

MINISTRY OF DEFENCE



MOD Architectural Framework

White Paper on Acquisition View 1 (AcV-1): *System of Systems Acquisition Clusters*

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 | 29 October 2004 | First draft for review |
| Draft 0.2 | 14 November 2004 | Second draft, reflecting more of a systems approach than the previous capability slant the document had. Also incorporated new introductory section and document layout. |
| Draft 0.3 | 22 December 2004 | Review comments incorporated. MODAF Data model and XML examples added |
| Draft 0.4 | 11 January 2005 | Minor changes to UML diagram and also to data model in line with comments from review meeting 5 Jan 05 |
| Draft 0.5 | 18 January 2005 | UML Diagram modified to use classes instead of packages |
| Draft 0.6 | 20 January 2005 | MODAF Data Model removed for release |
| Draft 0.7 | 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 AcV-1 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 to be published June 2005.

The MOD Architectural 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 Acquisition Clusters* view is one of the new Acquisition Views (AcV-1) which MODAF adds to the base DODAF standard. The purpose of the AcV-1 System of Systems Acquisition Clusters view is to describe how the individual acquisition projects relate to each other and hence how they are grouped together for acquisition purposes.

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

System of Systems Acquisition Clusters (AcV-1)

System of Systems Acquisition Clusters (AcV-1) – Product Description

Product Definition – The *System of Systems Acquisition Clusters (AcV-1)* view describes how multiple acquisition projects are related to each other organisationally into programmes.

Product Purpose – The *System of Systems Acquisition Clusters* view enables the user to define the best acquisition structure to support the multiple projects under analysis. The goal is to populate the hierarchy of acquisition clusters and programmes with projects that integrate together and / or are highly dependent upon each other, so as to improve the ability to manage this integration / dependency. As such, this view is primarily of interest to those who are responsible for programmes of acquisition projects.

Product Detailed Description – An AcV-1 *System of Systems Acquisition Clusters* view provides a way of describing the organisational relationships between multiple acquisition projects, each of which are responsible for delivering individual systems. By definition, this view covers acquisition programmes consisting of multiple projects and will generally not be developed by those building architectures for an individual project.

An AcV-1 view is hierarchical in nature. Though there is no prescribed diagrammatic format for an AcV-1 view, it is required that all such views will be represented by a diagram or table that clearly shows:

- All of the acquisition projects delivering systems or system of systems within the acquisition programme under consideration
- Other systems and systems of systems which may have a bearing on the architecture
- How the systems should be best grouped into acquisition clusters to best enable their integration
- How the acquisition clusters can be composed of other clusters (i.e. a hierarchy)

Each AcV-1 view may change through time i.e. the clusters are likely to change as new systems are introduced into the acquisition programme. Hence, it is likely that any given acquisition programme may have more than one AcV-1 view, each showing how the acquisition clusters are arranged for relevant periods of time.

Figure 1 shows an example AcV-1 view for the acquisition organisation of the DPA. This shows how current acquisition projects are organised into acquisition programmes (also known as clusters) of related capabilities under the leadership of an appropriate director or deputy director.

Figure 2 shows an example AcV-1 for a cluster of acquisition projects that relate to a part of the overall ISTAR capability. This view can be used to understand the dependencies and relationships between elements of the acquisition cluster and hence how best to develop the organisational relationships that will manage the dependencies between projects and the integration of the broader ISTAR capability.

