

Reorganising MODAF & NAF

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This paper outlines a new way of organising and classifying the MODAF and NAF views. It attempts to address two well-known issues with MODAF and NAF:

- **Inconsistent view numbering** – there is little or no correspondence between related view numbers across viewpoints – e.g. SV/NSV4 & OV/NOV5 are both process models but have different view numbers
- **Inappropriate viewpoint naming** – the operational viewpoint has always been a *logical* viewpoint, and the systems viewpoint covers human factors also

It is often remarked that these issues, combined with some misplaced views make MODAF and NAF very difficult to grasp for new users – for example OV-4 specifies human resource structures so should really belong on the SV/NSV viewpoint. Furthermore, MODAF and NAF use different naming conventions, as well as some other subtle differences. As the two frameworks are currently being harmonised to produce NAF v4, there will never be a better time to sort out the view structure.

The approach outlined in this paper re-organises the views whilst keeping the current MODAF/NAF viewpoints, albeit with names that better describe their purpose:

MODAF Name	NAF Name	New Name
Strategic (StV)	Capability (NCV)	Enterprise (E)
Service-Oriented (SoV)	Service-Oriented (NSOV)	Service (S)
Operational (OV)	Operational (NOV)	Logical (L)
Systems (SV)	Systems (NSV)	Resource (R)

These viewpoints form the vertical axis of a grid. The horizontal axis lists the common types of view that can exist at each level:

- Classification / Ontology – taxonomies of concepts such as capabilities, services, etc.
- Structure – how elements are assembled – enterprises, nodes, resources, etc.
- Connectivity – everything from high-level capability dependencies to detailed system connectivity
- Behaviour – how things work
 - Activities – process flows and decomposition
 - States – allowable state transitions
 - Sequences – how things interact and in what order
- Information – what information / data is used, and how it is structured
- Constraints – rules that govern the enterprise, nodes, resources, etc.
- Programme – project timelines and milestones affecting the elements in the architecture

The new approach is information-centric. It divides the framework up into categories of architectural information rather than how the information is presented. The grid acts as an entry-point to the framework, allowing users to select the correct view based on the type of information presented (horizontal axis), and the level of specificity (vertical axis).

The resulting grid is shown below, along with their corresponding MODAF/NAF codes:

	Behaviour								
	Classification	Structure	Connectivity	Processes	States	Sequences	Information	Constraints	Programme
Enterprise	E1 Capability Taxonomy <small>NAV-2, NCV-2 AV-2, SV-2</small>	E2 Enterprise Vision <small>NCV-1 SV-1</small>	E3 Capability Dependencies <small>NCV-4 SV-4</small>	E4 Standard Processes <small>NCV-6 SV-6</small>	E5 Effects		E7 Performance Parameters <small>NCV-1 SV-1</small>	E8 Planning Assumptions	Ep Capability Phasing <small>NCV-3 SV-3</small>
Service	E1-S1 (NSOV-3) S1 Service Taxonomy <small>NAV-2, NSOV-1 AV-2, SOV-1</small>		S3 Service Interfaces <small>NSOV-2 SOV-2</small>	S4 Service Functions <small>NSOV-3 SOV-5</small>	S5 Service States <small>NSOV-4b SOV-4b</small>	S6 Service Interactions <small>NSOV-4c SOV-4c</small>	S7 Service I/F Parameters <small>NSOV-2 SOV-2</small>	S8 Service Policy <small>NSOV-4a SOV-4a</small>	Sp Service Delivery
Logical	L1 Node Types <small>NAV-2 AV-2</small>	L2 Logical Scenario <small>NOV-2 OV-2</small>	L3 Node Interactions <small>NOV-2, NOV-3 OV-2, OV-3</small>	L4 Logical Activities <small>NOV-5 OV-5</small>	L5 Logical States <small>NOV-6b OV-6b</small>	L6 Logical Sequence <small>NOV-6c OV-6c</small>	L7 Logical Data Model <small>NSV-11a OV-7</small>	L8 Logical Constraints <small>NOV-6a OV-6a</small>	Lp Lines of Development <small>NPV-2 AcV-2</small>
Resources	R1 Resource Types <small>NAV-2, NSV-9 AV-2, SV-9</small>	R2 Resource Structure <small>NOV-4, NSV-1 OV-4, SV-1</small>	R3 Resource Connectivity <small>NSV-2, NSV-6 SV-2, SV-6</small>	L4-R4 (NSV-5) R4 Resource Functions <small>NSV-4 SV-4</small>	R5 Resource States <small>NSV-10b SV-10b</small>	R6 Resource Sequence <small>NSV-10c SV-10c</small>	R7 Physical Data Model <small>NSV-11b SV-11</small>	R8 Resource Constraints <small>NSV-10a SV-10a</small>	Rp Configuration Management <small>NSV-8 SV-8</small>
Deployed	D1 Master Data <small>NAV-2 AV-2</small>	D2 Deployed Resources <small>NCV-5, NOV-4 SV-5, OV-4</small>							Dp Deployment Schedule <small>NCV-5 SV-5</small>
Architecture	A1 Meta-Data Definitions <small>NAV-3 AV-1/2</small>	A2 Architecture Products	A3 Architecture Correspondance <small>ISO42010</small>	A4 Methodology Used <small>NAF Ch3</small>	A5 Architecture Status <small>NAV-1 AV-1</small>	A6 Architecture Versions <small>NAV-1 AV-1</small>	A7 Architecture Meta-Data <small>NAV-1/3 AV-1</small>	A8 Standards <small>NTV-1/2 TV-1/2</small>	Ap Architecture Plan

