28 June 2013   NC3B ArchitectureCaT-M7-GBR-IP02
NAF Enhancement

INFORMATION PAPER
Enhancement of the NATO Architecture Framework

References:
(A) AC/322-D(2007)0048 NATO Architecture Framework V3.
(B) NC3B ArchitectureCaT-GBR-WP01 submitted at Meeting 6, ACT TIDESPRINT, at the JWC in Stavanger.
(C) NC3B ArchitectureCaT-M7-GBR-IP01

INTRODUCTION

1. Earlier this year the UK informed NATO and the Nations of its intentions to migrate from MODAF to NAF and offered to undertake the alignment of NAF with the IDEAS principles. The proposed approach and schedule were published as References B and C.

UPDATE

2. The UK MOD has commissioned a small contracting team to undertake the majority of the envisaged work. As part of this, Ian Bailey and Rachel Moore have been engaging with a number of national representatives who have offered their assistance.

3. The UK is pleased to inform the nations that a first report on the potential impact of MODEM / NAF has now also been completed and which is herewith attached.

REQUEST

4. NATO, Commands and Nations are cordially invited to review this document and to forward comments or request for clarifications to Patrick Gorman (UK MOD CTO) or Rachel Moore (rachel.moore@atkinsglobal.com).

SSAC Task 83

NATO Architecture Framework – MODEM Review

Draft v0.2

19 June 13

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Approvals Table

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Reference		Date		Version	

Review Table

Change No	Revision No Incorporating Change	Originator	Date	Description

Ownership

This document is owned and updated by Rachel Moore SOSA Task 83 Lead and reviewed by Kees van Haperen prior to submission to EG.

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Introduction

This report outlines a review of the NATO Architecture Framework (NAF v3.1) comparing it with the MODEM ontology. The purpose of the comparison is to identify any issues that may arise by replacing the NAF Meta-Model with the MODEM (the new MODAF meta-model). The criteria for the comparison were:

- What is the impact on tools of replacing NMM with MODEM?
- What is the impact on existing NAF architectures of replacing NMM with MODEM?
- What are the consequences to UK MOD of moving to NAF (updated with MODEM)?
- What improvements / corrections are required in NAF?
- What, if any, changes are required to MODEM to fit with NAF?

NAF and MODAF have shared a common meta-model for some time. The NAF Meta-Model (NMM – Chapter 5 of the NAF Specification) is the same as v1.2 of the MODAF Meta-Model (known as M3). MODAF has had one minor update since the last release of NMM so the meta-models are slightly different in some areas. The UK MOD and Swedish Armed Forces have together developed a replacement for M3, known as MODEM (the MODAF Ontological Data Exchange Mechanism). MODEM was developed by re-engineering v1.2.004 of the MODAF Meta-Model and has been designed to replicate all the functionality of M3. MODEM is backwards compatible with M3/NMM in terms of functionality, but the structure of the model is different – i.e. there is no syntactic compatibility between them. Wherever possible, MODEM has attempted to keep the M3/NMM terminology.

MODEM has been proposed to NATO as a successor to NMM as part of a broader plan to release a new version of NAF. The current NAF documentation has been recognised as being out of date, inconsistent and internally contradictory. The UK MOD and Swedish Armed Forces have proposed:

1. to offer MODEM as a baseline meta-model for NAF v4 (i.e. to be Chapter 5)
2. to offer the current MODAF documentation to replace the current NAF Chapter 4
3. a new grid structure for the NAF views (which has become known as the periodic table approach because of its pictorial similarity to Mendeleev's Periodic Table)

Apart from minor version differences in the meta-models, the main differences between NAF and MODAF are around the view structure, naming and documentation. NAF uses different view codes to MODAF. NAF has some additional views to MODAF, but there are also some cases where views that use the equivalent code / number have different purposes. The view naming and numbering in DoDAF, NAF and MODAF has always been something of an issue, hence the suggested adoption of the "periodic table" approach.

