

MINISTRY OF DEFENCE



MOD Architectural Framework Concepts & Doctrine Community of Interest Deskbook

Draft 0.1

29 July 2005

Prepared by:- **MODAF**
partners

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 July 2005	First Draft

Concepts & Doctrine MODAF Deskbook

Table of Contents

1. Foreword.....	4
2. Introduction	5
2.1 What is MODAF?	5
2.2 Guide to Deskbook.....	6
2.2.1 Purpose	6
2.2.2 Context	6
2.2.3 Deskbook Structure.....	8
3. MODAF Relationship to Concepts & Doctrine Processes and Activities	9
3.1 Architecture Development Process	9
3.1.1 Six-Stage Architecture Development Process	9
3.1.2 Architectural Data Sources.....	10
3.1.3 Application to Concepts & Doctrine Process	10
3.1.4 Overview of MODAF View use	13
3.1.5 Ensuring Views are MODAF compliant - hybrid and modified Views ..	14
3.2 Concepts & Doctrine Processes.....	14
3.3 Policy	16
3.3.1 Capability Identification	16
3.3.2 Future Capability Reconciliation	17
3.4 Analytical Concepts.....	19
3.4.1 Concept Generation	21
3.4.2 Capability Development and Assessment	21
3.5 Applied Concepts.....	25
3.5.1 Capability Selection and Endorsement.....	26
3.5.2 CADMID Validation and Oversight / LOD Oversight.....	28
3.6 In-Service Development of Doctrine	28
4. Worked Example.....	33
5. Document Maintenance	34

1. Foreword

(Generic foreword - championing the use of MODAF, covering mandation issues and policy, emphasis of the benefits of MODAF and an architectural approach – to be written by MOD)

2. Introduction

2.1 What is MODAF?

The MOD Architecture Framework (MODAF) is a framework for conducting Enterprise Architecture and provides a means to model, understand, analyse and specify Capabilities, Systems, Systems of Systems (SoS) and Business Processes. MODAF consists of the six Viewpoints that are shown in Figure 2-1.

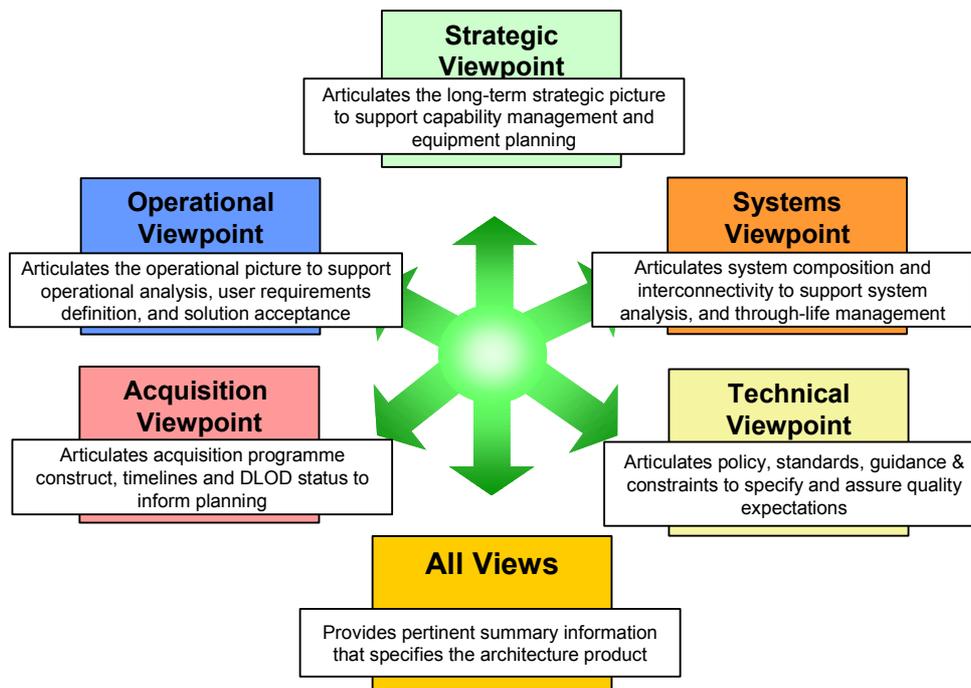


Figure 2-1: MODAF Viewpoints

MODAF uses six Viewpoints, each consisting of a number of modelling Views, to cover the complexity of MOD activities as shown in Figure 2-1. Not all MODAF Viewpoints and Views are needed for every architecture and it is intended that users select appropriate ones in order to most effectively represent their area of interest.

MODAF may be applied across a wide variety of MOD processes, including capability management, acquisition, operational analysis, planning and through-life management. Applied appropriately MODAF should be an enabler to the successful delivery of Network Enabled Capability (NEC)¹. Amongst the benefits of MODAF within the Concepts & Doctrine processes are:

- Improved articulation of concepts to identified defence capabilities
- Improved identification and management of cross-capability dependencies
- Better support for concept generation and capability development and assessment
- Ensure better capability selection, endorsement and integration across all DLODs.

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

2.2 Guide to Deskbook

2.2.1 Purpose

The purpose of this document is to:

- Assist relevant members of the Concepts & Doctrine community to produce MODAF compliant architectures
- Illustrate to the general Concepts & Doctrine community how the MODAF Views within these architectures can support the various elements of their processes and activities.

2.2.2 Context

The Concepts & Doctrine Deskbook forms part of the overall suite of MODAF 1.0 baseline documentation as shown in Figure 2-2.

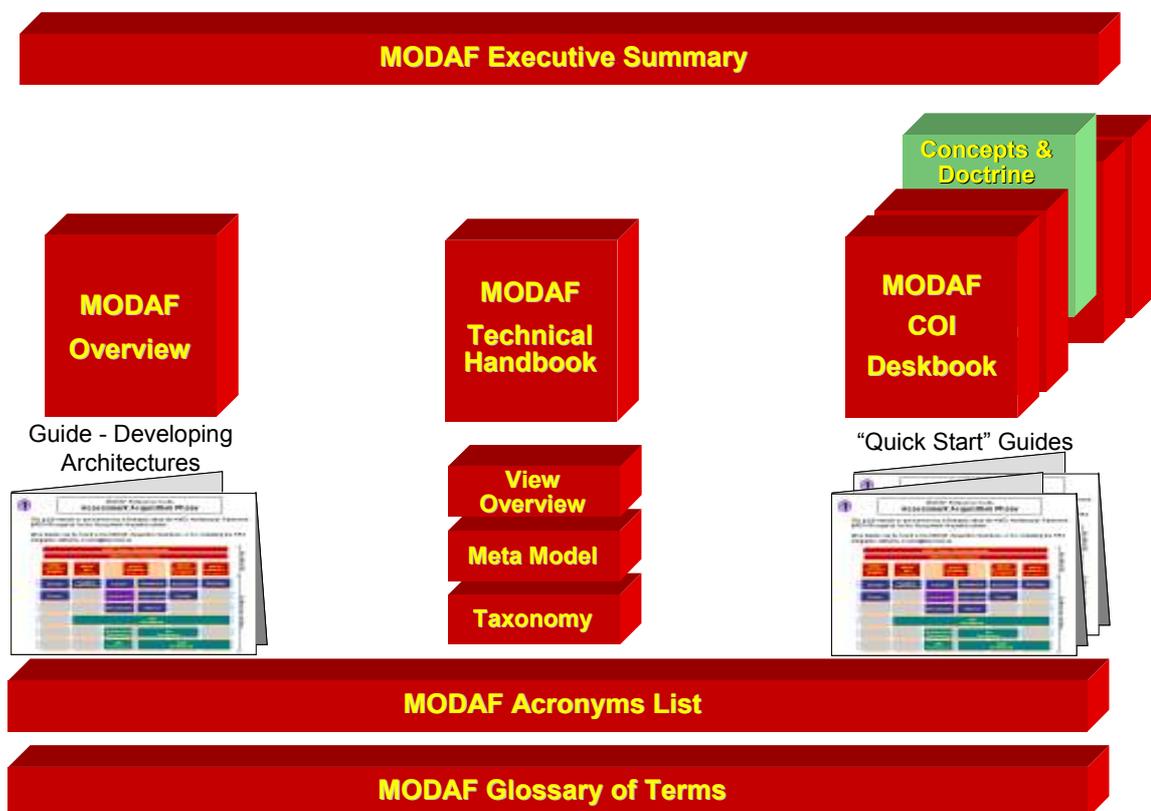


Figure 2-2: MODAF 1.0 Baseline Products

The main elements of the MODAF baseline documentation are:

- Executive Summary – provides a brief summary of the entire MODAF baseline
- MODAF Overview – describes what MODAF is, why it should be used and details the process for developing architectures
- MODAF Technical Handbook – provides details of the construction of MODAF Views and their relationship to the MODAF meta model (M³). This is supported by:

- View Overview – a short summary of each View intended for quick reference by MOD users
- Meta Model – used to define the architectural objects that are permitted in MODAF Views and their relationships with each other
- Taxonomy – provides the approved names and definitions for architectural objects to be used within the MOD’s architectures
- MODAF Deskbooks – describe how users within particular communities in the MOD are expected to utilise MODAF architectures to support their processes. Each of the Deskbooks has one or more “quick start guides” that provide an easy reference summary of the relationship of MODAF Views to the community’s processes

For the purpose of describing the relationship of MODAF to MOD’s processes, five communities of interest (COIs) have been considered as shown in Figure 2-3 below. Whilst these do not describe the whole of the MOD’s processes as described in the Business Management System (BMS), they do cover the core processes around acquisition and military operations.