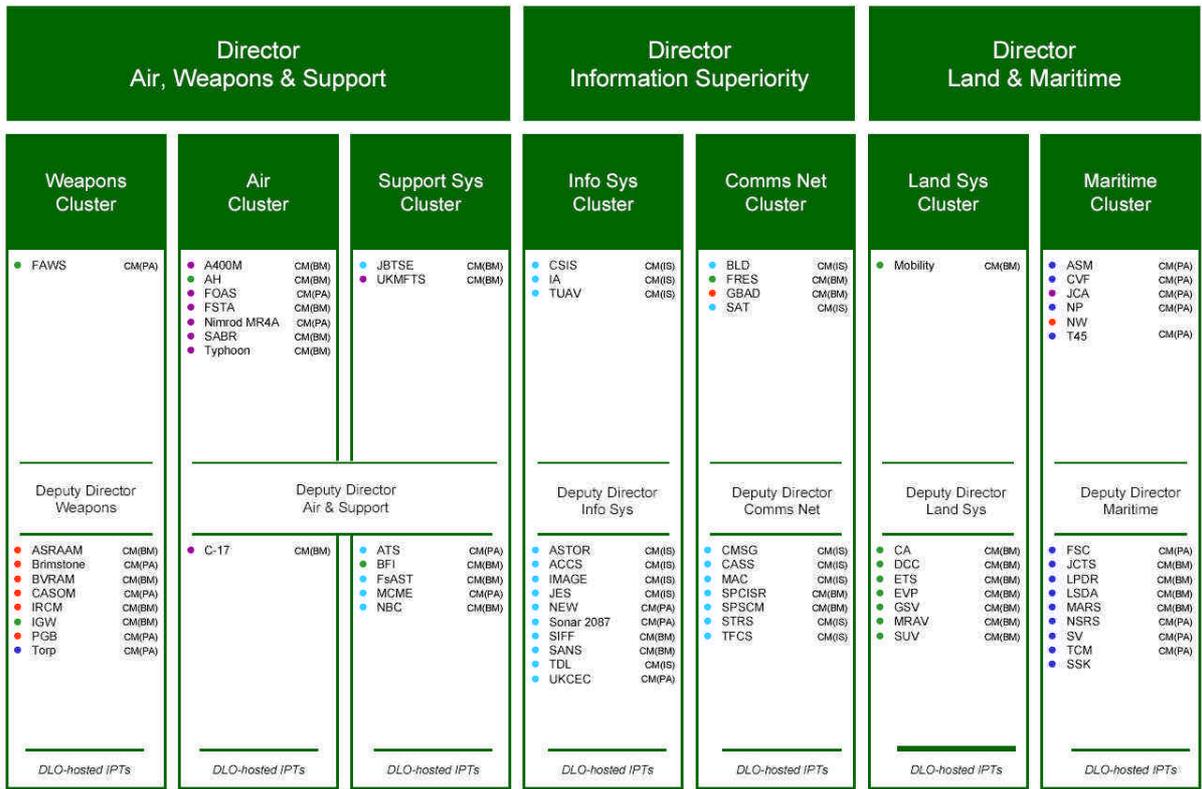


Figure 1 – Example DPA Acquisition Clusters

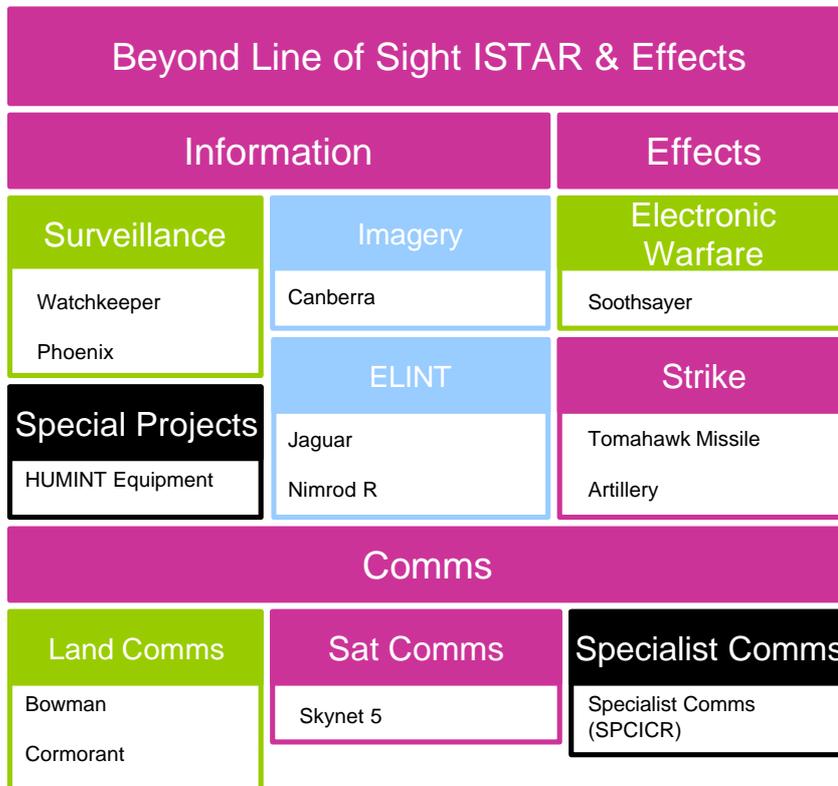


Figure 2 – Example AcV-1 for Hypothetical ISTAR Cluster

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.