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Summary

Most of the issues uncovered in this study are around Chapter 4 of NAF – the chapter that documents the views. This chapter has had multiple editors and was not entirely developed with Chapter 5 (the NAF Meta-Model) in mind. Furthermore, Chapter 5 has been revised since Chapter 4 was released, but there have been no corresponding updates to Chapter 4. As a result, it has a number of issues, summarised as follows:

- It references an alternative meta-model (originally specified in the now defunct Chapter 3). This has the potential to confuse and mislead tool vendors and architects.
- It features examples from old DoDAF documentation that neither follow the intent of NAF nor comply with the NAF Meta-Model
- It contains NATO-specific guidance on content of architectures that may not be applicable to all member nations (particularly for non-NATO work)

These issues have a strong bearing on the impact of adopting MODEM. If tools and architectures have followed the NMM, then the impact of adopting MODEM is minimal. If tools have been developed using Chapter 4 instead of Chapter 5, then there could be very significant impact. This is summarised below:

Architect used: Tool based on:	Chapter 4	Chapter 5 (NMM)
Chapter 4	Significant compatibility issues. Architectures and tools likely to require re-work.	Tool will have to be re-developed. Architect is likely to have produced a non-compliant (NMM) architecture without even knowing.
Chapter 5 (NMM)	Tools should have hopefully kept the architect on the straight-and-narrow. May still need some re-work to architectures.	Any issues likely to be cosmetic or syntactic.

Figure 1 - High Level Impact Analysis

Even in the best-case scenario, a movement to MODEM will mean some minor changes, though these are likely to be cosmetic.

The view naming and numbering inconsistency between NAF and MODAF needs to be resolved. As NAF currently stands, the view contents don't always follow the strategic-logical-physical stratification as modelled in NMM. MODAF is also not perfect in this regard, still having StV-6 (should be OV) and OV-4 (should be SV). A move to the periodic table approach would at least provide a consistent and logical layout for these views. However, as raised by the Swiss NAF users, this will also mean that users need to re-learn the numbering.

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Recommendations

Without knowing whether tools were implemented based on Ch4 or Ch5, it is hard to assess the impact of moving to MODEM. If the tools were based on Ch5 (NMM), as they should have been then the impact will be low in the most part. It is highly recommended therefore that tool vendor engagement begin as soon as possible. Furthermore, the impact on legacy architectures is equally hard to gauge, again due to the discrepancies between Ch4 and Ch5. It also recommended, therefore, that a brief survey of the main (in-use) NAF architectures is undertaken to ascertain the compliance with NMM.

Aside from the above recommendations, there are some specific actions arising from this review.

MODEM Actions

1) Look into simplifying the resource structure approach currently in use in MODEM
2) NAF does service orchestration using processes *and* sequence diagrams. Investigate what is needed in MODEM to support this.
3) Assess level of effort required to cover BPMN functionality in MODEM

NAF Actions

1) The running example is a really useful feature. It should be updated in accordance to the new meta-model
2) Ensure terminology throughout the documentation matches MODEM (if this is to be adopted by NAF) and also that it follows ISO42010 wherever possible.
3) Produce simplified version of MODEM for each view to replace the currently misleading "Supporting NNEC Architecture Elements" in Chapter 4.

Issues

Major Issues

Chapter 4 is not well aligned with Chapter 5. The main risk from this is that NAF tools may have been developed using Chapter 4 as the basis. There is also a risk that even an NMM compliant tool may have been used by an architect who has based their work on Chapter 4. The impact of this should be less, as the tool should prevent too much incorrect data being created.

Chapter 4 does not account for the way in which NAF (and MODAF) are intended to be used. The document is based on old DoDAF documentation, "enhanced" with references from Chapter 3 and some excerpts from old MODAF documentation. The strategic-logical-physical (NCV-NOV-NSV) stratification is not mentioned, and the documentation around the NSVs is highly misleading. This may have resulted in tools and architectures that do not follow the approach.

The Ch4 view documentation makes reference to "Supporting NNEC Architecture Elements" which appear to be from the now obsolete chapter 3. If a tool vendor has based their implementation on this, there could be significant compatibility issues for MODEM. However, it should be noted that such a tool would not be compatible with the existing NAF Meta Model (NMM – Chapter 5). In the case where a tool is based on Ch5, but architects have used Ch4, there may be issues, though these are likely to have been ameliorated by the tool.

Minor Issues

NAF has not used the ISO42010 naming convention for views, viewpoints, etc. Following this standard would open up the use of NAF to a wider community.

When NAF, DoDAF and MODAF were first developed, BPMN did not exist. This is now the de-facto business modelling notation, but there has never been any attempt to formalise how this fits into the frameworks and meta-models.

NAF Ch4 is overly prescriptive in many areas, enforcing NATO and NCIA concepts, and encroaches on methodology. This may make the framework harder to adopt for some of the nations who wish to use it for non-NATO work.

All Views (NAV)

General Comments

Chapter 3 Artefacts in Chapter 4

Chapter 3 has been selected for removal from NAF. However, Ch4 contains references to a number of the elements defined in Ch3's alternative meta-model. If tools have been developed around this spec, and architecture built using those elements then there may be serious impact in migrating. That said, those architectures will already be non-compliant with NAF v3.1 as they do not conform to the Ch5 meta-model. It is recommended that some investigation is carried out as to how NAF tools and architecture have been built.