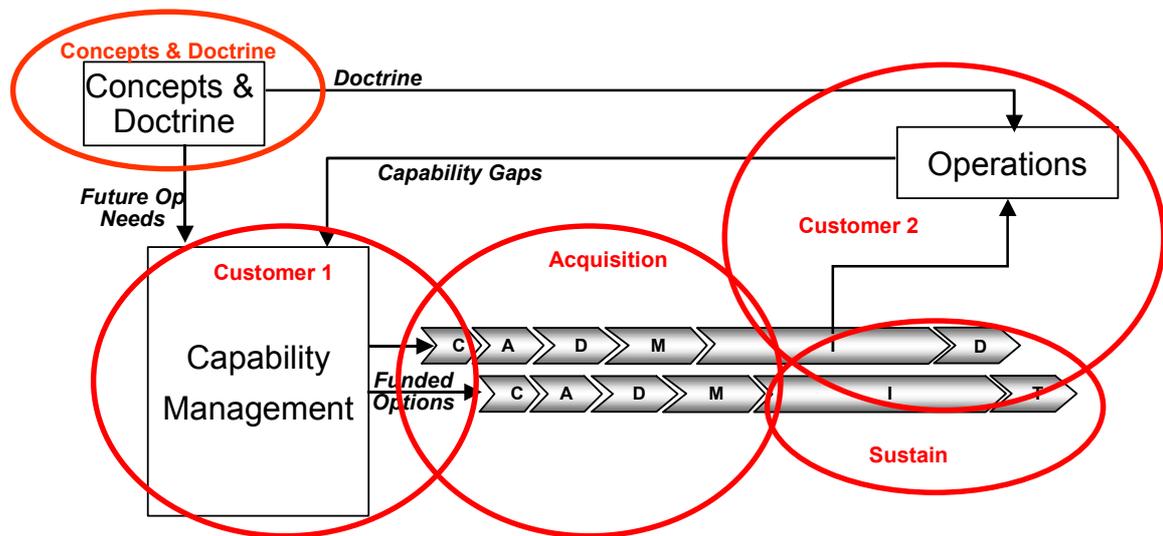


Figure 2-3: Community of Interest Deskbook Scope

The high level scope of these COIs is:

- **Concepts and Doctrine** – the development of analytical concepts (e.g. Joint HLOC), applied concepts (e.g. Carrier Strike Concepts) and in-service doctrine, SOPs and TTPs
- **Customer 1** – the monitoring of capability gaps against future needs, building the Equipment Programme (EP) and ownership of URDs for new capabilities
- **Acquisition** – the development and fielding of new military capabilities, the primary focus is up to the acceptance into service of a fully operational capability

- **Sustain** – the processes to maintain and upgrade a military capability throughout its operational life
- **Customer 2** – the Front Line Commands planning and conducting their operational activities including their Core Leadership and Pivotal Management roles as defined in Smart Acquisition²

2.2.3 Deskbook Structure

The remainder of the MODAF Concepts & Doctrine Deskbook comprises two key sections:

Section 3 - MODAF's Relationship to the Concepts & Doctrine Processes and Activities – this section explains the process of architecting as applied by those engaged in the Concepts & Doctrine process. Specifically, it identifies the key processes and activities during development of Policy, Analytical and Applied Concepts and Doctrine and outlines how these align with the MODAF Viewpoints.

Section 4 - Worked Example of MODAF in Concepts & Doctrine – this section demonstrates how MODAF can be used practically within the Concepts & Doctrine community by means of a real-life architecture example.

In addition, the following 'quick start guides' are available that summarise key architecture elements of this Deskbook:

- Concepts Development Guide
- Doctrine Development Guide

² See Smart Acquisition Handbook, available on the Acquisition Management System (AMS) at <http://www.ams.mod.uk>

3. MODAF Relationship to Concepts & Doctrine Processes and Activities

3.1 Architecture Development Process

3.1.1 Six-Stage Architecture Development Process

The approach to developing a MODAF-compliant architecture is shown in Figure 3-1. This shows how a MODAF user within any community in the MOD goes about establishing the intended use, scope and data requirements, developing the architecture, using this to conduct the required analyses and documenting the results. A more detailed description of this six-stage architecture development process is provided in the Overview of MODAF (MODAF-M07-020).

Prerequisites	1. Establish Intended Use	2. Define Architecture Scope	3. Develop Data Requirements	4. Capture Architecture	5. Conduct Analyses	6. Document Results
MODAF Governance		Inform Central Reg.	Query of Avail. Data Sources	Provide Extant Arch. Data Publish Baseline to MODAR		Publish Final Arch. to MODAR
MODAF Users User training - MODAF principles	Workshop - Determine Architecture Usage Architectural Use Doc.	Workshop - Bound Architecture Scope Workshop - Determine Use Cases Plan of Time & Resources Architectural Scope Doc.	Workshop - Establish Data Needs Data Gathering Plan Tool Selection	Tool-specific Training Baseline Arch. Review Baseline Architecture	Analysis Review Initial Analysis Final Analysis	Finalised Arch. Review Finalised Architecture
MODAF Resources MODAF Baseline MODAF Training Material	MODAF Tiger Teams MODAF Help Desk	MODAF Tiger Teams MODAF Help Desk Hybrid View Development	MODAF Tiger Teams MODAF Help Desk Certified Tool List Tool Advice	MODAF Tiger Teams MODAF Help Desk MODAF Taxonomy ERM / M3	MODAF Tiger Teams MODAF Help Desk	MODAF Tiger Teams MODAF Help Desk

Figure 3-1 : General Process for Building MODAF-Compliant Architectures

In addition to showing the steps that a MODAF user should follow, Figure 3-1 also highlights the MODAF resources that are available to help them and the key interactions that are required with the MODAF governance processes. One of the key MODAF governance mechanisms is the MOD architectural repository (MODAR) that is run by the Integration Authority (IA). This can be used to run queries and extract existing architectural data – such as information on the systems that a new capability has to interface with. It is also important that all new architectures are lodged with MODAR to inform others and allow the re-use of new architectural data. Furthermore, for the Acquisition community the IA provides additional integration services that assist in modelling end-to-end performance and interoperability assurance.

Another key resource will be the list of certified tools. The MODAF tool certification scheme is still being developed at the time of this MODAF baseline issue, definitive

guidance as to tool availability and fit with different COIs is not currently available. Therefore, interim guidance exists on the availability of MODAF convergent tools³.

In order to facilitate the searching and query of architectures it is essential that the All Views (AV-1 with meta data regarding the architecture and AV-2 with the architecture's object dictionary) are completed thoroughly for all architectures before they are published.

3.1.2 Architectural Data Sources

In future, when the development of MODAF architectures is a mature process, a MODAF user would expect to commence analysis or planning with a comprehensive set of data sources. These may include MODAF architectures supporting the capability definition (Strategic Views), URD and CONEMP (Operational Views), interfacing systems (System Views), applicable standards (Technical Views) and programmatic information (Acquisition Views). Realistically, it is likely that some or all of these will be missing when architectural activities are started and the user will have to either backfill the key elements themselves, validating them with the stakeholders who should have provided them, or request that they be produced.

It is important to repeat the six-stage architectural process for each new piece of work as the required outcomes, assumptions, scope, data sources etc may have changed in the meantime.

Any team conducting architectural activities within the MOD should contact the IA as custodians of the MODAR in order to establish what architectural data may exist or to understand who else may be developing related information – all of which will minimise nugatory work.

3.1.3 Application to Concepts & Doctrine Process

The relationships between policy, concepts and doctrine, force development, science and technology and the Directorate Lines of Development⁴ (DLOD) are key to successfully developing future capability. MODAF architectures will play several important roles in this process by:

- Developing a clearer understanding of future concepts and contextual information from which systematic analysis and experimentation will transform these ideas into coherent and credible guidance to capability developers or an accepted future tactic or practice.
- Providing a mechanism to document the process being provided by all organisations involved in concepts and doctrine development so that a complementary approach is achieved.

The intent is that the architecture development approach should be applied by all Concepts & Doctrine development staff in support of their business processes. For Version 1.0 of MODAF, the MODAF architecture process has been mapped to 4 key areas for Concepts & Doctrine development: Policy, Analytical Concepts, Applied Concepts and In-Service Development of Doctrine.

³ Interim NEC, CBM and BMS MODAF Modelling Policy, DEC (CCII) File ses 046-05, 1/3/05.

⁴ Training, Equipment, Personnel, Infrastructure, Doctrine & Concepts, Organisation, Information and Logistics.

These in turn are related to the Defence Management Board (DMB) endorsed 7-Step Concept to Capability Process⁵ to illustrate the progress of Concepts & Doctrine development through the CADMID / CADMIT lifecycle⁶ to deliver the required new or enhanced military capability (Figure 3-2).

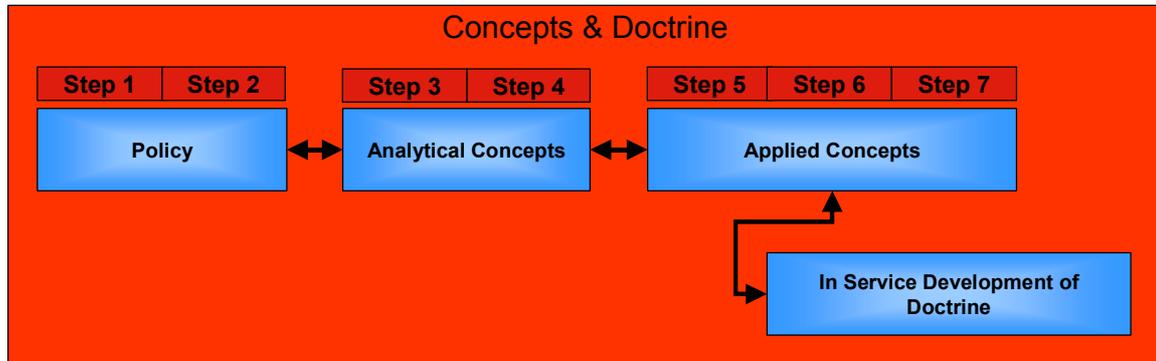


Figure 3-2 : 7-Step Concept to Capability Process Mapping to the Concepts & Doctrine Lifecycle

Table 3-1 shows the key data sources, products and issues that the architectural activities are likely to impact on at each of the key stages of the Concepts & Doctrine lifecycle. It should be noted that as these stages encapsulate two or more steps from the 7-Step Concepts to Capability process, some of the inputs will be outputs from a previous step within the stage.

Concepts & Doctrine Development Stages	Key Data Sources	Key Objectives	Key Products
Policy (Incorporating Step 1: Capability Identification & Step 2: Future Capability Reconciliation)	<ul style="list-style-type: none"> Political Direction (White Papers) Ad-hoc Defence Reviews Jt HLOC/EOCs Jt Vision DIST DPA's JCD and Force Estimation HLOA 	<ul style="list-style-type: none"> Identification of defence capabilities required or desired to counter the identified strategic threats/ emerging problems out to 30 years in the future. Reconcile a prioritised View of required capabilities in the Future Capability Development (FCD) paper. 	<ul style="list-style-type: none"> Contribution to Defence Strategic Guidance (DSG) FCD Paper Gap analysis to feed JDCB Part 1 -Direction and Prioritisation. Capability Experimentation Strategy: <ul style="list-style-type: none"> DIST technologies research Capability gap experimentation

⁵ The 7-Step Process was developed as part of Medium Term Workstrand 1a (MTWS 1a) in order to better define the process of developing capability from conceptual work.

