

MINISTRY OF DEFENCE



MOD Architectural Framework

White Paper on Acquisition View 2 (AcV-2): *System of System Acquisition Programmes*

Version 1.0
7 March 2005

Prepared by:-



Approved by:-

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RECORD OF CHANGES

This page will be updated and re-issued with each amendment. It provides an authorisation for the amendment and a checklist to the current amendment number.

Issue No.	Date	Revision Details
Draft 0.1	19 November 2004	First draft for review
Draft 0.2	26 November 2004	Formatting and edits after initial review
Draft 0.3	4 January 2005	Revised Data and Model section
Draft 0.4	14 January 2005	Changes made following review meeting of 5 Jan 05
Draft 0.5	17 January 2005	Revision to Data and Model section
Draft 0.6	27 January 2005	Final revision prior to release
Version 1.0	7 March 2005	Incorporated review comments, updated to include linkage to MODAF meta model and finalised for publication

Introduction

The purpose of this paper is to describe the initial content and layout of the System of System Acquisition Programmes (AcV-2) view in a way, which would allow peer review from stakeholders. With the exception of this section, the rest of the paper follows the layout of the DODAF volume II document. The intention is that this format will be retained and used in the final MODAF documentation, currently scheduled for publication in June 2005.

The MOD Architecture Framework (MODAF) is being developed with the intention of providing a rigorous way to specify capabilities / systems, provides a common language to describe system designs and is a key enabler to NEC¹. MODAF will support the entire system lifecycle, to varying degrees, including: concepts and doctrine, capability management, acquisition, operations and sustainment. MODAF not only supports the documentation of project / system architectures but also the generation of broader capability portfolio / programme / system of systems architectures.

The most mature and widely adopted architectural framework in the defence sector globally has been the US DoD Architectural Framework (DoDAF). This framework has its origins in the C4ISR community from the mid 1990s and is seen as a fundamental part of the DoD's drive towards Network Centric Warfare. The MODAF is based on the DoDAF specification for Operational, Systems and Technical Views, and will use most of these aspects of DoDAF largely without alteration. In addition to tailoring a few DoDAF views to align with MOD-specific processes and structures, MODAF adds two new sets of views – the Strategic and Acquisition Views – which permit more coherent analysis and management of the MOD capability portfolio and acquisition programmes (ie clusters of system IPTs). In addition, some views will be modified, based on lessons learned by users of DoDAF.

A high level summary of how the various MODAF views support the MOD business processes is given in the MODAF Concept of Use² and will be developed in more detail within the MODAF deskbooks. Specifically, the Acquisition Views are intended to provide information regarding the dependencies between individual acquisition projects, to understand the timescale for delivery of each project and to demonstrate the progressive maturity of each project across all of the lines of development. The Acquisition Views will be generated across of programme (or cluster) of related system projects. These views will be used to provide high level programmatic data, understand inter-project dependencies and analyse the impacts of changes to elements within the programme.

The *System of Systems (SoS) Acquisition Programmes (AcV-2)* view is one of the new Acquisition views that MODAF adds to the base DODAF standard. The purpose of the AcV-2 view is to provide an overview of the dependencies and management interactions across either a complete programme or a subset of projects, including supporting information across the Lines of Development (LoDs).

These White Papers are provided for information only at this point in time, although your comments and views are welcome on them. They are currently going through a formal review process within the MODAF Project Management Structure and will be part ratified at Version 1.0 after this process is completed (April 2005). They will be fully ratified for the complete MODAF baseline Version 1.0 release in June 2005 at which point the information will feature within the MODAF Handbook.

¹ CM(IS) NEC Next Steps paper of April 2003

² MODAF Concept of Use, MODAF-M04-003, October 2004

SoS Acquisition Programmes (AcV-2)

SoS Acquisition Programmes (AcV-2) – Product Description

Product Definition - The *SoS Acquisition Programmes (AcV-2)* provides an overview of the time-line and dependencies across a programme of individual projects. In addition, it also summarises for each of the projects illustrated, the level of maturity achieved across the Lines of Development (LoDs) at each stage of the CADMID lifecycle.

Product Purpose - The AcV-2 view is intended primarily to support the acquisition and fielding processes including the management of dependencies between projects and the integration of all the LoDs to achieve a successfully integrated military capability. The information provided by the view can be used to determine the impact of either planned or unplanned programmatic changes, and highlight opportunities for optimisation across the delivery programme. The inclusion of the LoD information allows areas of concern that are outside of the immediate scope of an IPT to be considered. Areas of concern identified across the LoDs, e.g. a shortfall in training resource, may be able to co-ordinated across a programme or group of projects each of which require additional activity to be initiated to successfully deliver to the project/programme schedule.