NAV-1

Impact on Tools

The NAV-1 section of MODEM is based on ISO42010 to a much greater extent than NMM/M3, as this was a requirement from SwAF. Some tools are already based on IEEE1471/ISO42010, and even where not, most architects could live without the 42010 features.

Impact on Legacy Architecture

NAF defines key meta-data elements in NAV-1:

- *Architecture Project Identification* – *Identifies the architecture project name, the architects, and the organisation developing the architecture. It also includes assumptions and constraints, identifies the approving authority and the completion date, and records the level of effort and costs (projected and actual) required to develop the architecture.*
- *Scope* – *Identifies the views and subviews that have been developed and the temporal nature of the architecture, such as the time frame covered, whether by specific years or by designations such as current, target, transitional, and so forth. Scope also identifies the organisation that fall within the scope of the architecture.*
- *Purpose and viewpoint* – *Explains the need for the architecture, what it will demonstrate, the types of analyses (e.g., Activity-Based Costing) that will be applied to it, who is expected to perform the analyses, what decisions are expected to be made on the basis of an analysis, who is expected to make those decisions, and what actions are expected to result. The viewpoint from which the architecture is developed is identified (e.g., planner or decision maker).*
- *Context* – *Describes the setting in which an architecture exists. Context includes such things as: mission, doctrine, relevant goals and vision statements, concepts of operation, scenarios, information assurance context (e.g. types of system data to be protected, such as classified or sensitive but unclassified, and expected information threat environment), other threats and environmental conditions, and geographical areas addressed, where applicable. Context also identifies authoritative sources for the rules, criteria, and conventions that were followed.*
- *Tools and File Formats Used* – *Identifies the tool suite used to develop the architecture and file names and formats for the architecture and each product.*
- *Findings* – *States the findings and recommendations that have been developed based on the architectural effort. Examples of findings include: identification of shortfalls, recommended system implementations, and opportunities for technology insertion. During the course of developing an architecture, several versions of*

a product may be produced. An initial version may focus the effort and document its scope, the organisation involved, and so forth. After other subviews within an architecture's scope have been developed and verified, another version may be produced to document adjustments to the scope and to other aspects of the architecture that may have been identified. Costing information, such as integration costs, equipment costs and other costs can be included in the findings.

It may be that existing architectures have therefore completed all these sections. They can all be covered by MODEM using the generic meta-data functionality, and some of these elements are covered specifically. However, users might want to see all of these itemised out specifically in the meta-model and currently that is not the case. If the MODAF documentation is used for Ch4, this may be less of an issue. Also, MODEM copies NMM in this area, so if the architectures are NMM compliant it shouldn't be an issue.

Other Issues
None

Recommended Action
Provide guidance in Ch4 on ISO42010 aspects. Provide Ch4 guidance on how to use the generic meta-data functionality in MODEM.

NAV-2

Impact on Tools
Minimal provided they already implement NMM/M3 as functionality is broadly similar.

Impact on Legacy Architecture
Minimal provided they were developed according NMM/M3 as functionality is broadly similar.

Other Issues
Ch4 discusses definitions for elements. It may be worth putting the description model from IDEAS into NAV-2 section of MODEM.

Recommended Action
Make naming and description pattern (from IDEAS Foundation) explicit in MODEM.

NAV-3

NAV-3 is not in MODAF (meta-data is covered in AV-1 and applicable throughout). NAV-3b is covered, but the NAV-3a compliance statement is not explicitly modelled in MODEM (nor was it in M3/NMM).

Impact on Tools
None – the meta-data functionality is already in MODEM.

Impact on Legacy Architecture
None – should be compatible with MODEM approach.

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Recommended Action

Use current AV-1 Meta-Data Section in MODEM for NAV-3. Ask NAF user community about whether / how they use NAV-3a – if it is widely used there may be a case for modelling this explicitly in MODEM.

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Capability Views (NCV)

General Comments

NCV-1 Capability Vision

The NCV-1 spec in Ch4 appears to be based on a very old MODAF document and example. This needs to be updated to make it compliant with NMM/M3, at which point it should also cover most of MODEM.

MODEM also introduces some more detail in NCV-1, such as phases of enduring task, and measures of enterprise capability.

Impact on Tools

If the tools have followed Ch4 rather than Ch5 then there could be significant impact, depending on how it was implemented. The text might just map onto Enterprise visions and goals in some tools which would mitigate any impact.

Impact on Legacy Architecture
If the architectures have followed Ch4 rather than Ch5 then there would need to be updates made. As the new features are additive, it may be possible to extend what is already there.