⁶ Further information on the CADMID / CADMIT lifecycle can be found on the Acquisition Management System (AMS) – <http://www.ams.mod.uk>

Concepts & Doctrine Development Stages	Key Data Sources	Key Objectives	Key Products
<p>Analytical Concepts</p> <p>(Incorporating Step 3: Concept Generation & Step 4: Capability Development & Assessment)</p>	<ul style="list-style-type: none"> • DSG • FCD • JDCB(+) Pt 1 Direction • Quantitative analysis including: • Established Customer 1 (DAES) and DFD OA • CBM experimentation procedures • Qualitative analysis: • Joint and single service development cells. • Context from environmental concepts • Programme analysis • Lessons Identified • Relevant recent operational experience 	<p>Generation of concepts that:</p> <ul style="list-style-type: none"> • Describe how to meet the required capabilities • Outline implications for the DLoDs. • Describe the operational context for the capabilities <p>Perform iterative development and assessment of analytical concepts through focussed technical assessment, research, analysis and experimentation, in addition to discussion with both the EC and RP communities, and recent operational commanders.</p>	<p>Joint and environmental concepts and sub-concepts including:</p> <ul style="list-style-type: none"> • Jt HLOC • FMOC • FASOC • FLOC • Jt Log Concept • Specified joint concepts or concepts required to answer specific problems identified in 'futures' work. • Prioritised draft CONOPS • Risk Register
<p>Applied Concepts</p> <p>(Incorporating Step 5: Capability Selection & Endorsement; Step 6: CADMID Validation & Step 7: LOD Oversight)</p>	<ul style="list-style-type: none"> • Mature Draft CONOPS with supporting BOI • High level Joint and Single Service operating concepts for endorsement • Defined Capability Requirements • Funding (EP/STP) • PPSG endorsed CONOPS further developed by C2CL • Existing joint and single-Service Doctrine 	<ul style="list-style-type: none"> • Prioritisation, selection and endorsement of CONOPS and their subordinate capabilities to be taken forward as planning guidance for Defence Planners and Capability Developers. • Selection and nomination of SROs. • Identification of Defence Planning implications. Risk Analysis Management • Conduct requirements reviews, modelling & experimentation, operational analysis and stakeholder liaison /coordination • Generate CONEMP and evolve CONEMP into CONUSE 	<ul style="list-style-type: none"> • Endorsed CONOPS for development of subordinate CONEMP /CONUSE • TLMP • Funding Options (Balance of Investment) • DLOD • Capability Gaps/Issues • Planning guidance for Defence Planners and Capability Developers. • International Aspects (Interoperability) • Effective military capability, available to the Front Line Commands, that has been delivered coherently across all Lines of Development. • CONEMP/ Draft CONUSE • High-level joint and single-Service Doctrine

Concepts & Doctrine Development Stages	Key Data Sources	Key Objectives	Key Products
<p>In-Service Development of Doctrine</p> <p>(Incorporating Step 6: CADMID Validation & Step 7: LOD Oversight and beyond into In-Service use)</p>	<ul style="list-style-type: none"> • TLMP • Operational/ Tactical Situation & perspective • Funding Options • CONOPS/ CONEMP/Draft CONUSE • Joint Capability /Equipment /Resources • Doctrine (CONUSE /SOPs/ TTPs) • Review of Capability Gaps/ Issues • Training Plans and delivery • Balance of Investment 	<ul style="list-style-type: none"> • Risk Analysis Management • Interoperability • Conduct requirements reviews, modelling & experimentation, operational analysis and stakeholder liaison /coordination • Perform TNA • Develop derived CONOPS • Review the impact of Mid-Life Upgrades 2nd Customer Core Leader (CL2C) 	<ul style="list-style-type: none"> • Doctrine (CONUSE/ SOPs/ TTPs) • Review of Capability Gaps/Issues • Training Plans and delivery • Balance of Investment • Revised CONUSE

Table 3-1: Key Architectural Issues by Lifecycle Stage

The application of specific MODAF Views to the different Concepts & Doctrine activities is described in more detail later in this Chapter.

3.1.4 Overview of MODAF View use

MODAF Views support business processes at a variety of different levels - from being the core basis for a business activity, to providing some supplementary guidance to that activity. AcV-2 for example, as the SoS Acquisition Programme View, is designed to support the acquisition and fielding processes to achieve integrated military capabilities. However, it could also be used, to a lesser degree, to inform the Concepts & Doctrine community of the current and proposed status of projects/programmes during the development of concepts.

MODAF Views may also provide a means of communication between different stakeholders in a process.

Two levels of use have been defined for MODAF Views identified in this Deskbook, reflecting the level of support provided by a View to a particular activity:

- **Essential** – Views that are essential for use during a particular Concepts & Doctrine activity.
- **Highly Desirable** – Views that are recommended to inform a particular activity, given that they contain a significant amount of data of value to that activity in the majority of scenarios or circumstances.

The Essential Views are the starting point for any new MODAF user. Highly Desirable Views are more appropriate to users who have more experience of

MODAF and are looking for further ways of using architectural information to inform an activity.

Any View may be used in addition to the Essential and Highly Desirable Views at any stage if it helps in the execution of the analysis / task.

3.1.5 Ensuring Views are MODAF compliant - hybrid and modified Views

As identified in Figure 2-1, MODAF provides a discrete set of Views that can be selected to model and visualise an architecture. However, it is possible for a user to create Views that look similar to those specified by MODAF, but that are not compliant to MODAF, without understanding the data elements and relationships that MODAF specifies within the view construct.

In brief however, a View is considered MODAF compliant when the data elements and relationships within that View are the same as those specified by MODAF, in what is known as the MODAF Meta-Model. This is referenced in the MODAF Overview⁷ and the MODAF Technical Handbook⁸. Otherwise, the View created is unlikely to be supported by the MODAR architectural repository and other tools, and cannot claim MODAF compliance.

A 'hybrid' or 'modified' View is a MODAF compliant View that deviates in content from a View provided in the MODAF View suite (as described in the Technical Handbook⁸) but which still maintains compliance with the meta-model. Hybrid or modified Views may contain a mixture of data elements from two or more Views, or may only provide a subset of the information required for a fully compliant MODAF View.

For more information and guidance regarding MODAF compliance, readers should contact the MODAF project team or the IA.

3.2 Concepts & Doctrine Processes

The Concepts & Doctrine community will be generating and using MODAF architectures during concepts-to-capability development and for articulating how best to use these capabilities within the Services.

This Deskbook describes the architectural processes based on MODAF as they relate to the Concepts & Doctrine community by reference to the Concepts & Doctrine process model shown in Figure 3-3. This diagram also shows the key interfaces with the other communities considered within the MODAF Deskbooks.

⁷ MODAF Overview. Reference MOD-M09-002

⁸ MODAF Technical Handbook. Reference MOD-M07-022

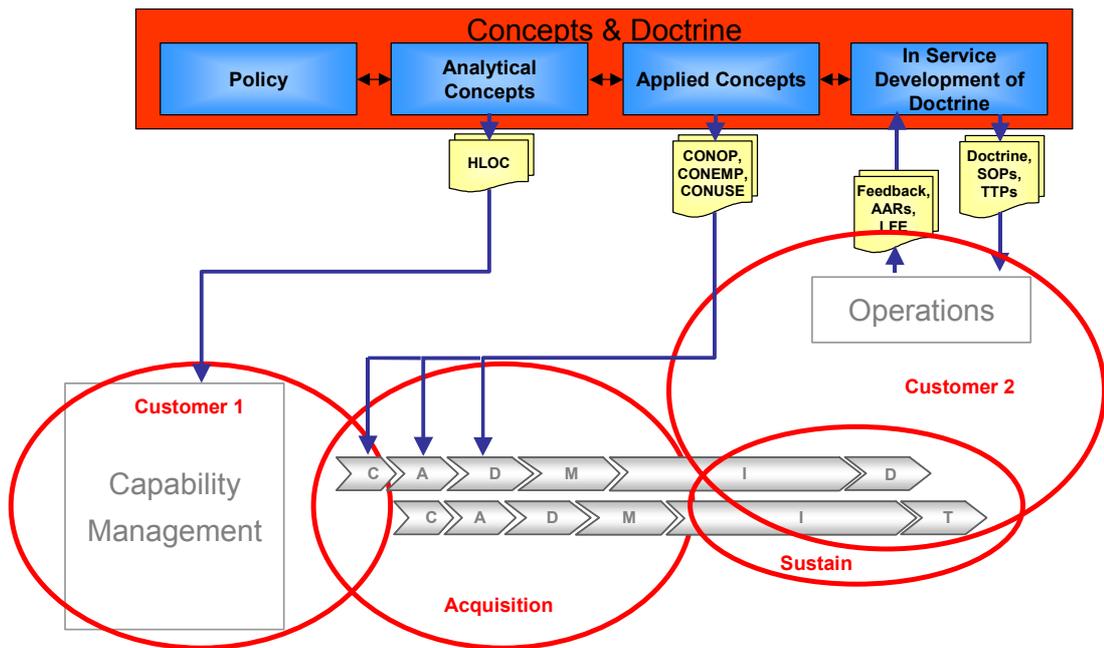


Figure 3-3: Key Elements and Interfaces of Concepts & Doctrine COI Processes

The Concepts & Doctrine COI processes interface with all of the other COIs, some of the key inputs and outputs being:

- **Capability Management** – provides Customer 1 with changes to conceptual thinking and collaborates with them to determine feasibility and resourcing of applied concepts. Key outputs to Customer 1 will be the Draft and endorsed Concept of Operations.
- **Acquisition** – provides the Acquisition processes with applied concepts that document the operational context and usage of the new capability.
- **2nd Customer** – provides key elements in the concepts and doctrine development, both as core leaders and pivotal managers. Core Leaders provide the single service focus of Joint and Environmental high level concepts and doctrine delivery, and during the delivery stages of the capability will also develop operational and tactical doctrine to support the Pivotal Manager.
- **Sustainment** – supporting documentation in terms of the CONOPS, CONEMP and CONUSE of capabilities and equipment will be provided to the Sustainment COI. In addition when mid-life equipment upgrades are proposed, the acquisition lifecycle will be reiterated and updated CONUSE developed.