Product Detailed Description - The AcV-2 view graphically displays the key milestones and interdependencies between the multiple projects that constitute a programme. In addition, the use of a 'Hex Traffic Light' icon associated with each key milestone summarises the level of maturity for each of the LoDs associated with that project.

Although an AcV-2 view could be compiled for a single system project (ie a single bar) the view becomes far more useful when considering the dependencies between the multiple projects that contribute to an acquisition programme. This acquisition programme could align with the definition of a DPA cluster organisation or any other useful grouping of projects that have strong dependencies or contribute towards a common goal. It is expected that a single bar on the AcV-2 programme plan would represent each system development, while an IPT may be delivering several systems simultaneously.

The recommended structure for an AcV-2 view is an enhanced Gantt chart that displays the entire CADMID or CADMIT cycle of each project. The specific enhancements to the 'standard' Gantt chart format are:

- **Gantt Chart 'bars'** - The Gantt 'bars' on the view are colour-coded or shaded to indicate the relevant phases of the CADMID / CADMIT cycle. The colour or shading aids clarity; allowing the view to be interpreted quickly by the reader. Note: although a standard set of colour codes is expected to be mandated to deliver consistency across all AcV-2 views, a key to the colours or shading used on the 'bars' should be included with the view.
- **'Hex Traffic Light' Icon** - The 'Hex Traffic Light' icon is inserted between each stage of the CADMID / CADMIT lifecycle to represent the level of maturity across the LoDs. Each of the hexagon shaped cells on the circumference of the icon represents the level of maturity within a single LoD specifically for the project being represented by the Gantt chart 'bar'. The cells are colour coded (or shaded) on a traffic light basis, to indicate the level of outstanding issues in the particular LoD:
 - Green cells indicate that there are no outstanding issues or areas of concern and that the LoD is at a level of maturity appropriate to the stage of the lifecycle

- Yellow cells indicate that there are outstanding issues or areas of concern, but that there are planned activities that will provide resolution in the required timescale and the LoD is at a level of maturity appropriate to the stage of the lifecycle
- Red cells indicate that there are outstanding issues or areas of concern, for which the no planned activities that will provide resolution in the required timescale, or that the LoD is below the level of maturity appropriate to the stage of the acquisition lifecycle

Note: The detail of all issues or areas of concern, or reference to relevant documents and/or points of contact, that contribute to a yellow or red cell should be included as a textual annex to the AcV-2 view.

Examples of the Hex Traffic Light icon are shown in Figure 1 below:

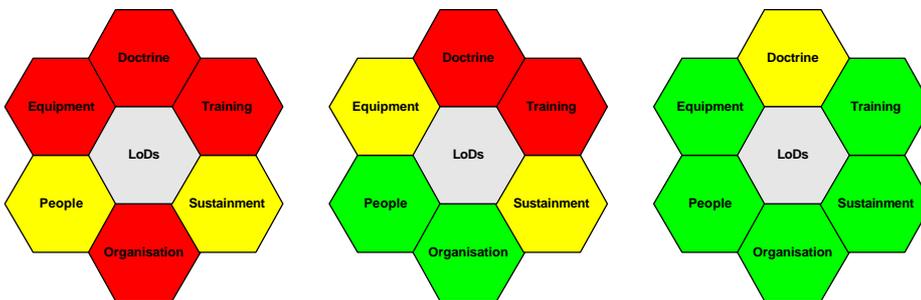


Figure 1: Examples of Lines of Development “Hex Traffic Light Icons”

The three icons above illustrate an ideal scenario as a project matures towards the in-service phase; as the Project develops each of the LoDs matures until the majority of the cells are either green or yellow.

An expected profile for the maturity of LoDs throughout the acquisition lifecycle is required against which the projects can measure their improving maturity. This will be developed more fully within the MODAF deskbooks, but an indication of how some of the LoDs mature through the lifecycle is given below:

- **Concepts and Doctrine.** The project will usually start with only a high level operational concept, which will be developed into a Concept of Employment during Concept Stage. During Demonstration and Manufacture the Concept of Operations and Concept of Use will be developed. By IOC any system / platform specific doctrine should be available. Tactics, Techniques and Procedures will evolve throughout the in-service life of the system, but each affected unit should have its initial versions by FOC.
- **Training.** During Concept through to Manufacture a progressively improving Training Needs Analysis will be developed. Prior to IOC the initial units receiving the system should undergo appropriate training. All units should be trained by FOC. On-going refresher training and induction training for new staff will be provided throughout the in-service life of the system.

