ArchiMate Modeling Guide

For the NATO Architecture Framework Version 4

Architecture Capability Team
Digital Policy Committee 30/04/2025

Contents

1 INTRODUCTION

1.1 Changes in this version

Ref.	Change
CR1	Added Triggering Relation from Operational Activity to Operational Activity to represent 'logical flows between activities'.
CR2	Section 1.2.11.3.1 wording amended to clarify this mapping is to the types of objects rather than the viewpoints specifically.
CR3	Section 1.2.1 wording added to clarify the fact that this is a guidance document and programme level architects should acknowledge the needs of their specific program of work
CR4	Section 1.3.1 elaborated the heading definitions of implementation guidance tables, to clarify sources of table contents
CR5	Section 1.3.2 Deletion of misleading use of 'application'
CR6	Section 1.3.2 updated to reflect that all elements are specialisations
CR7	Section 1.3.3 wording modified slightly to reflect that this is a general requirement of tooling, not specific to modelling
CR8	Addition of known/unresolved issues table. Section 1.3
CR9	Glossary tables updated to include parent ArchiMate element type. Noting also that mapping is also provided as part of implementation guidance
CR10	Glossary tables updated to include previously missing elements from the guidance.
CR11	Additional rationale added to NAF4 ArchiMate element descriptions where specialisations are most deviant from ArchiMate standard
CR12	Corrected various instances where the mandatory/optional nature of elements and objects was incorrectly represented.
CR13	Missing description for C9 added
CR14	Amendments to Logical layer viewpoints L1, L3 & L4 to clarify usage of Role and Interactions
CR15	Amendment to L1 to accommodate the specific Measure of Performance (MoP).
CR16	Views updated to be conformant with 'Box' views from ArchiMate 3.2
CR17	Numbering updates following these changes
CR18	Errors in implementation mapping tables resolved and consistency with viewpoints and implementation narrative addressed.

1.2 Introduction and Overview

1.2.1 About this Document

This document refers to Chapter 4, Section 1.3, of the NATO Architecture Framework (NAF) version 4. It provides guidance on how to develop NAFv4 compliant architectures based on the ArchiMate 3.2 specification.

The NATO Architecture Framework document concerns all nations or organizations using the NAF. It is provided and maintained by the NATO Architecture Capability Team (ACaT). The ArchiMate modeling guidelines (i.e. this document) concern all nations or organizations using the ArchiMate modelling language for their architecture development. Because tools and specific extensions of framework and language may differ between nations or organizations, these aspects are not

considered in this document. Nations or organizations need to provide and maintain additional guidelines in order to cover these aspects themselves.
This specialized version of NAF has been built using the following principles:

- Conciseness - Only elements and relationships that are directly relevant to the requirements and objectives, especially in the context of NATO operations have been included on viewpoints.
    - We want to avoid having redundant relations and object types that are hardly used.
- Flexibility - Where practical and relevant, **specialisms** have been used.
    - This allows specific tailoring of the ArchiMate Metamodel allowing for scalability and adoption to evolving business requirements.
- Usability – Clarity of semantics and representation of architectural concepts, avoiding ambiguity in design.
- Alignment – Whilst promoting simplicity and minimalism, priority has been given to making sure the overall Metamodel aligns to the NAF v4 standard.

It has resulted in the minimum number of ArchiMate element use to fulfil the needs of NAFv4, although there is some repetition of *object* usage. It is **not** intended to be a 1:1 mapping of ArchiMate to NAFv4.
Addressed readers are:

- Modelers required to produce NAFv4 compliant ArchiMate Models.
- Developers of national/organizational guidelines.
- Implementers of tool specific ArchiMate profiles.

It is noted that Architects at the program level may follow this document as guidance, but have the freedom and flexibility to develop fit-for-purpose views and extend the metamodel as necessary to suit their program needs. Due to program time and bandwidth constraints it is expected that they produce a minimum viable architecture suitable for their program rather than creating the entire set of views, supporting the viewpoints in this document.