The role of MODAF architectures in supporting the Concepts & Doctrine COI processes and its key interfaces with the other COIs is described in the sections that follow, structured according to the main sub-processes shown in Figure 3-3.

A complete one-page diagram of how the MODAF Views map to the Concepts & Doctrine processes is held in Appendix 1. Each of the following sections refers to appropriate segments of that process to maintain clarity.

3.3 Policy

This section provides detail of the Policy forming stage of the Concepts & Doctrine development. The key activities at this stage that may be supported by use of MODAF Views are:

- Capability Identification
- Future Capability Reconciliation

'Fighting Power defines an Armed Forces' ability to fight and achieve success on operations. It is made up of an essential mix of three inter-related components: conceptual, moral and physical⁹. The conceptual component develops the framework of thinking within which the means to fight (the physical component) are combined with the motivation and leadership of people (moral component), and applied on operations and training. However, the military is but one instrument of national power¹⁰ and exists only to serve the interests of the people. These 'interests' are expressed in terms of national policy¹¹.

Defence policy reflects the prevailing and emerging strategic environment and while enduring and fluid, it provides the framework for the setting of subordinate policy within the MOD and will be subject to continuous review as circumstances changes. Policy must state what is to be done and as importantly, what is not to be done. This is described by the Defence Policy Goals within Defence Strategic Guidance and is the basis for future Concepts & Doctrine development work. The focus of policy should generally be beyond the 15-year point (Epochs 3 and 4) or more, but for political reasons the focus may be much nearer (Epochs 1 and 2). It is also likely that feedback from the analytical concepts development activities may influence Policy more than the 7-Step process acknowledges.

3.3.1 Capability Identification

This stage is Step 1 of the 7-Step process, and is initiated in order to give substance to Defence Policy. This is considered integral to the Directorate Policy Planning's (D Pol Planning) primary outputs, and may be in the form of Defence Implications of Strategic Trends (DIST), Defence Planning Assumptions (DPA) and Defence White Papers. The Joint Doctrine and Concepts Centre (JDCC) will support this process through provision of Future Strategic Trends futures analysis, for which D Pol Planning is the primary customer.

MODAF can support this process by providing StV-1 (Capability Vision) Views representing the current JHLOC and Joint Vision as contextual inputs. Capabilities described in these Views may cover a number of epochs, which may be further detailed in corresponding StV-3 (Capability Phasing) Views supplied by the Customer 1 community. However, at this stage of conceptual development, it is likely that this level of detail may not be sufficiently mature to capture within an StV-3.

StV-1 Capability Vision: The high-level concepts are presented as an StV-1. This outlines the future capability requirements as a textual description. Figure 3-4 is an example of an StV-1. This will normally be provided to the Customer 1 Community as an input from the Doctrine and Concepts Community (i.e. JDCC and

⁹ British Defence Doctrine 2nd Edition – Chapter 4.

¹⁰ Other instruments of power are diplomatic and economic.

¹¹ BDD describes policy as '...the nations response to the prevailing strategic environment, reflecting the Government's judgement on what is necessary and possible in the pursuit of the national interest'.

required capabilities. This is encapsulated in the Future Capability Development Paper (FCD).

The FCD is the focus of this Step and should provide the path for concepts development as well as informing the generation of a Capability Experimentation Strategy to enable greater coherence within the UK's experimentation, analysis and research efforts. This work will, in the future, be led by the JDCC and endorsed by the Joint Doctrine and Concepts Board (JDCB).

Part of the FCD should consider capability gap analysis. The use of the MODAF AcV-2 SoS Acquisition Programmes View as part of this analysis process will assist in the identification of the main dependencies and timescales, providing information on how the Lines of Development (LoDs) are expected to develop and mature within the duration of the proposed concept to capability delivery cycle.

AcV-2 SoS Acquisition Programmes: Acquisition Viewpoint AcV-2 is collated by the Customer 1 community to support decision making during the Capability Audit and Equipment Planning activities. These Views show when acquisition programmes are expected to deliver scheduled capability, illustrating programme dependencies and status across all Lines of Development (LoDs) at each stage boundary (See Figure 3-6).

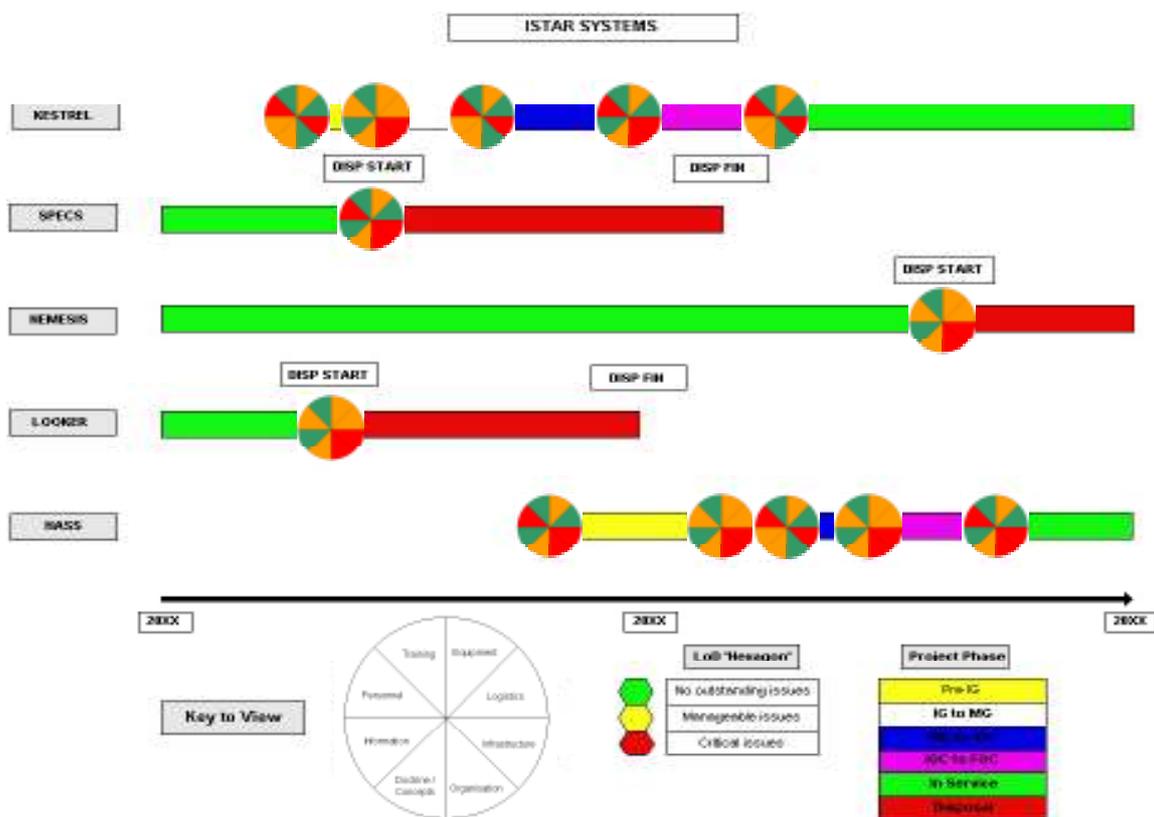


Figure 3-6: Example AcV-2 SoS Acquisition Programmes

While no MODAF outputs are expected at this stage, the outputs of the Policy stage should be clear guidance and direction from the JDCB on conceptual development and associated links to Science and Technology (S&T) resources, which will feed into the Defence Science & Technology Board. Figure 3-7 shows the key

architectural inputs for the Policy stage, StV-1 Capability Vision and AcV-2 SoS Acquisition Programmes, with respect to the overall process.

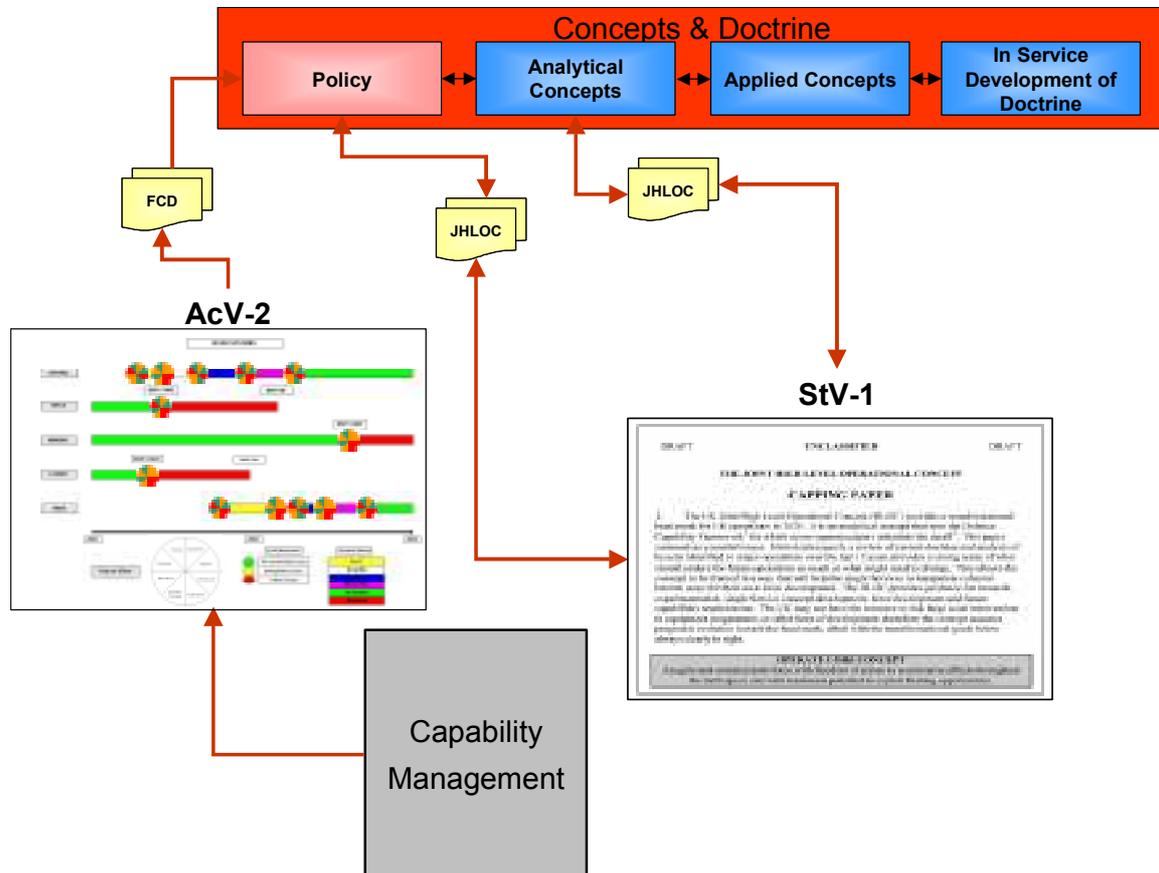


Figure 3-7: Key MODAF Relationships to Policy Development

3.4 Analytical Concepts

JWP 0-01.1 defines a concept as 'a notion or statement of an idea, expressing how something might be done or accomplished in the future'. In Defence, concepts exist at different levels; for example the Joint High Level Operational Concepts (Jt HLOC) describes the ways in which the Services will operate in the future in broad and abstract terms, while a detailed Concepts on Employment (CONEMP) will inform an ongoing equipment acquisition process.