Other Issues
None

Recommended Action
Consult NAF users about whether they have used NMM or Ch4 as the basis for their work. If it's Ch4, there may be some re-work needed on both tools and architectures.

NCV-2 Capability Taxonomy

Impact on Tools
None immediately, but they may wish to add new MODEM features such as measures of effectiveness in future versions.

Impact on Legacy Architecture
None – MODEM differences are additive.

Other Issues
Ch4 documentation of NCV-2 is a little out of date.

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Recommended Action
Update Ch4.

NCV-3 Capability Phasing

Impact on Tools
None

Impact on Legacy Architecture
None

Other Issues
Ch4 entry for NCV-3 mentions service phasing as well as capabilities. This is not in MODEM or MODAF.

Recommended Action
Investigate adding service phasing to MODEM. This should work well if the periodic table approach is taken, also.

NCV-4 Capability Dependencies

Impact on Tools
None

Impact on Legacy Architecture
None

Other Issues
This view could be interpreted ambiguously in MODAF, therefore consideration should be taken in either deleting / revising the view if it is not used in NAF also. Documentation in Ch4 appears out of date.

Recommended Action
Discuss usage and whether it actually plays a useful role in its current form. If the periodic table approach is adopted, the decision as to whether this view exists in its own right would be down to whether the structure/connectivity column is split into two.

NCV-5 Capability to Organisation Deployment Mapping

Impact on Tools
None

Impact on Legacy Architecture
None – may be worth investigating if this view is actually used anywhere

Other Issues
The documentation in Ch4 looks a little old. This is another view that is rarely used (if at all) in MODAF. It would be interesting to know if it's being used in NATO.

Recommended Action
None

NCV-6 – Capability to Operational Activity Mapping

There is a problem with this view being used for the purpose indicated by its title. MODAF is designed with a tiered set of views starting at the most abstract (strategic / NCV) down to systems. For the more abstract viewpoints to be useful to more than one architecture, they should have no content that depends on more detailed tiers. In this case, the use of operational activities in NCV-6 could prevent more than one operational architecture re-using a given set of capabilities.

MODAF fixed this problem ensuring StV-6 could only refer to *standard* (i.e. doctrinal) operational activities.

Impact on Tools
Could be significant for MODAF users if NCV-6 stays as it is.

NMM is the same as M3 in this respect, so the current Ch4 documentation does not map well onto the meta-model.

Impact on Legacy Architecture
Could be significant for MODAF users if NCV-6 stays as it is. Existing NAF architectures could be migrated to the MODAF approach of tracing capabilities through Nodes to Activities.

Other Issues
None

Recommended Action
Revise NAF along the lines of MODAF. If the periodic table approach is adopted, this would simply become the process view at the enterprise level.

NCV-7 – Capability to Services Mapping

This presents the same problem for MODAF users as NCV-6 did. A strategic view should have no knowledge of services. The capabilities from the strategic views are there to be reused in the service views. This view is SOV-3 in MODAF.

Impact on Tools
Minimal, as this is really just a question of where the view resides rather than any fundamentally different usage of the meta-model.

Impact on Legacy Architecture
This should just be a case of view renaming.

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Other Issues

MODEM appears to be missing *templateForTask,* which maps an enduring task to a group of activities used to model that task (it is OV-5, however). Care would be needed here, as it would only be allowed for Standard Operational Activities. May be best left out, if in doubt.

Recommended Action

Fix Ch4 so that this view belongs in the SOVs. If the periodic table approach is adopted, this will be an interstitial view between cells.

Operational Views (NOV)

General Comments

NOV-1 – High Level Operational Concept Description

Impact on Tools
Most tools have traditionally implemented this view as a picture. Since MODAF v1.1 it has been possible to use architectural elements in an OV-1, each with their own OV-1 specific bitmap image – e.g. you could re-use an artefact from SV-1 and display it as an image of a tank. Few tools implement this feature. For those that do, the MODEM approach is not drastically different in structure, but it uses the SVG (scalable vector graphics) standard.

Impact on Legacy Architecture
Assuming most, if not all, are simple images there should be no impact.

Other Issues
The SVG approach in MODEM has not been tested in any tools. It would be useful to engage with some tool vendors to test that part of the model.

Recommended Action
Engage with tool vendors as stated above.

NOV-2 – Operational Node Connectivity Description

Impact on Tools
The MODEM approach is broadly similar to M3/NMM except that there is now no NodeType – there are just nodes and exchanges between them. As most tools will have implemented something based on their internal meta-models, this is unlikely to be an issue.