1.2.2 The NAFv4 Viewpoints

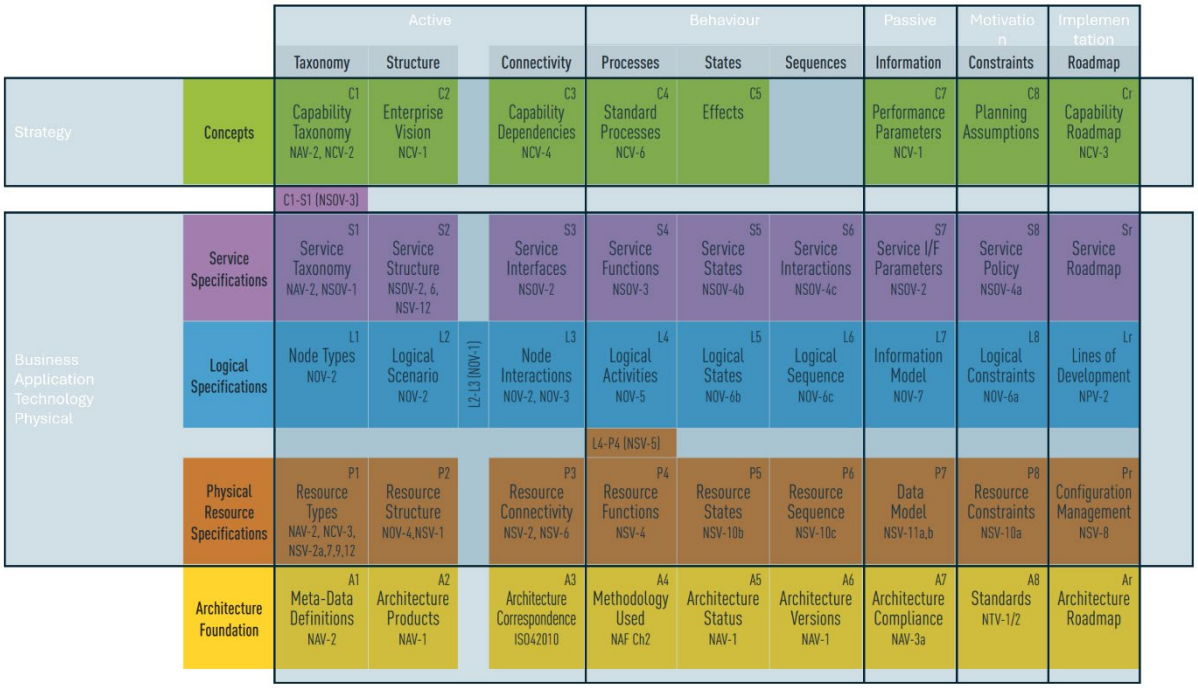
The NAF Grid is a two-dimensional classification scheme used to organise the standardized viewpoints of the NATO Architecture Framework (NAF), serving as a baseline for any NAF-compliant architecture development. The grid is structured with **Subjects of Concern** as rows and **Aspects of Concern** as columns. These columns represent broad model kinds that reflect different architectural perspectives.

While the NAF Grid provides a comprehensive foundation, viewpoint selection must be tailored to each specific architecture effort. Practitioners should identify the most relevant viewpoints from the grid and define additional viewpoints where necessary to address unique requirements.

Note: The Architecture Foundation Layer is out of scope for this guide. For a full explanation of the NAF Grid and its structure, see the NATO Architecture Framework Version 4 main document.

1.2.3 ArchiMate Layers

The ArchiMate Full Framework captures the viewpoints in the NAF Grid thusly;



Aspects from the ArchiMate Full Framework do not align explicitly to the viewpoints, however, the shading of the vertical 'aspects' related to the fact that encapsulated viewpoints emphasize the use of objects from these aspects, but are *not* limited to them. Due to the use of ArchiMate concepts in multiple layers within the NAF Grid, specialization of ArchiMate concepts is required that is detailed within the body of this document. Whilst in some cases there are terms in both NAF and ArchiMate that share the same meaning, others do not. Care must be taken to understand which term the document is referring to at any point in time, for example; Technology, Physical, Resource and Node.

1.3 How to Read

1.3.1 The Structure of this Document

For each row of the NAFv4 grid an ArchiMate extract is provided. Each Viewpoint (cell in the NAFv4 grid) is described by separate subsections containing:

- Information from the relevant section of the NAF
- ArchiMate extract relating to the viewpoint
- Implementation notes and mappings of ArchiMate to NAF objects
- In later iterations of this document modeling examples will also be provided.

Within the Implementation guidance section is included a table with 3 columns, this serves to provide a mapping between NAFv4, standard ArchiMate, and the specialized objects as part of this guide. In these tables the columns are;

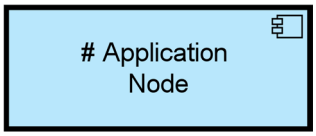
NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
The name of an identified element provided in the NAFv4 documentation or examples.	The name of the specialized ArchiMate element created for the purpose described in this document.	The name of the 'parent' element from the ArchiMate specification from which the NAFv4 specialization is derived

1.3.2 Specialisms

Specializing the ArchiMate metamodel is a necessity, and as such, all elements within this document should be viewed as specialisms of the standard ArchiMate specification.
Specialization addresses both;

- gaps in aligning the standard ArchiMate framework and NAFv4, and, in future
- exchange between different modelling languages

By tailoring ArchiMate elements to represent NAF-specific constructs, the resultant specialized *NAFV4 ArchiMate Metamodel* becomes more effective and relevant for its intended purpose. This specialization is fully supported by the ArchiMate specification, ensuring compliance while enabling enhanced clarity and usability. For instance, the Application Component is used to represent a Logical Node with the element name of '# Application Node' to reflect its specialized role. This bridges the gap between standard notations and the specific needs of NAFv4.