A concept must have certain attributes to be useful, and MODAF readily enables the development of these attributes. It must have suitable provenance, which demonstrates coherence with other conceptual work and provides authority for subsequent implementation. Conceptual work is not conducted in a vacuum; policy, science and technology, other conceptual activity, academic work, doctrine, lessons and resource constraints all inform the development process. The timescale for implementation is important and concepts must have a clear purpose and associated target audience. Post PPSG endorsement, the concept must be able to influence

policy, procedure and/or capability. In sum, the attributes of an effective concept are¹²:

- **Provenance.** The concept is generated in response to a change in policy, strategic context (including threats), or technological opportunities, and is coherent with other concepts. The concept should have wide support, produced by rigorous debate on its effect across all of the LODs. The quality of a concept, its potential positive impact upon capability and how well that is articulated will provide a high degree of provenance in its own right. Detailed analysis and experimentation should lead to its endorsement as a driver for change.
- **Authority.** Once endorsed the concept provides a focus for force and capability development and guides and informs subordinate concepts be they analytical or applied. In a few cases, a particular concept might provoke changes in the higher levels of the hierarchy, which should be regarded as a flexible framework rather than a rigid structure stifling innovative thinking. The overall concept process is, therefore, strongly iterative and developmental and MODAF Views used in conceptual development will similarly be subject to constant review and increasing resolution as development work is carried out.
- **Timescale.** Although not always the case, higher-level concepts are normally set in the long term and have broad windows of applicability; for example, Joint Vision currently addresses 2015 and beyond. Such concepts tend to be of an enduring nature. Subordinate concepts are more often set in the medium to near term and must have more tightly defined requirements, e.g. a specified in-service date for equipment.
- **Realism.** The concept should deliver an improvement upon what the MOD can do today, not just a new way of doing things. Affordability and technology should not necessarily constrain emerging analytical conceptual thinking, although concepts must be cast within the bounds of the possible in order to achieve the wide support that provenance and authority demand. Early consideration of those DLODs considered critical for a particular concept will assist defining the boundaries of realism and should help determine the major implications of a new concept. Experience shows that early consideration of the Personnel DLOD is invariably necessary but concepts developers should consider all DLODs at an early stage and determine which might be critical on a case-by-case basis. Analysis and experimentation will help build confidence that concepts are achievable and affordable.

MODAF architecture viewpoints will support the establishing and articulation of much of the conceptual development work. The MODAF Strategic Views used or developed during conceptual development will confirm the provenance, authority and timescale of a concept while the use of Operational, Acquisition and Technical Views will determine the realism and ultimately enable endorsement of a new concept.

This section describes the use of MODAF at the Analytical Concepts stage of Concept & Doctrine development. The key activities at this stage that may be helped by the use of MODAF are:

- Concept Generation

¹² Draft JDCC Concept Handbook – Chapter 3.

- Capability Development and Assessment

3.4.1 Concept Generation

Analytical concepts are generated in response to either changes in policy, the future security environment or focussed on emerging technology. They seek to present a solution to a perceived future problem or capability gap and break it down into its constituent parts for further analysis and examination. The focus of an analytical concept is generally beyond the 15-year point (Epochs 3 and 4) and they are generated by Joint and single-Service Concept staff based at the JDCC.

Concept Generation is Step 3 of the 7-Step process and concerns the generation of analytical concepts, describing the approaches to which required future capabilities could be met or how future problems could be solved. The output will be Joint and environmental concepts that have been agreed by the Joint Operational Concepts Committee (JOCC), and where appropriate single-Service committees, as being sufficiently mature for subsequent refinement and evaluation. These outputs will be captured as a series of MODAF StV-1 Capability Vision Views (Figure 3-4), which will be used to inform the Applied Concepts community and form the basis of the development of the Capability Requirements Document (CRD) by the Customer 1 community (*See the MODAF Customer 1 Deskbook for details of MODAF use for CRD*). The JDCC will lead the concept generation stage ensuring the active involvement of DLOD staffs and 2nd Customer Core Leadership¹³ (CL2C).

StV-1 Capability Vision: At this stage the StV-1 Capability Vision will define the strategic context for the proposed group of capabilities, and will usually be a high-level textual description using terminology easily understood by non-technical readers. They may make extensive use of military terminology and acronyms. There is no prescribed specification for an StV-1 although it should contain a description of the high-level concept, augmented by descriptions of the high-level operational goals and strategy in capability terms. It is not intended to be prescriptive in terms of system or user requirements, but should set the scope for the architecture in terms of future or current capability vision.

3.4.2 Capability Development and Assessment

Capability Development and Assessment is Step 4 of the 7-Step Process, which seeks to develop the initial analytical thought conducted in concept generation, through focused experimentation, research and operational analysis, to ensure the realism and affordability of concepts in context with Defence Planning. Qualitative, quantitative and programme analysis will be conducted to inform the completion of a risk register, across all DLOD. This process will convert initial conceptual thinking into draft CONOPS that are mature enough for submission to the Policy and Planning Steering Group (PPSG). The process will be controlled by the JOCC and utilise established Customer 1 and DFD operational analysis and D CBM/J6 Joint experimentation procedures. These draft CONOPS, generated in conjunction with 2nd Customer Core Leaders and DLOD staff, should contain: the context within which a particular concept and capability package fits, the cross-capability linkages and a completed risk register. The initial population of specific MODAF Views is recommended at this stage to confirm the initial scope of the draft CONOPS. The

¹³ To translate the equipment capability provided by Customer 1 into an operational Military Capability through the Capability Integration process; to manage the availability of the in-service equipment; to provide the relevant advice and expertise; and to support Customer 1's remit to deliver the required equipment capability and to be the user.

concept development will have been captured in an StV-1 Capability Vision View, while the collaborative development of draft CONOPS should be captured as follows:

- High Level Operational Concept Graphics OV-1a, OV-1b and OV-1c will articulate the initial work on the draft CONOPS, while
- An StV-4 Capability Cluster View can capture the cross-capability dependencies.

Operational Viewpoints are particularly useful in the initial engagement with the other COIs in identifying the operational context and use cases for the draft CONOPS. Customer 1 should also be engaged during the initial work on these Views during the Concept Stage.

Depending on the nature of the concept being developed, several Operational Viewpoint suites may be initiated at this stage. This is to reflect any sub-concepts that may require articulation as draft CONOPS before being moved to the Applied Concepts community for further development.

OV-1a High Level Operational Graphic: This View (Figure 3-8) provides a high level graphical summary of the operational concept: framing what happens, who does what, in what order and for what goal; as well as highlighting interactions to the environment and other external systems.



Figure 3-8: OV-1a High Level Operational Graphic

OV-1b Concept of Operations: The high level context to the OV-1a will be provided by the OV-1b Concept of Operations View. The View must always accompany an OV-1a and the content must be textual. Any changes made as the draft CONOPS is matured for endorsement by the PPSG must be cascaded through all associated architectural Views. The OV-1b View below (Figure 3-9) articulates the high level context to support the OV-1a at Figure 3-8.

In the warfighting scenario, ISTAR information is provided by the SPECS 2 system, the KESTREL UAV system and by the NEMESIS system. SPECS 2 is an Operational level asset, and communicates via a data link to a common base station. KESTREL is a tactical UAV system that can transmit real-time video footage directly to the Fighting Patrols, and via relay to the common base station. NEMESIS is a strategic asset that has considerable on-board processing capability, enabling the data to be exploited during flight. The resultant information can be communicated either directly to a receiver based on board a Naval vessel or directly to the common base station

Figure 3-9: OV-1b High Level Operational Concept Description

OV-1c Operational Performance Attributes: The OV-1c Operational Performance Attributes View is unlikely to be fully populated at this stage of the concept development process, but a high level abstraction of the concept performance attributes could be captured at this stage for further development in the cycle.

Attribute	Measure	Value			
		As-Is	Epoch 1	Epoch 2	Target
Availability	Number of hours planned downtime	30 hrs/year	20 hrs/year	10 hrs/year	5 hrs/year
Maintainability	Support personnel required to sustain the system	50	40	30	25
Reliability	Number of hours unplanned downtime	10 hrs/year	5 hrs/year	3 hrs/year	1 hr/year

Figure 3-10: OV-1c Operational Performance Attributes

StV-4 Capability Cluster: The purpose of the MODAF StV-4 Capability Cluster View is to describe the relationships between capability elements as well as provide logical capability groupings. It is intended to analyse dependencies between capability elements and so, at this stage, can be partially developed to generate the high level cross-capability dependencies to provide context to the draft CONOPS.

This should be conducted in collaboration with the appropriate DECAs, as the DECAs will ultimately use this architecture View as part of the information gathering for their Capability Audit and Operational Analysis activities. At this stage the information will be an abstraction of the detail normally expected in the StV-4, but it will enable the cross-capability interaction to be identified at an early stage of the conceptual development.

Figure 3-11 shows an ISTAR related StV-4. It highlights that a reduced capability in Operational Information Acquisition might impact on the current capability in Effects, namely targeting and engagement planning, and also on information fusion. It similarly highlights that a reduced capability in Tactical Information Acquisition might impact on the engagement capability itself.