Most MODAF/NAF views fit neatly into one cell. However, because the grid is based on the type of information, rather than how it is presented there are cases where a cell covers more than one view (usually this is where there is a graphical view and a tabular one showing the same information).

In some cases, there are no corresponding views. Most of these are left blank on the grid, recognising there is no current requirement in NAF for this information. There are two cells (E5 & Sp) where there is meta-model coverage, but no equivalent view in the current MODAF and NAF specs. There are some views missing also – notably the technology and standards forecasts, and the AV-1. These views are important, and ways to incorporate them in NAF v4 are being investigated.

In order to deal with concepts such as actual organisations and fielded capabilities, the grid approach also introduces a *Deployed* layer. Although there is little coverage of individual people, equipment, etc. in MODAF and NAF, the MODEM meta-model has more detail in this area. This could potentially lead to new Deployed views being introduced in subsequent versions of NAF. There is also an *Architecture* layer for capturing various information pertaining to the AV-1 view and ISO42010.

Finally, some MODAF/NAF views existed only to document the mapping from one layer to another. These are shown as interstitial views (E1-S1 and LR-R4) in the grid.

In summary, the grid approach gives NAF a more logically organised set of views. The structure is easier to remember, and more importantly, easy to grasp at first sight. It helps defuse any tension over MODAF vs NAF naming conventions, and makes clear the existing MODAF/NAF layered approach. Furthermore, the MODEM meta-model proposed for NAF v4 defines common patterns that closely correspond to the grid columns that are then specialised for use at each layer. The combination of MODEM and the grid layout puts NAF on a much sounder foundation.

For detailed information on each view, please refer to <http://nafdocs.org>

Frequently Asked Questions

Why do we have all these new layers ?

The enterprise, service, logical and resource layers already existed in MODAF and NAF, so are not new. Some of the NAF 3.1 and MODAF 1.2 views made reference to deployed elements – e.g. OV-4/NOV-4 actual and StV-5/NCV-5 so it made sense to have a layer to cover this. The architecture layer is really not new either – it simply breaks the AV-1 down into sections for meta-data, methodology, etc.

Why is the operational viewpoint now called “logical” ?

The purpose of the OV/NOV viewpoint was to provide a logical, non-solution, specification of the architecture. This has been true since the beginning for MODAF, and therefore has also been the case since v3 of NAF. Version 1 of DoDAF was also clear about the OV being a logical specification.