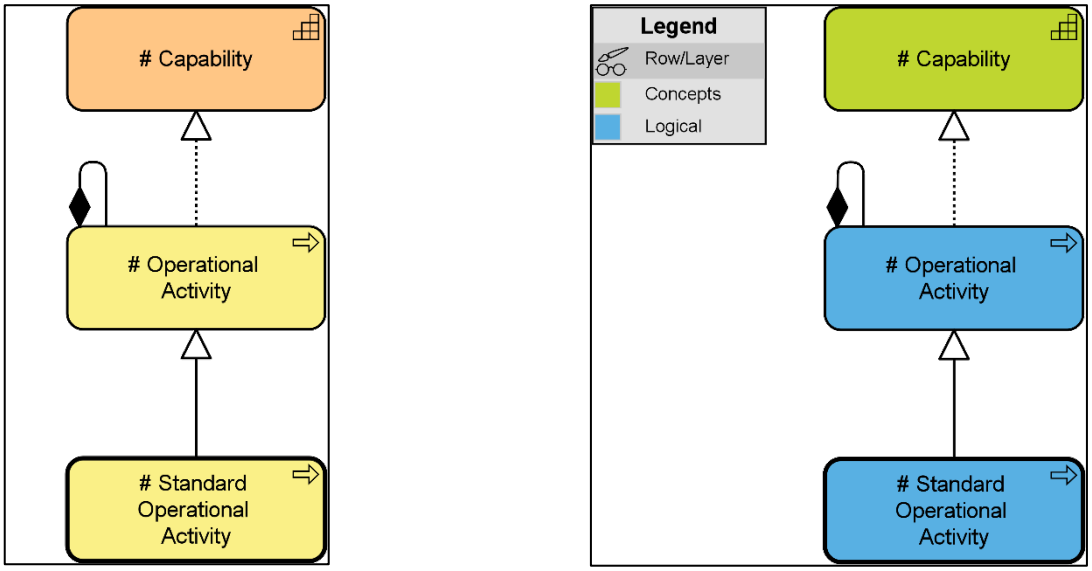


1.3.3 Tool Requirements for Implementation

This guide is written as tool agnostic, but the minimum requirement for any ArchiMate modeling tool is that it is capable of implementing the specializations required as per the ArchiMate specification. The toolset must support the ability to either embed the specializations as attributes for tagging elements or visually represent them as stereotypes on objects. These features are critical to ensuring that the specialized framework is consistently applied and intuitive for users, enabling effective modelling, analysis, and stakeholder communication.

1.3.4 Interpreting the Viewpoints

Elements on viewpoints show the specialization name and are prefixed with a #, such as '# Application Node' making their extended purpose immediately clear. Elements are also colored according to the NAF layer of which they are a part of. However, they retain the standard ArchiMate notations to maintain familiarity and consistency for users. This approach ensures that the specialized constructs remain intuitive while clearly conveying their specialized meaning within the NAFv4 framework. This strikes a balance between representing standard notation and representing extended functionality. See below for an example of the C4 viewpoint with default ArchiMate colors Vs NAF layering colors. N.B. In ArchiMate there are no formal semantics around colors.



Bold borders represent mandatory (shall be present in the viewpoint) objects on a viewpoint, otherwise objects are optional (may be present in the viewpoint).

Note that attributes/properties of elements are ***not*** visualized within the viewpoints, even when mentioned in the description of the framework, but are specifically mentioned, where appropriate, within the associated implementation guidance.

1.3.5 Implementation/Guidance Text

- Where terms refer to NAFv4 they will be **bold**
- For those that are ArchiMate specific they are *italicized*

As mentioned above, specialized elements are prefixed with '#' in figures and tables, and identified in the narrative as either ***Bold Italic*** where the ArchiMate Concept is a 1:1 mapping to the NAFv4 concept. In other cases the specialism is described by highlighting the **NAFv4 Concept** and drawing the readers attention to how these map to one, or more, *ArchiMate Concepts* both in the narrative and through tables as part of the Implementation Guidance sections for each viewpoint.

1.4 Known Issues

Within this document the following are acknowledged;

ID	Description
1	The NAFv4 framework document provides insufficient clarity of **Role** leading to ambiguous use as Business Role, [Logical] Node and Operational Performer [of an activity] in this document. This is expected to be resolved in a later revision.