Impact on Legacy Architecture
The Ch4 documentation uses old DoDAF examples that don't really support the intent that Nodes are logical elements of capability. It may be that this has resulted in a number of NAF architectures that may not be following the intent of NOV-2.

Other Issues
Ch4 documentation does not map well onto existing NMM and will need updating. MODEM also introduces capability measures for Nodes (implicit before in M3/NMM, now explicit) and this should be reflected in the documentation and examples.

Recommended Action
Update Ch4 documentation to reflect logical aspect of NOV-2, and the recently added material flows etc.
Ask NATO to examine a sample set of NOV-2 products to check how they have been developed.

NOV-3 – Operational Information Requirements

Impact on Tools
The impact will be similar to NOV-2.

Impact on Legacy Architecture
As with NOV-2 this will depend on whether architects have kept the operational architectures at a logical, solution-independent level.

Other Issues
None

Recommended Action
See NOV-2 actions.

NOV-4 –Organisational Relationship Chart

Impact on Tools
None/minimal.

Impact on Legacy Architecture
None/minimal

Other Issues
Unlike MODAF, NAF does not seem to distinguish between typical and actual organisation structures. This would be solved by moving to the periodic table approach.
The MODEM model for resources (also used in SVs) is somewhat complex. The migration to NAF may present an opportunity to fix this.

Recommended Action
Update Ch4 documentation.
Look into simplifying SV-1/OV-4 part of MODEM.

NOV-5 – Operational Activity Model

Other Issues
As in NOV-2/3, there is no mention of logical architectures in Ch4.

Recommended Action
Ch4 requires significant editing.
The use of BPMN was mentioned by a couple of presenters at the NATO IST Symposium in Toulouse. It may be worth considering how BPMN could be mapped onto MODEM – if not in the first release, then it should be a priority for the next release.

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NOV-6 – Operational Activity Sequence & Timing Description

Impact on Tools
Little or none unless they have implemented Petri Nets as suggested in the Ch4 documentation. UML tools would struggle with the state model in MODEM, but they should be implementing UPDM instead.

Other Issues
The name of this view seems to be incorrect – or at least not in line with the intent of the framework and meta-model.
Petri nets are mentioned in Ch4, but neither the NMM nor MODEM support them. It also mentions how 6b and 6c can be used together, but the UML meta-model pretty much separates them, and therefore so does NMM.

Recommended Action
Ch4 requires significant editing – examples, in particular, are poor.

NOV-7 – Information Model

Impact on Tools
Slight / none

Other Issues
It is not clear how an information model differs from a logical data model. There is a disconnect here with MODAF and the NMM.

Recommended Action
Ch4 needs some attention. Issue of conceptual vs logical should be sorted if the periodic table approach is used.

Service Oriented Views (SOV)

General Comments

The NATO SOA views were developed in NATO then later adopted in MODAF. Meanwhile, DoD were developing their own service views. Whilst MODAF and NAF share the same meta-model for services, the structure of the views are different. The DoDAF approach to services is significantly different however, and any DoDAF tools that have been put to use for NAF work may well produce non-compliant architectures.

The view structure differences between NAF and MODAF are easily resolved. MODAF is careful to ensure that each layer in the stack introduces more detail (specificity). The idea is that the more general layer can be re-used by more than one architecture. This is how cohesion is achieved across federated architectures – with the more general layer overarching the elements in the layers below. For these reasons, it is not appropriate for more specific elements from lower layers to be used in the less specific upper layers. NAF was less strict about this, so has views in the capability (strategic) layer that reference services and operational activities. Similarly, the orchestration of services is considered logical in MODAF and so is handled by OV-5 rather than an SOA view.

NSOV-1 – Service Taxonomy

This is identical to SOV-1 in MODAF.

Impact on Tools
None provided they followed NMM and cover service attributes and policy.

Impact on Legacy Architecture
None

Other Issues
There is more detail in MODAF – particularly around service policy and attributes.

Recommended Action
Update Ch4 documentation with newer examples from MODAF.

NSOV-2 – Service Definitions

This view is called "Service Interfaces Specification" in MODAF but still covers roughly the same data, though with MODAF perhaps going into more detail on the interface spec.

Impact on Tools
None provided they follow NMM and cover the necessary detail on service interfaces.

Impact on Legacy Architecture
None, though existing architectures might be considered lacking in detail if they haven't included proper interface specs.

Other Issues
None

Recommended Action
Update Ch4 documentation with newer examples from MODAF.

NSOV-3 – Service to Operational Activities mapping

This is covered in OV-5 in MODAF, and probably ought to the same in NAF. SOV-3 in MODAF describes the functions performed **by** the service rather than the processes the service supports. The periodic table approach would force that approach also.