If OV is now “logical”, where do I put my business architecture ?

Again, this hasn't really changed. The logical requirement for your business and technology is specified in the Logical layer. The solution (human and non-human resources and their functions) is specified in the Resource layer. MODAF 1.2 and NAF 3 also followed this principle. However, OV-4 was something of an anomaly and belongs in the Resource layer.

Why is there no layer for the Human Factors Views ?

Since MODAF v1.1 (and NAF v3) the systems views (proposed to become the Resource layer) covers everything required for the Human Factors Views. This has been confirmed by the developers of the human factors views. The authors are currently looking into the feasibility of publishing their work as a handbook that specifies how to use the existing NAF views to support human factors.

What if I want to use a different stack, for example MDA (Model-Driven Architecture) ?

MODAF and NAF are built on the principle of the abstraction layers shown in the grid – nothing has really changed there other than the addition of the deployed layer. It is possible to do MDA with MODAF, but as with the Human Factors approach, this is methodological. It would be more appropriate to develop NAF guidance on how to use the existing views in an MDA process.

What about the security views ?

UK MOD and GCHQ have conducted a great deal of research into representing security in MODAF and NAF. As a result of this work, some new features were added to the meta-model in version 1.2 (and therefore into NAF 3.1). The MODAF documentation was changed to show how the existing views could be used for domain based security and entity trust models. Chapter 4 of NAF was never updated in this way (in fact, ch4 was never aligned with the NMM since the beginning). There has been some excellent work done in Canada and Switzerland that may result in further additions to the framework and meta-model.

Why is Service a layer ?

The short answer to this is that it always has been, at least since MODAF 1.1 and NAF v3. NATO's overriding requirement for SOA was that the same meta-model elements could be used for specifying business services and technical services. The NATO/MODAF service views were based on the OASIS service reference model. It is important not to conflate the service specification (which belongs in the service layer) with how it is implemented (resource layer) and how services are orchestrated to meet a requirement (logical layer).

Why didn't you just use the Zachman grid ?

The MOD conducted a study into this in 2010. The existing MODAF and NAF views did not map cleanly onto the Zachman grid. If Zachman were to be used as the basis for MODAF/NAF, it would require significant changes to the meta-model, with resulting impact on tools and existing architectures.

What if I want to use a Resource in the Logical layer ?

The guiding principle of each layer is that the layer above should not depend on the layer below – that way re-use of enterprise and logical architectures is encouraged. However, since MODAF 1.2 (NAF 3.1) it has been possible to refer to known resources in OV-2 (L2 in the grid) – this is particularly useful for brown-field architectures.

My understanding of “capability” is different to yours

When MODAF was developed, it was clear there were at least three different senses to the term “capability” as it was used in defence acquisition. The broadest sense is about an ability to achieve something, and this is called <<Capability>> in M3/NMM/MODEM. Then there is the configuration of resources (systems and people) that can deliver a capability – i.e. a design. This is called <<CapabilityConfiguration>> and belongs in the Resource layer, but traces up to the Enterprise layer. Finally, there is <<FieldedCapability>> which refers to a physical (e.g. serial numbered) instance of a <<CapabilityConfiguration>>. There are also Nodes, in the Logical layer, which are elements of capability in a particular logical scenario. Just to stress this again; NONE OF THIS HAS CHANGED. The grid just follows the principles that are clearly set out in MODAF and NAF.

Where are the Technical Views ?

There never have been any technical views in MODAF or NAF. The TV/NTV (technical standards) views are about specifying standards that apply throughout the architecture. You'll find them in the *Architecture* view. If you want to model technology, use the SVs (or Resource layer in the grid).

I want my own grid

Cool. However, recognise that the grid structure described here is *inherent* to MODAF and NAF and has been since NAF v3. Any other grid is likely to be for a particular purpose and as such belongs in a methodology document. It would be great to have a collection of methodologies for different purposes on the NAF website, and national contributions will be greatly appreciated.