1 CONCEPT GLOSSARY

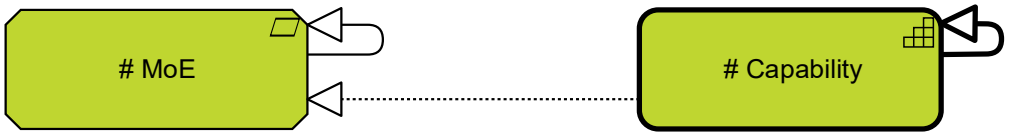
1.1 Concepts Glossary

NAFv4 ArchiMate Name	ArchiMate Name	Description
# Goal	Goal	The aim or outcome which a person, group, or organization works towards or strives to achieve.
# Capability	Capability	The expected ability of one or more resources to deliver a specified type of effect or outcome or a specified course of action.
# Measurement Category	Requirement	A supertype or logical grouping of measurements.
# Work Package	Work package	A series of actions identified and designed to achieve specific results such as project or program.
# Measurement	Requirement	Any measurement that can be used to define the achievements delivered by a capability. Since there is no specific ArchiMate element that naturally maps to measurement Requirement was chosen since a measurement can often be how a requirement is, or is not satisfied.
# MoE	Requirement	[Measure of Effectiveness]. A specific measurement that can be used to define the effectiveness or success of a capability.
# Effect	Outcome	The consequence or outcome of an action.
# Concept Requirement	Requirement	A [Constraint] specified at the strategic level.
# Enterprise Phase	Plateau	A current or future state of the enterprise. An ArchiMate plateau is used here with the rationale that it reflects the time dimension of a roadmap effectively.

2 C1 - CAPABILITY TAXONOMY

C1 – Capability Taxonomy	NAFv3: NCV-2
The C1 Viewpoint is concerned with the identification of capabilities, and their organization into specialization hierarchies (taxonomies) independent of their implementation and may be referenced in whole or part by, or used in, describing multiple architectures (e.g. a C1 View at Enterprise-level will be referenced by C1 Views at the Capability-level). Views implementing this Viewpoint • Shall include all capabilities relevant for the architecture. • Shall organize all capabilities into a specialization hierarchy. • May include Measures of Effectiveness (MoE).	
CONCERNS ADDRESSED	**USAGE**
• Capability Planning. • Capability Management.	• Identification of existing and required capabilities. • Source for the derivation of cohesive sets of Key User Requirements (KURs). • Providing reference capabilities for multiple architectures.
REPRESENTATION	
• Tabulation. • Hierarchical (Connected Shapes). • Diagram (with generalization relationships and property definitions).	

2.1 C1 Object [by NAF Layer]



2.2 C1 Implementation Guidance

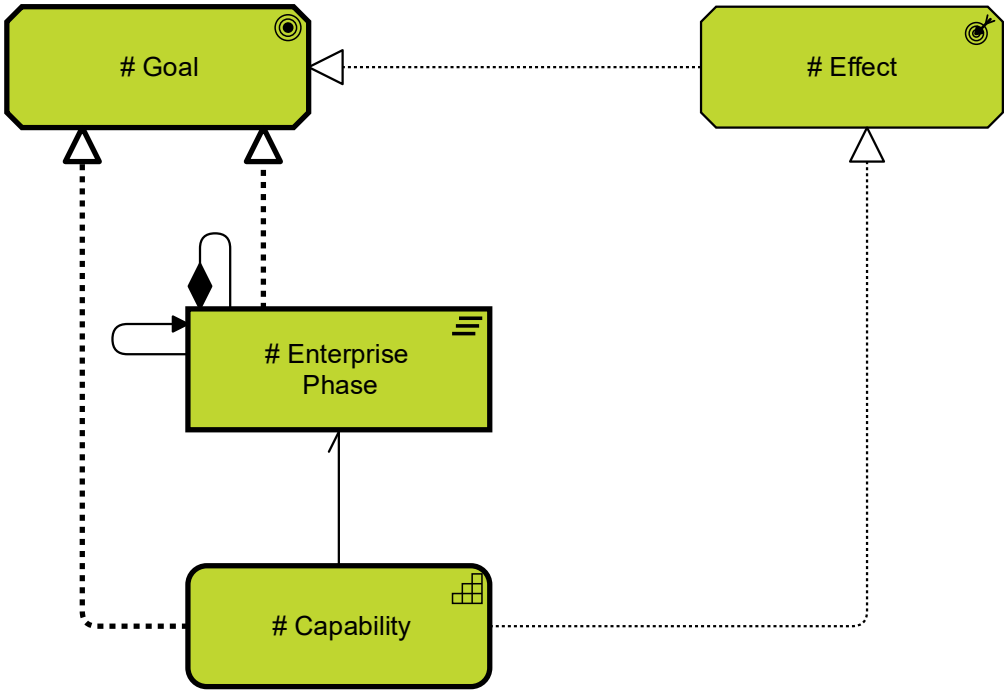
Hierarchical relations of ***Capabilities*** are represented using the *specialization* relation. **Measures Of Effectiveness** are represented here as a *Requirement,* as a specialization of **Measure Category** (**C7**).

