why this issue is of importance and its place as part of the Support definition process. It introduces the concepts of Depth of Maintenance and Lines of Maintenance and discusses their implementation and the varying terminology within the UK Armed Services.

This is augmented by a discussion of the relationship between the UK terminology and that used by the US DoD and commonly found in the literature, which is summarised at the conclusion of the module.

## Day 05 - AM

### 007-P LSA During the Demonstration Phase

This module concentrates upon the Support Resource Identification aspects of the LSA process. The Objectives of the Full Development / Engineering and Manufacturing Development Phase are defined.

The techniques that are introduced or expanded upon in this module are:

Detailed Task Analysis.

The LSAR.

LSAR reports and their relationship to Support "Deliverables" and DIDs.

Spares Modelling techniques.

Testing Supportability.

The Early Fielding Analysis Task.

The Post Production Support Risk Analysis Plan.

### 016-P The LSA Tasks - The 400 Series

The module describes each of the tasks which make up the 400 Series. Each tasks is described in detail and related to the Systems Engineering Process.

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**017-P The LSA Tasks - The 500 Series**

The module describes the sole task (Task 501) which makes up the 500 Series. This task comprises two main elements, the first dealing with assessing compliance during the acquisition phase and the second with assessing compliance during the in-service phase. Each of these elements is described in detail and related to the Systems Engineering Process.

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**Day 05 - PM**

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**010-P The Management of Logistic Support Analysis (LSA)**

The basic management issues are explored in this module. The purpose and content of the major ILS and LSA plans are discussed and typical outline plans examined. The importance of the strategic approach to LSA is emphasised. The control of an LSA programme through the effective use of the LSA review is discussed.