Figure 2 below is a generic example of a completed AcV-2 view for a hypothetical programme of projects – note that this example includes keys to both the 'bars' and the Hex icon as part of the AcV-2 view. This view shows a number of system projects maturing through their lifecycle and into service during the time scale being considered and one system (system E) being retired. It can clearly be seen from Figure 2 how the LoDs of each

System progressively mature through the lifecycle such that no critical issues remain by IOC. Figure 2 also shows three programme dependencies, which are:

- The need for System B to have achieved its Main Gate as a precursor to System C Main Gate
- The need for Main Gate on System D as a precursor to commencing the disposal of System E
- The achievement of IOC for System D and a precursor to the complete retirement of System E

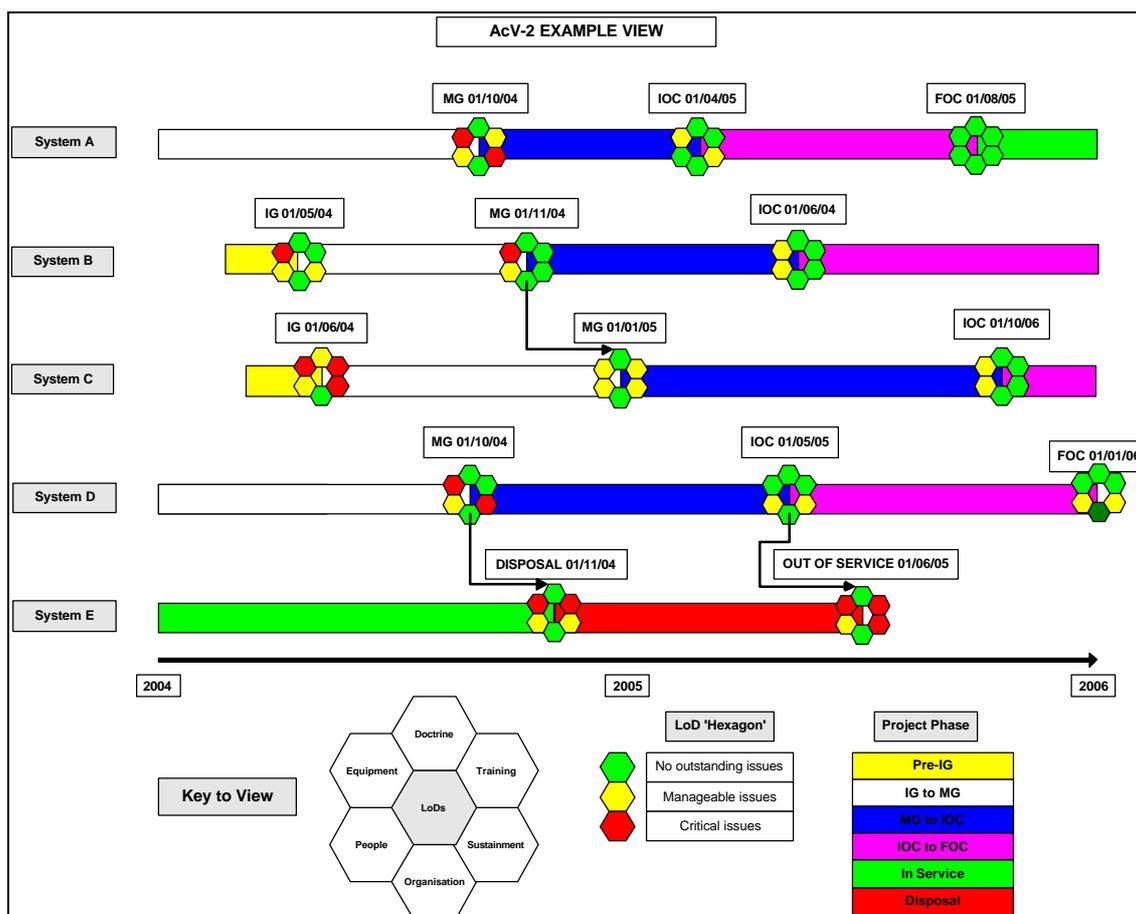


Figure 2: Example AcV-2 view for a hypothetical programme of projects

Taxonomies

The MODAF Taxonomy is to be developed in a related project in conjunction with the communities of interest. The Integration Authority is coordinating current work and subsequent ownership will rest with DG Info.

UML Representation

MODAF does not mandate the use of UML representation and indeed a number of MODAF views are not amenable to UML. This section describes how a UML representation of the relevant MODAF view may be developed if UML is being used.

There is no readily applicable representation of the AcV-2 view in UML.

MODAF Meta-Model Support for AcV-2

The MODAF Meta-Model defines a UML profile for exchanging information between MODAF tools using the XMI file format. For AcV-2 the appropriate section of meta-model needed to exchange that view's information is shown in Figure 3. It should be noted that the classes shown for one view may be used in several other views.

The classes defined in the MODAF Meta-Model specify the allowable UML stereotypes that may be exchanged in an XMI file. As it is a meta-model, all relationships that feature in the view are also modelled as classes. Rather than define a class for every conceivable item that could appear in a view, the meta-model defines generic classes and allows references to the MODAF Taxonomy. For example, the MOD would be represented in XMI as an Organization stereotype, with a tagged value referring to the element in the taxonomy which says "Ministry of Defence".