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
Measurement	# MoE	Requirement

3 C2 - ENTERPRISE VISION

C2 – Enterprise Vision	NAFv3: NCV-1
The C2 Viewpoint is concerned with scoping the architecture effort and providing the strategic context for the capabilities described in the architecture. Views implementing this Viewpoint: • Shall describe the vision and goals for the capabilities in scope for a defined period (or periods) of time. • May include desired outcomes and measurable benefits associated with the goals. • May link the capabilities to enduring tasks.	
CONCERNS ADDRESSED	**USAGE**
• Enterprise Strategy. • Capability Planning.	• Capture and communication of the strategic vision related to capability evolution. • Identify the capabilities required to meet the vision and goals. • Identify the required timescales for the capabilities (as opposed to Cr which provides a summary of when projects are estimated to deliver capability). • Identify any enduring tasks the enterprise performs. • Provision of a blueprint for a transformational initiative.
REPRESENTATION	
• Structured Text. • Composite Structure Diagram.	

3.1 C2 Objects [by NAF Layer]



3.2 C2 Implementation Guidance

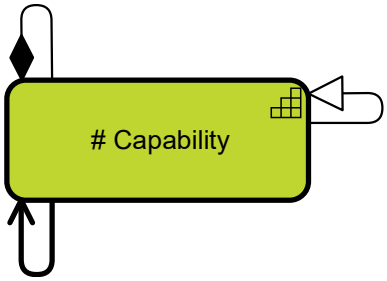
This viewpoint must contain a ***Capability*** element and how it is realizes a ***Goal,*** as part of an **Enterprise Phase** associated with that same ***Capability***. A *Plateau* is used to represent an **Enterprise Phase**. Optionally, in order to link desired outcomes or measurable benefits to ***Goals***, these are *realized by* **Effects**, which are represented as *Outcomes*. An Enterprise Lifecycle is a composition of sequential (*triggered*) **Enterprise Phases**.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Benefit	# Effect	Outcome
Capability	# Capability	Capability
Desired Outcome	# Effect	Outcome
Enduring Task	# Capability	Capability
EnterpriseGoal	# Goal	Goal
EnterprisePhase	# Enterprise Phase	Plateau
Vision	# Goal	Goal
WholeLifeEnterprise	# Enterprise Phase	Plateau

4 C3 - CAPABILITY DEPENDENCIES

C3 – Capability Dependencies	NAFv3: NCV-4
The C3 Viewpoint is concerned with identification of dependencies between capabilities, and defining the logical composition of capabilities (i.e. capability clusters). Views implementing this Viewpoint: • Shall include all dependencies between capabilities relevant for the architecture. • May defines logical groupings of capabilities by means of composition. • May include capability specializations (Note, this can also be expressed in a C1 View).	
CONCERNS ADDRESSED	**USAGE**
• Capability Management.	• Analysis of dependencies between capabilities and between capability clusters. • Impact analysis for capability options, disposal of capabilities. • Highlight potential integration requirements and the interactions needed between acquisition projects in order to achieve the overall capability.
REPRESENTATION	
• 'Nested box' diagram. • Class diagram. • Composite Structure diagram.	

4.1 C3 Objects [by NAF Layer]



4.2 C3 Implementation Guidance

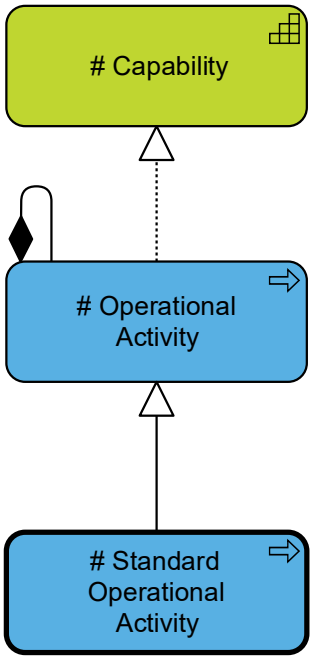
Hierarchical relations of ***Capabilities*** are represented using the *specialization* relation. The *serving* relation is mandatory here to show dependencies between ***Capabilities.***

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
Capability Cluster	# Capability	Capability

5 C4 - STANDARD PROCESSES

C4 – Standard Processes	NAFv3: NCV-6
The C4 Viewpoint is concerned with identification of standard activities (e.g. doctrinal) and optionally with their traceability to the capabilities they support. Views implementing this Viewpoint: • Shall identify all standard activities relevant for the architecture. • May provide a composition of these standard activities. • May link capabilities to supporting standard activities. A standard process list, in whole or parts, may be referenced by, or used in describing, multiple architectures (e.g. a C4 View at enterprise-level will be referenced by C4 Views at the capability-level).	
CONCERNS ADDRESSED	**USAGE**
• Doctrine Production. • Operational Analysis.	• Specification of doctrine. • Tracing capabilities to enduring tasks. • Tracing capabilities to standard operational activities. • Capability audit.
REPRESENTATION	
• Tabular. • Tracing Diagram.	