Impact on Tools
It should just be a case of re-labelling this view to NOV-5, or equivalent periodic table code.

Impact on Legacy Architecture
Work would be required to go through existing NSOV-3 architecture products that are still in use and update them to NOV-5.

Other Issues
None

Recommended Action
Update Ch4 documentation and follow MODAF approach.

NSOV-4 – Service Orchestration

Service orchestration is usually based on processes. For some reason, the NAF one seems to be based on sequence models. Service orchestration is managed in OV-5 in MODAF. MODAF also has SOV-4c which models how service consumers interact with a service interface (using a sequence diagram).

Impact on Tools
This view should really be removed, and that will obviously affect tools. The extent to which it affects them will depend on how closely they have followed NMM. If NMM has been ignored in favour of Ch4 then there may be some significant re-work required.

Impact on Legacy Architecture
This will depend on whether the tool used followed NMM or Ch4 (see above) and the extent to which the architect was aware of the disconnect between the two.

Other Issues
The first example in the documentation appears to have nothing to do with services, or service interfaces, and the second is based in processes (it's an old MODAF OV-5 example).

Recommended Action
Remove view from spec – consider replacing the whole SOA viewpoint with the MODAF views, or going to periodic table approach.

NSOV-5 – Service Behaviour

At first sight, this appears to be the same as SOV-4 or SOV-5 in MODAF but is subtly different. The sequence diagrams are about different services interacting, which means they really belong in the operational viewpoint, and there is no service function model.

Impact on Tools
This could be simply a renaming. However, if they have implemented the sequence diagram approach then this will need to be removed.

Impact on Legacy Architecture
This will depend on whether the sequence diagrams were used. If so, they will probably not be compliant with NMM or MODEM.

Recommended Action
This view should be brought into line with NMM and MODAF.

Systems Views (NSV)

General Comments

NSV-1 – System Interface Description

Although MODAF and NAF share the same meta-model, you would not know this from reading Chapter 4. It talks about system nodes (old DoDAF terminology) and systems interfaces (usually considered to be SV-2 territory).

Impact on Tools
Provided tools follow NMM rather than Ch4, should be low-medium impact. However, MODEM is rather complex in this area and perhaps could be simplified for NAF.

Impact on Legacy Architecture
Most legacy architecture should be visually compliant, however there may be issues around use of NMM and MODEM.

Other Issues
The documentation talks about underlying services which is a confusing use of terminology. Documentation states that system structure is handled in more detail in other views, but in fact SV-1 is the resource structure view.

Recommended Action
Update Ch4 documentation from MODAF. Provide guidance on how to use MODEM in this area (and perhaps simplify MODEM).

NSV-2 – Systems Communication Description

Unlike MODAF SV-2, which has three parts, NSV-2 has a fourth part – Systems Communication Quality Requirements. This is something that would generally be handled in SV-6 in MODAF or DoDAF, so it is unclear why the additional view is required for NAF. The only example of an NSV-2d that is provided appears to be a Bandwidth & Frequency view developed by Model Futures, which was originally slated to be NSV-13.

Impact on Tools
The impact is similar to SV-1 – if the NMM has been followed, it should be manageable.
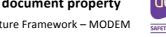
Impact on Legacy Architecture
Again, if NMM has been used, this should be reasonably compliant with a MODEM architecture.

Recommended Action
Update Ch4 documentation from MODAF. Decision on how/where bandwidth view should be used may be necessary

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NSV-3 – Systems to Systems Matrix

This is very similar to the equivalent MODAF view. The only area for concern is that the Ch4 description talks about using colour codes and symbols for depicting purpose, status, classification level, etc. However, there is no indication how this would be achieved using the Ch5 meta-model.

Impact on Tools
If a tool uses the colour coding / symbol suggestion outlined in Ch4 then there may be some issues with re-use of architectures developed in this way. If the tool vendors have been smart enough to link this to existing NMM elements then there should not be any significant compatibility issues.

Impact on Legacy Architecture
As above, if architectures have used the colour coding to depict something which has not or cannot be captured in the NMM then there may be issues.

Other Issues
None.

Recommended Action
Investigate how commonly used NAF tools have implemented this view. If they have used Ch4 as their basis then there may be a number of issues.

NSV-4 System Functionality Description

Chapter 4 still uses old DoDAF terminology about systems rather than resources so the casual reader may incorrectly assume NSV-4 is only for technical system functions, and that it does not cover human functions. It does mention HCI functions but only in terms of those offered by user interfaces rather than the functions carried out by the humans themselves. This is very misleading and does not align well with the NMM. Ch4 also mentions Nodes, which again is probably old DoDAF terminology about systems nodes.