For more information on the use of XMI in MODAF, refer to the document "XMI UML & MODAF", available from www.modaf.com

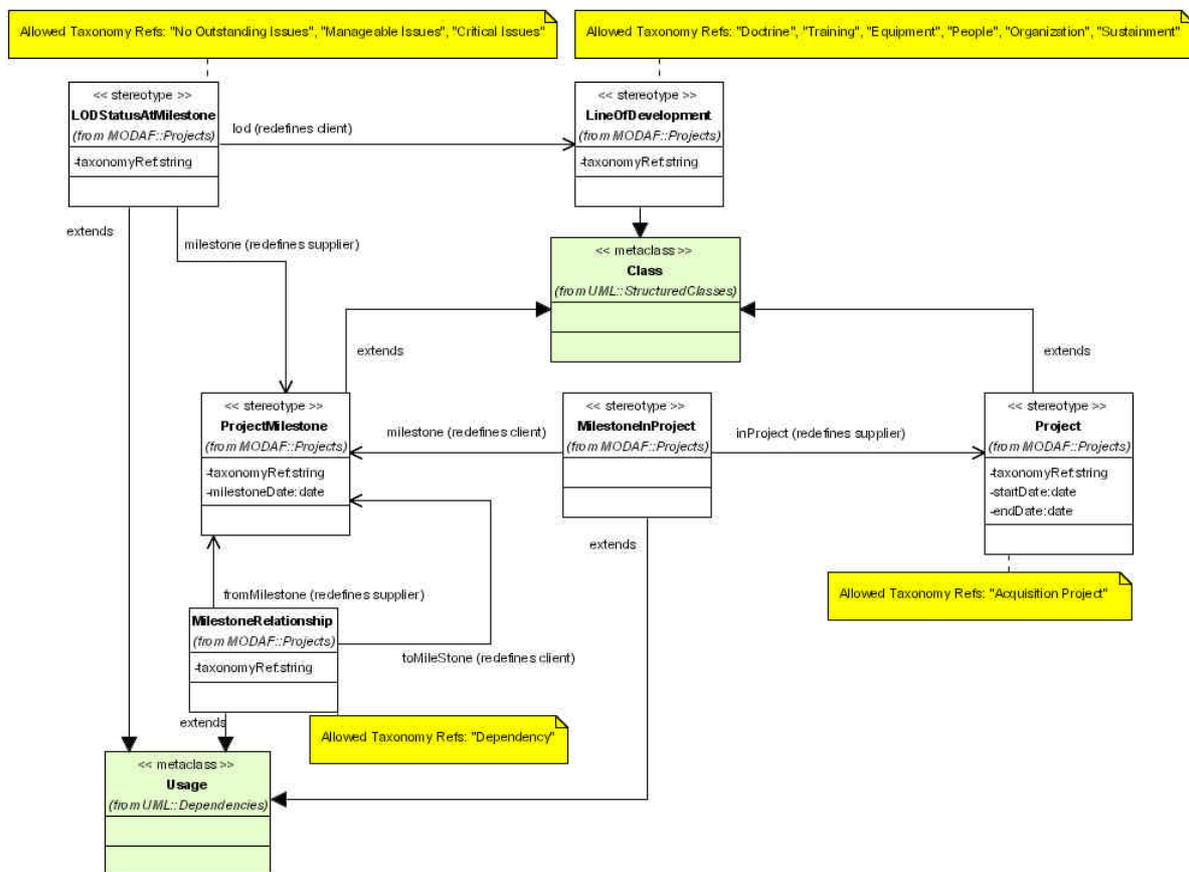


Figure 3 – MODAF Meta-Model Excerpt for AcV-2

Model Element Definitions

LineOfDevelopment – An element in any successful delivery of military capability, such as “training”, “sustainment”, “doctrine”, etc.

LODStatusAtMilestone – A relationship that relates a line of development to a milestone. The status of the LOD is given by the taxonomy reference, allowable values being “No Outstanding Issues”, “Manageable Issues” and “Critical Issues”

MilestoneInProject – A relationship between a milestone and its project.

MilestoneRelationship – A relationship between two milestones. For AcV-2 the only allowable type of *MilestoneRelationship* is “Dependency”.

Project – An extensive task or set of tasks performed by people and organizations for a purpose.

ProjectMilestone – An event in a project by which progress is measured.

MODAF Partners

This document has been prepared by MODAF partners with contributions from David Mawby (PA Consulting Group), Fariba Hozhabrafkan (Cornwell Associates), Ian Bailey (Cornwell Associates), and David Pile (PA Consulting Group)