5.1 C4 Objects [by NAF Layer]



5.2 C4 Implementation Guidance

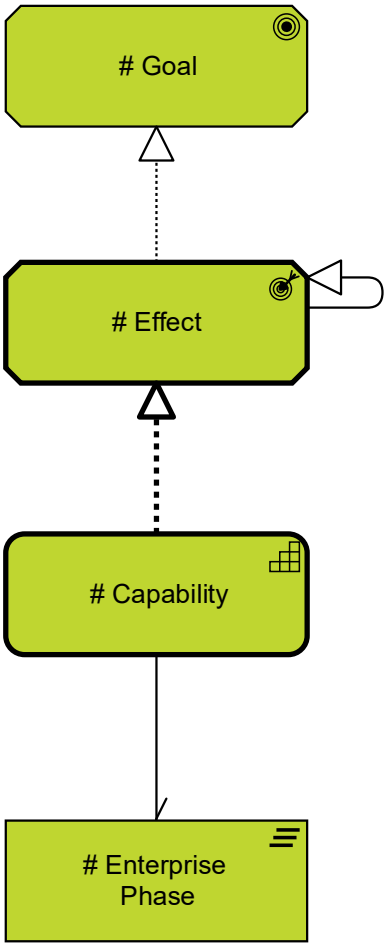
The **Standard Operational Activity** must be present in this viewpoint as a *Business Process* that is a *specialization* of an **Operational Activity** which may be *composed of* other **Operational Activities.** An **Operational Activity** may be traced back to a ***Capability*** via a *realization* relation.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
OperationalActivity	# Operational Activity	Business process
Standard Operation Activity	# Standard Operational Activity	Business process

6 C5 - EFFECTS

C5 – Effects	NAFv3: NONE
The C5 Viewpoint is concerned with identifying and describing effects of capabilities. Views implementing this Viewpoint: • Shall define effects relevant for the architecture effort. • Shall assign effects to capabilities. • May identify start and/or end dates of effects. • May identify resource types associated to start and end dates of effect. • May show a specialization hierarchy of effects.	
CONCERNS ADDRESSED	**USAGE**
• Operational Analysis. • Analysis of non-functional properties.	• Characterization of the expected results capabilities, positive or negative. • Analysis of cumulative effects. • Analysis of persistence of the effects. • Tracing the operational states and modes with regards to the effects.
REPRESENTATION	
• Tabular. • Structural diagram. • Histogram. • Finite state diagram.	

6.1 C5 Objects [by NAF Layer]



6.2 C5 Implementation Guidance

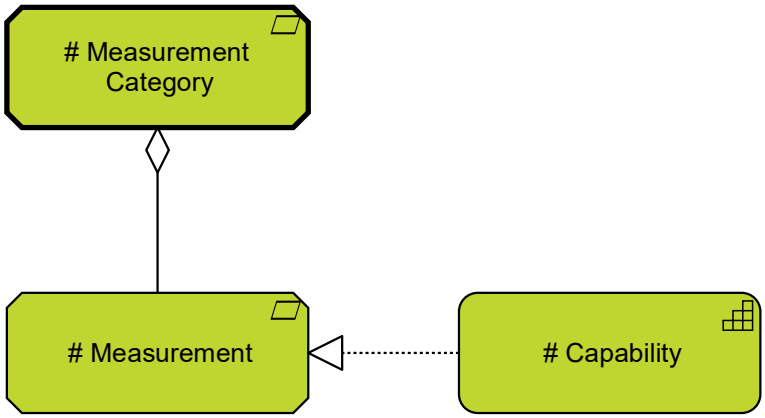
An **Effect**, as an *Outcome, is* realized by a ***Capability*** and must be present as part of the viewpoint. An **Effect** may have attributes to signify its start and end dates.
Optionally, ***capabilities*** may be *associated with* an **Enterprise Phase** represented as a *plateau* and ***Goals*** may be shown on this viewpoint for traceability.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Benefit	# Effect	Outcome
Capability	# Capability	Capability
CapabilityConfiguration	# Capability	Capability
Effect	# Effect	Outcome
EnterpriseGoal	# Goal	Goal
EnterprisePhase	# Enterprise Phase	Plateau

7 C7 - PERFORMANCE PARAMETERS

C-7– Performance Parameters	NAFv3: NCV-1
The C7 Viewpoint is concerned with the identification and description of measure categories, and identification of capabilities to which they are applicable. Views implementing this Viewpoint: • Shall identify all measure categories relevant for the architecture. • May link measure categories to capabilities.	
CONCERNS ADDRESSED	**USAGE**
• Capability Planning. • Capability Management. • User Requirement Specification.	• Setting Capability Requirements. • Military Estimates. • Strategic Reviews. • Planning Assumptions.
REPRESENTATION	
• Tabular (capabilities on one axis, measure categories on the other). • Class diagram with property definitions.	