Impact on Tools
Dependent on whether tool used Ch5 or Ch4 as the basis.

Impact on Legacy Architecture
Dependent on whether the architect used Ch5 or Ch4 as the basis.

Other Issues
None

Recommended Action
Audit use of view in NATO.

NSV-5 Systems Function to Operational Activity Traceability Matrix

The view description (as with NSV-3) mentions use of colour coding the cells but with no indication of how the meta-model is supposed to be used in support of this.

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MODEM has a more sophisticated mapping from activities to functions which allows the architect to specify if a group of functions are required for implement a given activity, or vice versa. This is not covered in either the MODAF or NAF documentation.

Impact on Tools
Minimal

Impact on Legacy Architecture
Minimal

Other Issues
None

Recommended Action
Consider adding functionality to MODEM that corresponds to the factors being indicated by colour coding.

Edit the view description to cover the enhanced group mapping now offered in MODEM.

NSV-6 Systems Data Exchange Matrix

This view is all about technical systems in NMM/M3/MODAF/MODEM so the documentation in Ch4 is a good fit.

Impact on Tools
None.

Impact on Legacy Architecture
None

Other Issues
None

Recommended Action
None

NSV-7 System Quality Requirements Description

The name for this view does not really describe its intent particularly well. It may be best to adopt the MODAF name "Resource Performance Parameters Matrix". As with other NSV views, there is an emphasis on technical systems when this should be about resources (human AND technical).

The Ch4 documentation states that the view covers properties of interfaces (this is NSV-3 territory) and functions (not covered by meta-model).

Impact on Tools
Dependent on whether tool used Ch5 or Ch4 as the basis.

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Impact on Legacy Architecture
Dependent on whether the architect used Ch5 or Ch4 as the basis.

Other Issues
None

Recommended Action
Audit use of view in NATO.

NSV-8 Systems Evolution Description

Overall, this appears to be compatible with NMM and MODAF. MODAF bases this on capability configurations but MODEM is broader in its coverage, allowing the view to be used for tracking the evolution of all resource types.

Impact on Tools
None.

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
None.

NSV-9 Technology Forecast

No issues here. MODAF (and NMM) are broader however, allowing NSV-9 to be used for skills / competence forecasting.

Impact on Tools
None.

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
None.

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NSV-10a Systems Rules

The Ch4 documentation for this view seems to be based on very old DoDAF specs. It also mentions "Object Role-Models" (ORM) which doesn't have much at all to do with rules

Impact on Tools
None unless ORM has somehow been incorporated.

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
Major re-write required in Ch4.

NSV-10b System State Transition Description

The Ch4 documentation mentions UML state charts, but also talks about "actions". This should be replaced with MODAF documentation.

Impact on Tools
None provided UML states approach has been followed – MODEM re-engineers the UML approach to states, but keeps all that is needed for NSV-10b.

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
Some re-write required in Ch4.

NSV-10c Systems Event-Trace Description

The Ch4 documentation looks fully compatible with NMM, MODEM and MODAF

Impact on Tools
None.

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
None.

NSV-11 System Data Model

For some reason, NAF deviates from MODAF and DoDAF here by splitting into two sub-views. One for logical data modelling, the other for physical. Logical data modelling should be handled in NOV-7, physical in NSV-11 and conceptual in NAV-2

Impact on Tools
Just cosmetic as views are rationalised – this should all be cleaned up if the periodic table approach is used.

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
Use periodic table approach to view structure.

NSV-12 Service Provision

This view differs to MODAF SV-12 in that it is a matrix. However, the meta-model elements required to map resources onto the services they provide should be the same.

Impact on Tools
Will need to add capability configuration view from MODAF SV-12b

Impact on Legacy Architecture
None.

Other Issues
None

Recommended Action
None.

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Technical View

NTV-1 Technical Standards Profile

This is rather more prescriptive than MODAF in that it specifies in Ch4 what constitutes a valid standard in NATO. To be useful in the member nations, this may have to be relaxed. Also, it may be sensible to drop the "technical" part of the view title as this view is equally useful for identifying non-technical standards that apply to the architecture.

Ch4 also goes into specifics about how to use the view for NATO SIPs and SIOPs. This is probably best handled in Ch3 whilst keeping the Ch4 spec neutral.

Impact on Tools
None provided the tools don't restrict the types of standards used.

Impact on Legacy Architecture
None

Other Issues
None.

Recommended Action
None.