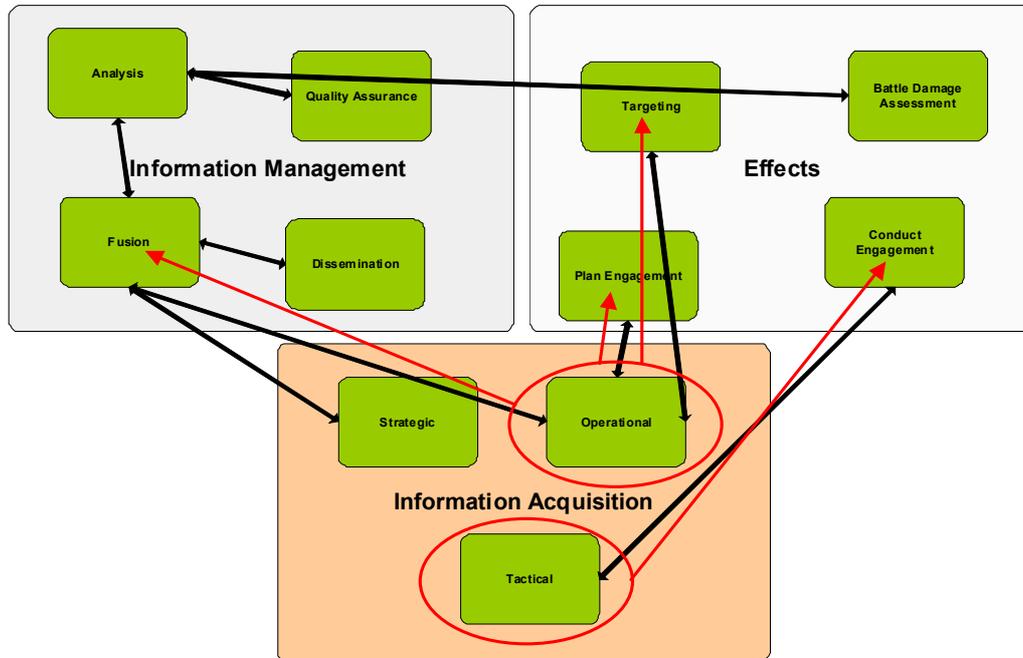


Figure 3-11: StV-4 identifying capability dependencies

In summary, the Concepts & Doctrine COI will already start engaging with the other COIs during the Analytical Concept stage of the process to initiate the development of supporting MODAF Views. The level of detail captured will be representative of the architecture maturity at this stage, however the information within the Views will provide an unambiguous perspective of the intent of the concept as it passes into the applied concept development stage. Figure 3-12 shows the key architectural outputs for the Analytical Concepts stage, StV-1 Capability Vision, and how these fit within the overall process.

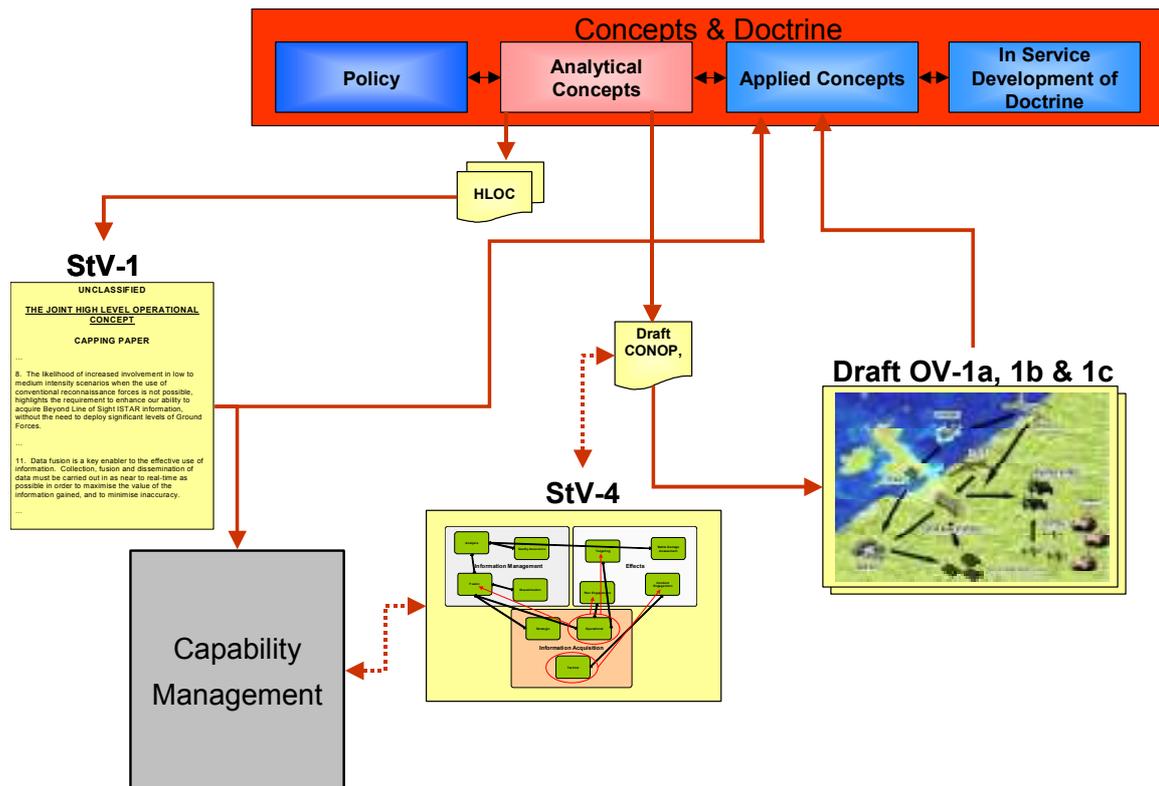


Figure 3-12: Key MODAF Relationships to Analytical Concepts Development

3.5 Applied Concepts

This section describes the use of MODAF for the Applied Concepts stage of Concept & Doctrine development. The key activities at this stage that may be helped by use of MODAF are:

- Capability Selection and Endorsement
- CADMID Validation and Oversight
- LOD Oversight

Applied Concepts are those that are put to practical use by capability developers. Their focus is the 5-15 year timeframe (Epochs 1 and 2) and fall they into three broad categories¹⁴:

- **Concept of Operation (CONOPS).** CONOPS describe how a range of (future and where necessary extant) capabilities is used in a future operational context to solve a particular problem or capability gap. CONOPS are refined and validated by concept development work and, at the time of their endorsement by PPSG, will have demonstrated sufficient maturity to stand as guidance to the Defence Planning and EC communities. JDCC Joint and environmental staff are responsible for the generation of the majority of CONOPS.
- **Concept of Employment (CONEMP).** A CONEMP is the Applied Concept of employment for a specific capability within a range of operations or

¹⁴ Draft JDCC Concept Handbook - Chapter 3.

scenarios; its focus is Epochs 1-3 and it will be produced by Joint and single-Service 2nd Customer.

- **Concept of Use (CONUSE).** A CONUSE describes the way in which specific equipment is to be used in a range of operations or scenarios.

3.5.1 Capability Selection and Endorsement.

This is the 5th Step in the 7-Step process, taking the draft CONOPS for selection and endorsement by the PPSG on the basis of operational effectiveness, affordability, delivery and time. The endorsed CONOPS output from this step is a genuinely Applied Concept that stands as guidance to programmers and capability development staffs by assessing Defence Programming implications, and will feed directly into the conceptual phase of the CADMID/CADMIT cycle. However PPSG endorsement at this stage does not imply a commitment of EP or STP resources (which are subject to separate planning processes). One concept could potentially contain multiple capabilities and projects, and particular projects could derive provenance from a number of concepts. This complexity will be reflected in the associated CONEMP and CONUSE that are developed subsequently for the Assessment and Development phases of CADMID/CADMIT.

During this activity, MODAF Views will be passed between Concept development staff and the appropriate DEC in Customer 1, adding greater levels of detail to the initial draft CONOPS until it is sufficiently mature for presentation to the PPSG. At this stage, the original StV-1 generated in the Analytical Concepts stage may have been broken down by the Concepts development community into a series of new StV-1s, representing sub-concepts articulated in the parent strategic View. Consequently, a number of CONOPS may require development to reflect additional sub-concepts, and new information should be fed back to the concept originators to enable coherent revision of the initial conceptual work.

During this stage, the Customer 1 community will be deconstructing the StV-1 Capability Vision into an StV-2 Capability Taxonomy, for the process of identifying current and future capability requirements by epoch. The decomposition will add clarity and the necessary level of granularity to qualify the concept. Subsequent analysis and experimentation of the operational scenario or vignette by the Customer 1 community will add detail to the draft Operational Viewpoint suite. This is essential for the progressive development of the capability concept into information for subsequent use by the Acquisition Community and will result in a User Requirements Document (URD). (*Details of this process are covered in the MODAF Customer 1 Deskbook (MODAF-M07-021)*).

Collaboration between the two communities at this stage will be enabled through the exchange of MODAF Views with the implementation of MODAR under the IA. Revisions to the original data captured in the draft OV-1a, OV-1b and OV-1c will be further enhanced by the addition of two new operational Views – the OV-2 Operational Node Connectivity Description and the OV-4 Organisational Relationships Chart. These additional Views will make up the complement of the CONOPS Operational Viewpoint suite that will be further developed in subsequent stages to produce the CONEMP and CONUSE.

OV-2 Operational Node Connectivity Description: The OV-2 View defines the connectivity between operational nodes through the use of two separate Views that specify the required set of operational nodes, connectivity and need line information flows for the scenario or vignette. The OV-2a Operational Node Connectivity Specification (Figure 3-13) provides a graphical depiction of the

operational nodes (or organisations) depicting needlines between those nodes that have a requirement to exchange information. This View ensures that suppliers are aware of the operational communications and interdependencies that will underpin the success of the solution.

At this stage of the capability development, the OV-2a is the most likely choice for the OV-2, over the use of the OV-2b that provides the Operational Node Needline Specification. Sufficient technical information may not be available to support the development this View and is more likely to be developed further into the Assessment phase of the CADMID/CADMIT cycle.