7.1 C7 Objects [by NAF Layer]



7.2 C7 Implementation Guidance

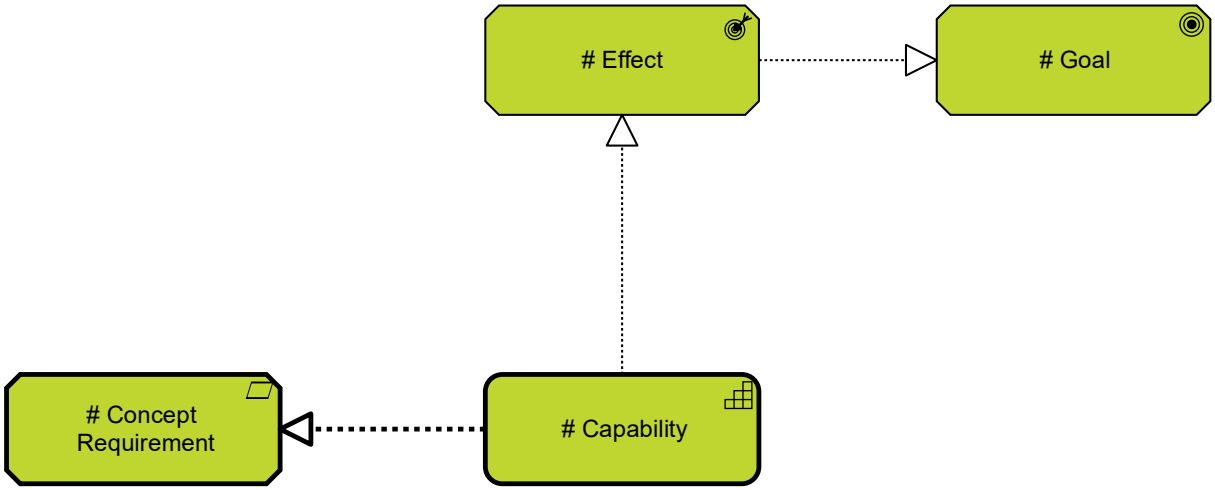
Measurement Categories are broad properties of **Capabilities,** each can *aggregate* specific **Measurements**. These are represented as *Requirements.*

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
Measure Category	# Measurement Category	Requirement
Measurement	# Measurement	Requirement
MeasurementSet	# Measurement	Requirement

8 C8 - PLANNING ASSUMPTIONS

C8 – Planning Assumptions	NAFv3: NONE
The C8 Viewpoint is concerned with identification and description of assumptions that have been made for the implementation of capabilities. Views implementing this Viewpoint: • Shall contain capabilities relevant for the architecture. • Shall include constraints for capability implementation. • May include goals. • May include assumed benefits.	
CONCERNS ADDRESSED	**USAGE**
• Capability Planning. • Planning Assumptions.	• Implementation Planning.
REPRESENTATION	
• Tabular. • Benefits diagram.	

8.1 C8 Objects [by NAF Layer]



8.2 C8 Implementation Guidance

A ***Concept Requirement*** is used to represent a **Constraint**, that is *realized by* a ***Capability.*** For traceability this viewpoint can also show that ***Capabilities*** *realize* ***Effects*** *which in turn realize* ***Goals.*** In ArchiMate v3.2, the constraint is a specialization of a requirement. Modelers can choose to use this object if they prefer. For simplicity, the *Requirement* object is used.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Benefit	# Effect	Outcome
Capability	# Capability	Capability
Constraint	# Concept Requirement	Requirement
EnterpriseGoal	# Goal	Goal

9 CR - CAPABILITY ROADMAP

Cr– Capability Roadmap	**NAFv3: NCV-3**
The Cr Viewpoint is concerned with the representation of the actual or estimated availability of capabilities over a period of time (derived from capability delivery milestones in acquisition projects). Views implementing this Viewpoint: • Shall identify capabilities related to the roadmap. • Shall identify associated capability increments. • May identify programmes or projects associated with the capability increments. • May associate capability increments with specific periods of time.	
CONCERNS ADDRESSED	**USAGE**
• Capability Planning. • Acquisition Management.	• Capability phasing. • Capability integration planning. • Capability gap/surplus analysis. • High-level dashboard for acquisition management.
REPRESENTATION	
• A time based chart in the style of a Gantt chart.	