AcV-1 views lend themselves well to UML representation. The procurement organizations are represented as stereotyped classes, with sub organizations shown within them. Projects are similarly stereotyped from classes and shown within the organization which runs the project. Displaying projects is optional, as often there is a 1:1 system to procurement project relationship. In cases where a project procures more than one system, the project should also be shown. The systems themselves are also stereotyped classes and shown within the project that procures them.

Figure 3 below shows the same acquisition relationships for a hypothetical ISTAR cluster as was shown in Figure 2, but this time using the UML notation.

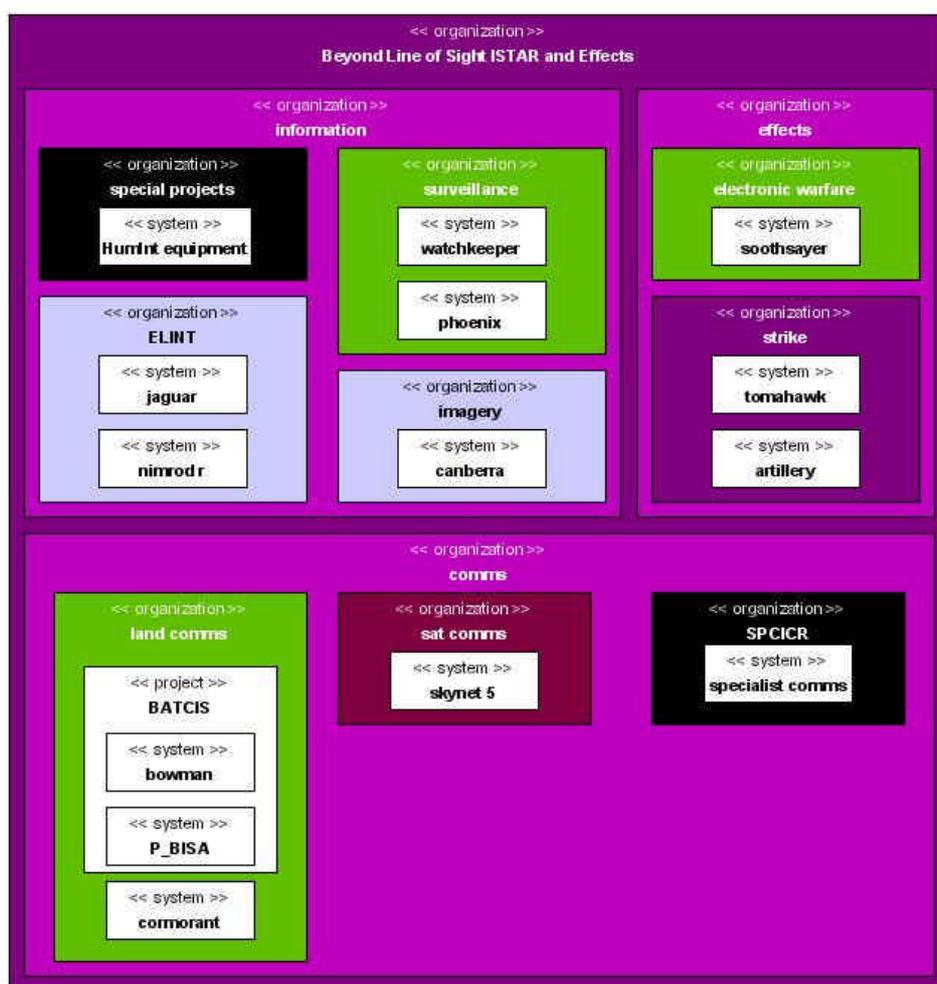


Figure 3 – Example UML Representation of AcV-1

MODAF Meta-Model Support for AcV-1

The MODAF Meta-Model defines a UML profile for exchanging information between MODAF tools using the XMI file format. For AcV-1 the appropriate section of meta-model needed to exchange that view's information is shown in Figure 4. 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