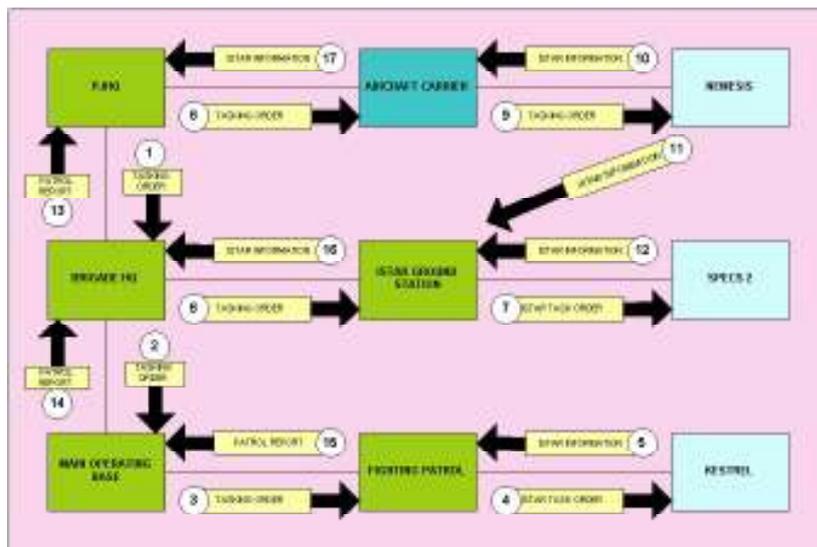


Figure 3-13: OV-2a Operational Node Connectivity Specification

OV-4 Organisational Relationships Chart: The nodes identified in the OV-2a will be further clarified in the OV-4 Organisational Relationships Chart (), which is used to illustrate the command structure and relationships between the human roles, organisations and organisation types that are key players for a concept. The make of these nodes can substantially alter the capability performance and specification depending on the roles of the formation elements employing the capability.

The relationships can include supervisory reporting, command and control relationships and command-subordinate relationships, as well as coordination relationships between equal organisations or individuals.

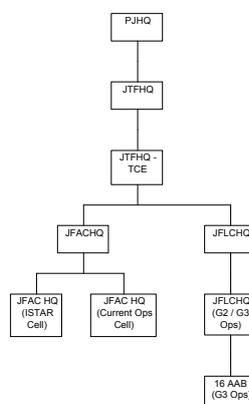


Figure 3-14: OV-4 - Organisational Relationship Chart - Global C2 hierarchy

3.5.2 CADMID Validation and Oversight / LOD Oversight.

These are the 6th and 7th steps in the Concept to Capability process and ensure that, during the delivery phase, capability development remains coherent with the extant concepts, as well as being delivered across all DLOD. The oversight and subsequent development of capabilities must be maintained through to acceptance into Service and throughout their in-service life.

Such oversight will be maintained by 2nd Customer Core Leaders and the Senior Responsible Officers (SRO), prior to the Front Line Commands assuming responsibility as 2nd Customer (Pivotal Management). Integral to these activities is the development and provision of high-level Joint and single-Service doctrine, ensuring interoperability and coherence across International, Joint and Single-Service domains. The specifics of this will be covered in the following section: In-Service Development of Doctrine.

Figure 3-15 shows the key architectural outputs for the Applied Concepts stage and how these fit within the overall process.

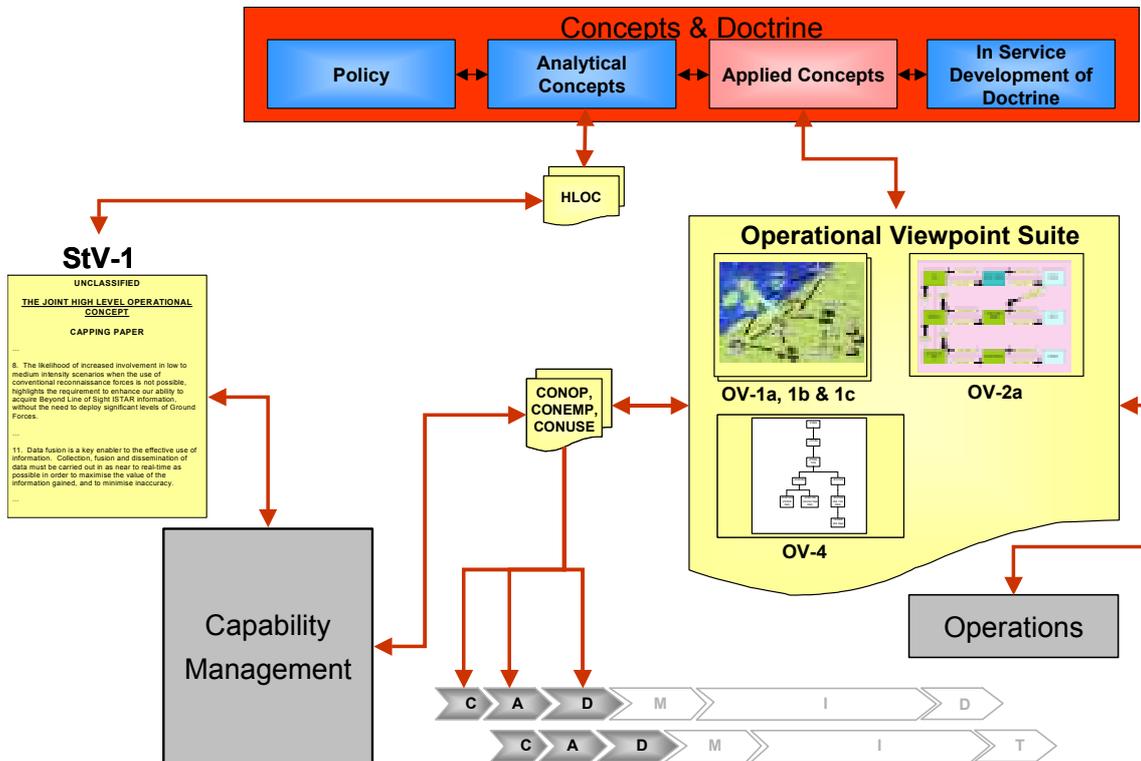


Figure 3-15: Key MODAF Relationships to Applied Concepts Development

3.6 In-Service Development of Doctrine

This section describes the use of MODAF for the In-Service Development of Doctrine. The four key development areas during this stage that may be helped by use of MODAF are¹⁵:

¹⁵ JWP 0-01 British Defence Doctrine (Edition 2) – Chapter 4.

- **NATO Doctrine:** NATO is the most important security arrangement for the UK and is the principle organisation through which the UK conducts military activities. A substantial amount of operational and tactical doctrine is produced by NATO, with all three Services using it for guidance as appropriate. The export of appropriate NATO Architecture Framework (NAF) Views into MODAR as MODAF-compliant Technical Views is one way that this doctrinal information can be mandated as standards for capability architectures.
- **Joint Doctrine:** This is articulated in the hierarchy of Joint Warfare Publications, with the British Defence Doctrine being the highest level of joint doctrine. It is focussed on the military strategic level of war. The principal operational level publication is the UK Operational Doctrine (UKOPSDOC). All Joint Doctrine publications can be captured for the purposes of MODAF as references within the content of the MODAF TV-1 Technical Standards Profile (), while emerging Joint Doctrine can be announced within the TV-2 Technical Standards Forecast ().
- **Higher Level Single Service Doctrine:** Both the Royal Navy and Royal Air Force produce higher level doctrine publications (*BR1806 British Maritime Doctrine* and *AP3000 British Air Power Doctrine*). Although they are oriented to their service, they deal principally with military strategic and operational level and are best described as single service perspectives on joint doctrine at those levels¹⁶. As with Joint Doctrine, these publications should be referenced within the appropriate TV-1 Technical Standards Profile for the architecture being developed.
- **Single Service Tactical Doctrine:** Some elements of tactical doctrine will, by their nature, be exclusively Single Service. They are the responsibility of the Single Service, but will be consistent with Joint Doctrine.

The development of doctrine during the in-service phase of the CADMID/CADMIT cycle will involve most of the MODAF COIs. High level strategic doctrine will be overseen by the JDCC and Single Service Concepts and Doctrine branches, while the development of operational and tactical doctrine will be led by the 2nd Customer Core Leaders with input from Pivotal Managers, Customer 1 and the Acquisition communities.

Key outputs from the operational and tactical level of doctrinal development will be the Tactics, Techniques and Procedures (TTPs) and Standard Operating Procedures (SOPs). While these textual outputs will, by their nature, be referenced using MODAF TV-1 Views, supporting MODAF Views can assist in providing capability operational detail. Specific MODAF Views that can be used for this include the underpinning OV-1, OV-2 and OV-4 Views developed to articulate the CONOP, CONEMP and CONUSE, and the supplementary operational Views: OV-3 Operational Information Exchange Matrix, OV-5 Operational Activity Model and OV-6a Operational Rules Model. These supplementary Views will not be developed specifically by the Concepts and Doctrine COI, but rather as the result of collaborative efforts between this community and all other parties to the capability delivery. However, in terms of specific doctrinal content, the OV-6a enables the extraction of detail from doctrine to constrain how a mission or operation will be conducted.

¹⁶ BDD serves the Army's needs for higher-level doctrine.

OV-3 Operational Information Exchange Matrix: This View (Figure 3-16) is used to detail the information exchanges, identifying *who* exchanges *what* information, with *whom* and *why* the information is needed and *how* the information exchange must occur. Certain attributes of the information exchange can be crucial to an operational activity and should be detailed as attributes of the View.