NTV-2 Technical Standards Profile

No real issues for MODEM or MODAF alignment here. The example shown in Ch4 might be quite difficult to map onto NMM or MODEM though.

Impact on Tools
None.

Impact on Legacy Architecture
None

Other Issues
None.

Recommended Action
Look at producing a different example for Ch4.

NTV-3 Standard Configurations

This view looks like it serves the same purpose as MODAF SV-12b, but without the mapping onto capability. It doesn't really look as though it belongs in the NTV viewpoint.

Impact on Tools

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None.

Impact on Legacy Architecture
None

Other Issues
None.

Recommended Action
If the periodic table approach is used, this would be a mapping view between Enterprise and Resources.

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Annex A – Priority 1 Task List

View	Recommended Action
NA	Taking MODEM and "NATOising" it
NAV-2	Make naming and description pattern (from IDEAS Foundation) explicit in MODEM
NAV-3	Use current AV-1 Meta-Data Section in MODEM for NAV-3. Ask NAF user community about whether / how they use NAV-3a – if it is widely used there may be a case for modelling this explicitly in MODEM.
NCV-3	Investigate adding service phasing to MODEM. This should work well if the periodic table approach is taken, also.
NCV-6	Revise NAF along the lines of MODAF. If the periodic table approach is adopted, this would simply become the process view at the enterprise level.
NOV-5	Ch4 requires significant editing. The use of BPMN was mentioned by a couple of presenters at the NATO IST Symposium in Toulouse. It may be worth considering how BPMN could be mapped onto MODEM – if not in the first release, then it should be a priority for the next release.
SOV-4	Remove view from spec – consider replacing the whole SOA viewpoint with the MODAF views, or going to periodic table approach.
SOV-5	This view should be brought into line with NMM and MODAF.
NSV-11	Use periodic table approach to view structure.
NTV-3	If the periodic table approach is used, this would be a mapping view between Enterprise and Resources.

Table 1 - Priority 1 Task List

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Annex B – Priority 2 Task List

View	Recommended Action
NA	Clean up MODEM model where needed (some tidying required from previous project)
NA	Produce simplified view of MODEM for users
NCV-4	Discuss usage and whether it actually plays a useful role in its current form. If the periodic table approach is adopted, the decision as to whether this view exists in its own right would be down to whether the structure/connectivity column is split into two.
NCV-7	Fix Ch4 so that this view belongs in the SOVs. If the periodic table approach is adopted, this will be an interstitial view between cells.
NSV-4	Audit use of view in NATO.
NSV-5	Consider adding functionality to MODEM that corresponds to the factors being indicated by colour coding. Edit the view description to cover the enhanced group mapping now offered in MODEM.
NSV-7	Audit use of view in NATO.

Table 2 - Priority 2 Task List

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Annex C – Priority Tasks out of scope for Task 83

View	Recommended Action
NAV-1	Provide guidance in Ch4 on ISO42010 aspects. Provide Ch4 guidance on how to use the generic meta-data functionality in MODEM.
NCV-1	Consult NAF users about whether they have used NMM or Ch4 as the basis for their work. If it's Ch4, there may be some re-work needed on both tools and architectures.
NCV-2	Update Ch4.
NOV-1	Engage with tool vendors: The SVG approach in MODEM has not been tested in any tools. It would be useful to engage with some tool vendors to test that part of the model.
NOV-2	Update Ch4 documentation to reflect logical aspect of NOV-2, and the recently added materiel flows, etc. Ask NATO to examine a sample set of NOV-2 products to check how they have been developed.
NOV-3	See NOV-2 actions
NOV-4	Update Ch 4 documentation. Look into simplifying SV-1/OV-4 part of MODEM.
NOV-6	Ch4 requires significant editing – examples, in particular, are poor.
NOV-7	Ch4 needs some attention. Issue of conceptual vs logical should be sorted if the periodic table approach is used.
SOV-1	Update Ch4 documentation with newer examples from MODAF.
SOV-2	Update Ch4 documentation with newer examples from MODAF.
SOV-3	Update Ch4 documentation and follow MODAF approach.
NSV-1	Update Ch4 documentation from MODAF. Provide guidance on how to use MODEM in this area (and perhaps simplify MODEM).
NSV-2	Update Ch4 documentation from MODAF. Decision on how/where bandwidth view should be used may be necessary
NSV-3	Investigate how commonly used NAF tools have implemented this view. If they have used Ch4 as their basis then there may be a number of issues.
NSV-10a	Major re-write required in Ch4.
NSV-10b	Some re-write required in Ch4.
NTV-2	Look at producing a different example for Ch4.

Table 3 - Priority Tasks Out of Scope for Task 83