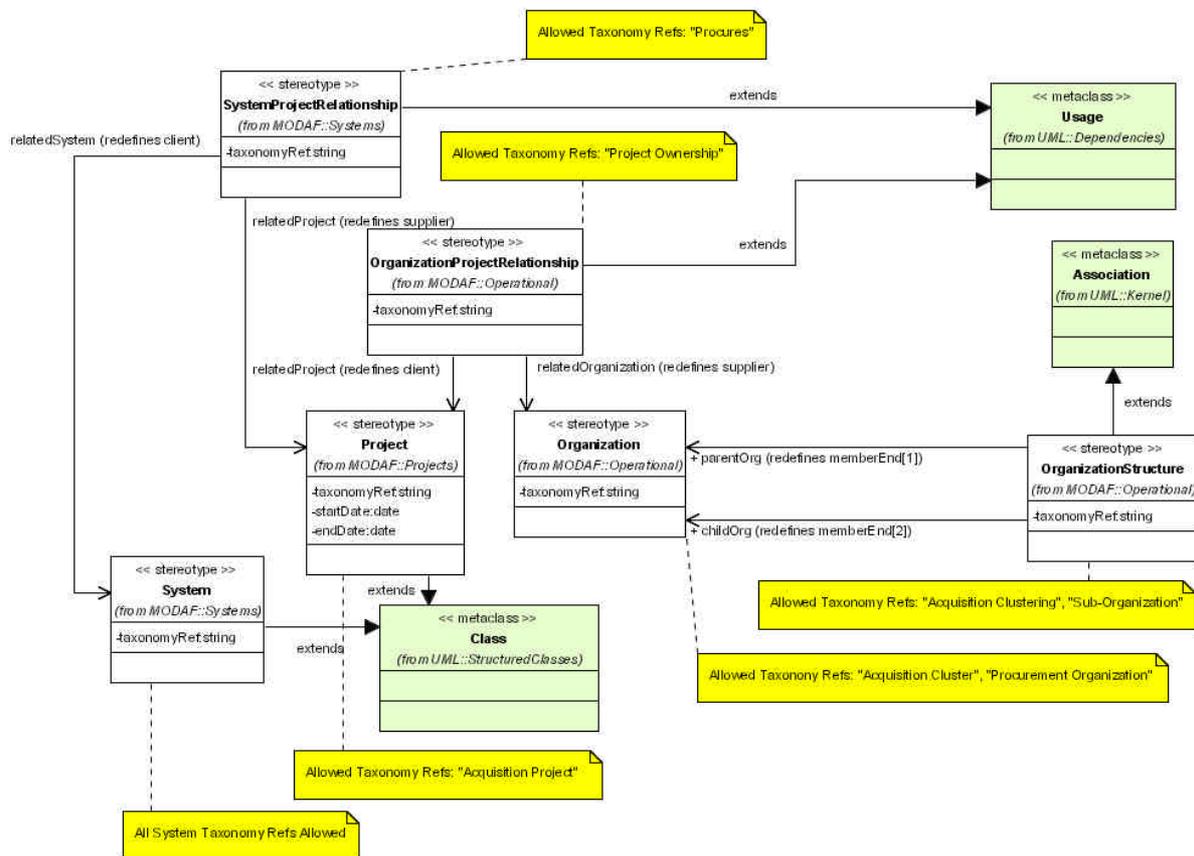


Figure 4 – MODAF Meta-Model Excerpt for AcV-1

Model Element Definitions

Organization – A group of persons, associated for a particular purpose. For AcV-1, allowable types of Organization are "Acquisition Cluster", where the organization is a cluster of other organizations, and "Procurement Organization" where the organization's main role is the procurement.

OrganizationProjectRelationship – A relationship between an organization and a project. For AcV-1, the only allowable type of OrganizationProjectRelationship is “Project Ownership”, asserting that the organization has ownership of the project.

OrganizationStructure – A relationship between two organizations that defines one organization as being part of another. For AcV-1, allowable types of OrganizationUsage are “Acquisition Clustering”, which asserts that the *parent* organization is a cluster containing the *child* organization, and “Sub-Organization” which asserts that the *child* organization is a part of the *parent* organization.

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

System – A coherent combination of physical artefacts, energy and information, assembled for a purpose.

SystemProjectRelationship – A relationship between a system and a project. For AcV-1, the only allowable type of SystemProjectRelationship is “Procures”, which asserts that the project has responsibility to procure the system.

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)