Needline ID	From	To	Content	Medium
1	PJHQ	BDE HQ	BDE TASKING ORDER	SAT COMM
2	BDE HQ	MAIN OPERATING BASE	BG TASKING ORDER	BOWMAN
3	MAIN OPERATING BASE	FIGHTING PATROL	PATROL TASKING ORDER	BOWMAN
4	FIGHTING PATROL	KESTREL	KESTREL TASK ORDER	UHF RX/TX
5	KESTREL	FIGHTING PATROL	TACTICAL ISTAR INFO	UHF RX/TX
6	BDE HQ	GROUND STATION	OPERATIONAL ISTAR TASK ORDER	BOWMAN
7	GROUND STATION	SPECS 2	SPECS 2 TASK ORDER	LINK 16
8	PJHQ	AIRCRAFT CARRIER	STRATEGIC ISTAR TASK ORDER	SAT COMM
9	AIRCRAFT CARRIER	NEMESIS	NEMESIS TASK ORDER	LINK 16
10	NEMESIS	AIRCRAFT CARRIER	STRATEGIC ISTAR INFO	LINK 16
11	NEMESIS	GROUND STATION	STRATEGIC ISTAR INFO	LINK 16
12	SPECS 2	GROUND STATION	OPERATIONAL ISTAR INFO	LINK 16
13	BDE HQ	PJHQ	BDE AFTER ACTION REPORT	SAT COMM
14	MAIN OPERATING BASE	BDE HQ	BG AFTER ACTION REPORT	BOWMAN
15	FIGHTING PATROL	MAIN OPERATING BASE	PATROL AFTER ACTION REPORT	BOWMAN
16	GROUND STATION	BDE HQ	OPERATIONAL ISTAR INFO	BOWMAN
17	AIRCRAFT CARRIER	PJHQ	STRATEGIC ISTAR INFO	SAT COMM

Figure 3-16: OV-3 articulating a Warfighting Scenario

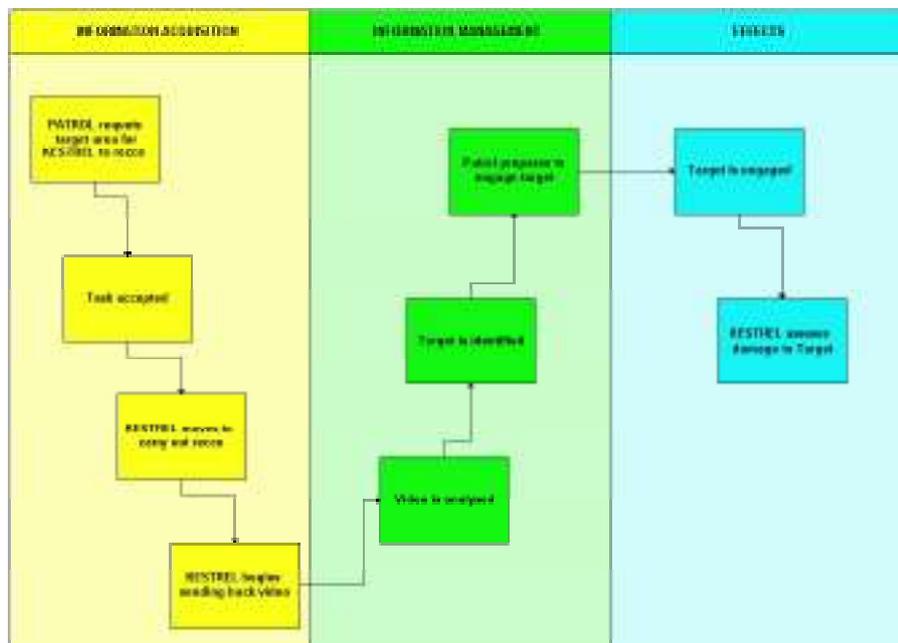


Figure 3-17: OV-5 articulating a Warfighting Scenario

OV-5 Operational Activity Model: The OV-5 View (Figure 3-17) is a key MODAF product for describing capabilities and relating them to mission accomplishment. It describes the operations that would be normally conducted during a mission and can be used to:

- delineate lines of responsibility for various activities when coupled with an OV-2;

- uncover redundant operational activities;
- flag issues or operational activities that need further scrutiny, and
- provide the foundation for depicting the sequence of activities and timing for the associated OV-6a.

OV-6a Operational Rules Model: The OV-6a View specifies operational rules that are constraints on an operation or mission. It is an important View inasmuch as it describes what *cannot* be done and what *must* be done. At a mission level, the OV-6a may consist of doctrine, guidance, rules of engagement and so forth. At an operational level, the View may include rules such as an OPLAN.

The detailing of the rules can be quite complex and the structure of the rules can be challenging. For the purposes of the Concepts & Doctrine community the rules language is likely to be English, and extracted source material will need to be structured to meet the View requirements. The rules are most likely to be constructed as Action Assertions, where the rule will either be a condition, and authorisation or a derivation.

Conditions use a statement (e.g. “If...Then...), where if the condition is met then this may signal further action assertions that may need enforcing or testing further. Authorisations confer certain actions to certain human roles, while derivations use a series of statements to compute a derivable fact (Figure 3-18).

A base fact could be:
 “Battle Damage Assessment consists of three activities: Conduct Battle Damage, Conduct Munitions Effects Assessment and Recommend Restrike.”

Derived Facts could be:
 “Recommend Restrike activity cannot be completed before a Battle Damage Assessment Report Has been completed.”
 “Recommend Restrike activity cannot be completed before a Munitions Effects Assessment has been completed.”

A derivation used to derive this derived fact above would be:
 A Restrike Recommendation is based upon facts contained in Battle Damage Assessment Reports and Munitions Effects Assessment Reports.

Figure 3-18: OV-6a Operational Rules Model – Action Assertion Derivation example.

Figure 3-19 shows the key architectural outputs for the In-Service Development of Doctrine stage and how these fit within the overall process.

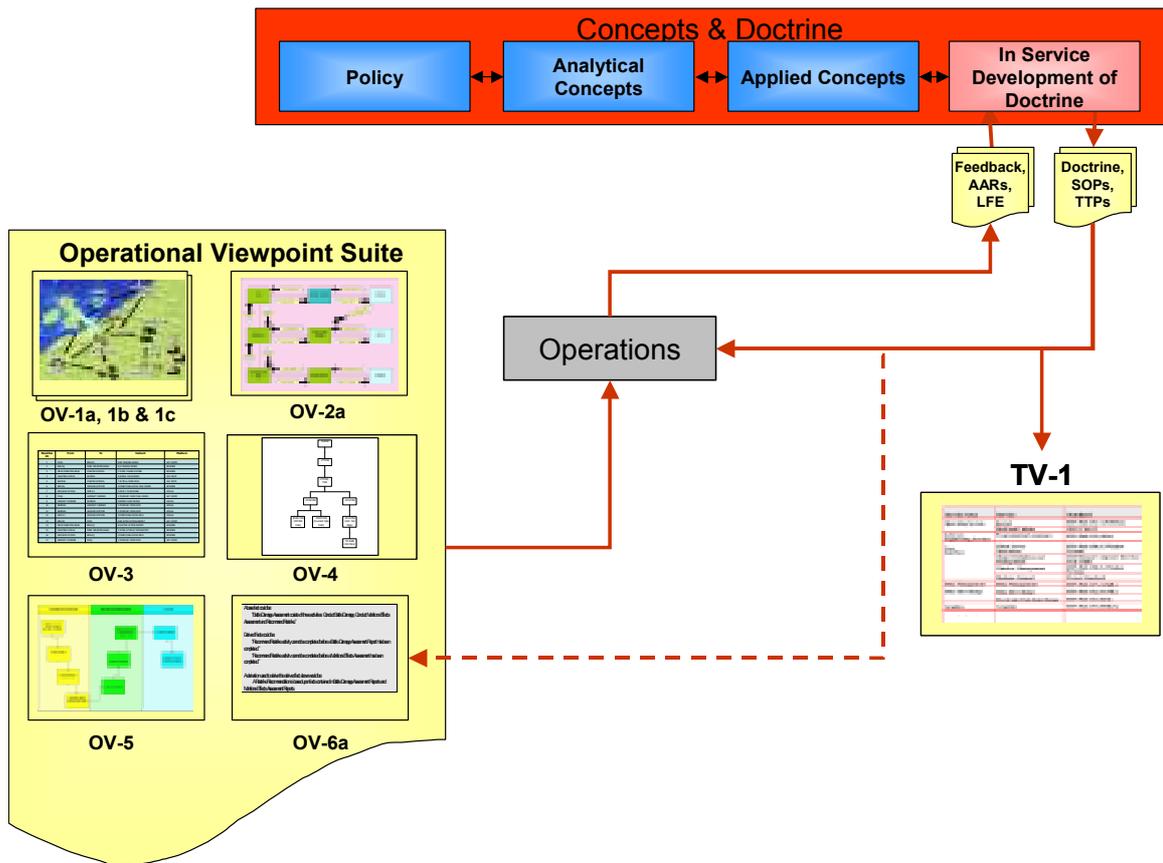


Figure 3-19 : Key MODAF Relationships to In-Service Development of Doctrine

4. Worked Example

This section will present a worked example of MODAF View development in the Concepts & Doctrine community. It is intended to add clarity, and realism, to the overview of the MODAF View relationship to the concepts and doctrine processes provided in the previous section.

This section will be updated once example material is available from the POET/Joint Fires MODAF pilot. For an example of what information this section will provide, please see section 4 of the Customer 1 Deskbook, available on www.modaf.com.

5. Document Maintenance

It is intended that the MODAF product suite will evolve through time in order to reflect learning from experience, changes to the MOD's processes and the evolution of architectural best practice. A change control process will be established for all MODAF products and suggestions upon the refinement / improvement of this and related products is welcome. The formal MODAF change control process shall be published in due course. In the interim, suggestions should be forwarded to the MODAF project manager:

EC CCII I2b

Tel: 0207 807 8884

Acknowledgements

This document has been developed by MODAF partners as part of the MODAF 1.0 Baseline that is being prepared by DEC CCII supported by the IA. Other organisations that have contributed to the content and / or review of this document are:

- DCBM(Army)
- DEC CCII Capability Strategy
- DEC UWE

The role of Industry is also acknowledged in providing support to the MODAF development and in reviewing the MODAF products prior to its release.

MODAF partners

The MODAF 1.0 Baseline has been developed for the MOD by MODAF partners. The MODAF partner's team leaders for this work have been:

Fariba Hozhabrafkan Cornwell Management Consultants Home Barn Court The Street Effingham Surrey KT24 5LG Tel: 01372 456086	Dave Mawby PA Consulting Group 123 Buckingham Palace Road London SW1W 9SR Tel: 020 7730 9000
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MODAF Concepts & Doctrine Process Diagrams

This Appendix provides the detailed process diagram (overleaf), as introduced in Section 3 of this Deskbook. The key to the Process / View mapping diagrams is as follows:

- **Activities** are shown as unshaded rectangles with the name of the activity inside the rectangle
- **MODAF Views** are shown as inputs and outputs:
 - Essential MODAF Views are shown as rectangular objects, colour-coded by Viewpoint as shown in Figure 2-1.
 - Highly desirable MODAF Views are shown as ellipse objects, similarly colour-coded by Viewpoint as shown in Figure 2-1.