9.1 Cr Objects [by NAF Layer]

9.2 Cr Implementation Guidance

Plateaus are used to represent an **Enterprise Phase,** that *is associated with* a specific ***Capability.*** *Work Packages* represent **Projects** and **Programs** that deliver **Capability Increments.** Each ***Capability*** may be *specialized* as a **Capability Increment,** with **Milestone** information as an attribute of the **Capability Increment.**

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
Capability Increment	# Capability	Capability
Perid of Time	# Enterprise Phase	Plateau
Program	# Work Package	Work package
Project	# Work Package	Work package
Roadmap	# Enterprise Phase	Plateau

10 SERVICE GLOSSARY

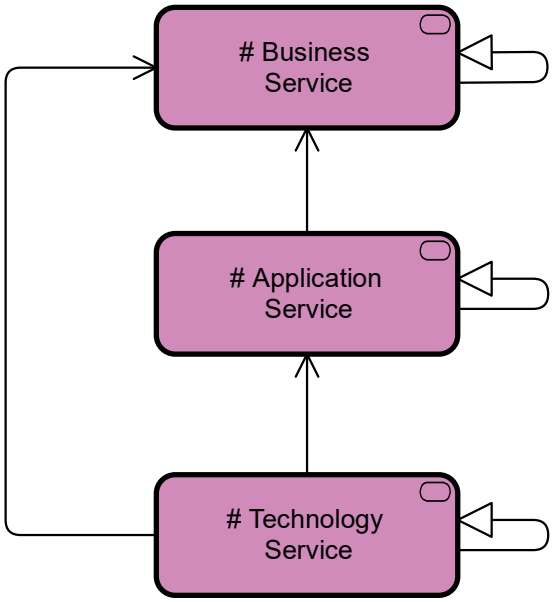
10.1 Service Glossary

NAFv4 ArchiMate Name	ArchiMate Name	Description
# Application Service Operation	Application function	Enables programmatic communication with an Application Service via an Application Service Interface.
# Service Policy	Requirement	A set of rules and constraints that specify the non-functional aspects of a [Service]. Examples: Availability, Reliability, Safety, Security, Useability.
# Application Service Interface	Application interface	Exposes an Application Service for consumption.
# Technology Service Interface	Technology interface	Exposes a Technology Service for consumption.
# Service Requirement	Requirement	A constraint specified at the service level
# Business Service Interface	Business interface	Exposes a Business Service for consumption.
# Technology Service Operation	Technology function	Enables programmatic communication with a Technology Service via a Technology Service Interface.
# Business Service	Business service	A [Service] which exposes business [Behavior] or business value. A means of providing value, functionality or a product to a consumer (human or machine) in a contracted way by hiding associated risks and constraints.
# Application Service	Application service	A [Service] which exposes application [Behavior] or business value. A means of providing value, functionality or a product to a consumer (human or machine) in a contracted way by hiding associated risks and constraints.
# Technology Service	Technology service	A [Service] which exposes technology [Behavior] or business value. A means of providing value, functionality or a product to a consumer (human or machine) in a contracted way by hiding associated risks and constraints.
# Business Service Operation	Business function	Enables programmatic communication with a Business Service via a Business Service Interface.
# Service Roadmap	Plateau	Canvas for a sequence of plateaus representing a [Roadmap] for the delivery of [Service]s. An ArchiMate plateau is used here with the rationale that it reflects the time dimension of a roadmap effectively

11 S1 - SERVICE TAXONOMY

S1 – SERVICE TAXONOMY	NAFv3: NSOV-1/NAV-2
The S1 Viewpoint is concerned with the identification of service specifications, and their organization into specialization hierarchies (taxonomies). Views implementing this Viewpoint: • Shall include all service specifications relevant for the architecture. • May organize all service specifications into a specialization hierarchy. • May include measures for the service specifications. • May include attributes for the service specifications. A service taxonomy, in whole or parts, may be referenced by, or used in describing, multiple architectures (e.g. a S1 View at enterprise-level will be referenced by S1 Views at the capability-level).	
CONCERNS ADDRESSED	**USAGE**
• Cataloguing Service Specifications. • Defining measures for Service Levels. • Specialization of Service Specifications.	• Service-oriented architecture governance. • Identification of services. • Service planning. • Service audit. • Service gap analysis. • Providing reference services for architectures. • Tailoring generic services for specific applications.
REPRESENTATION	
• Tabulation. • Hierarchical (connected shapes). • Class diagram.	

11.1 S1 Objects [by NAF Layer]



11.2 S1 Implementation Guide

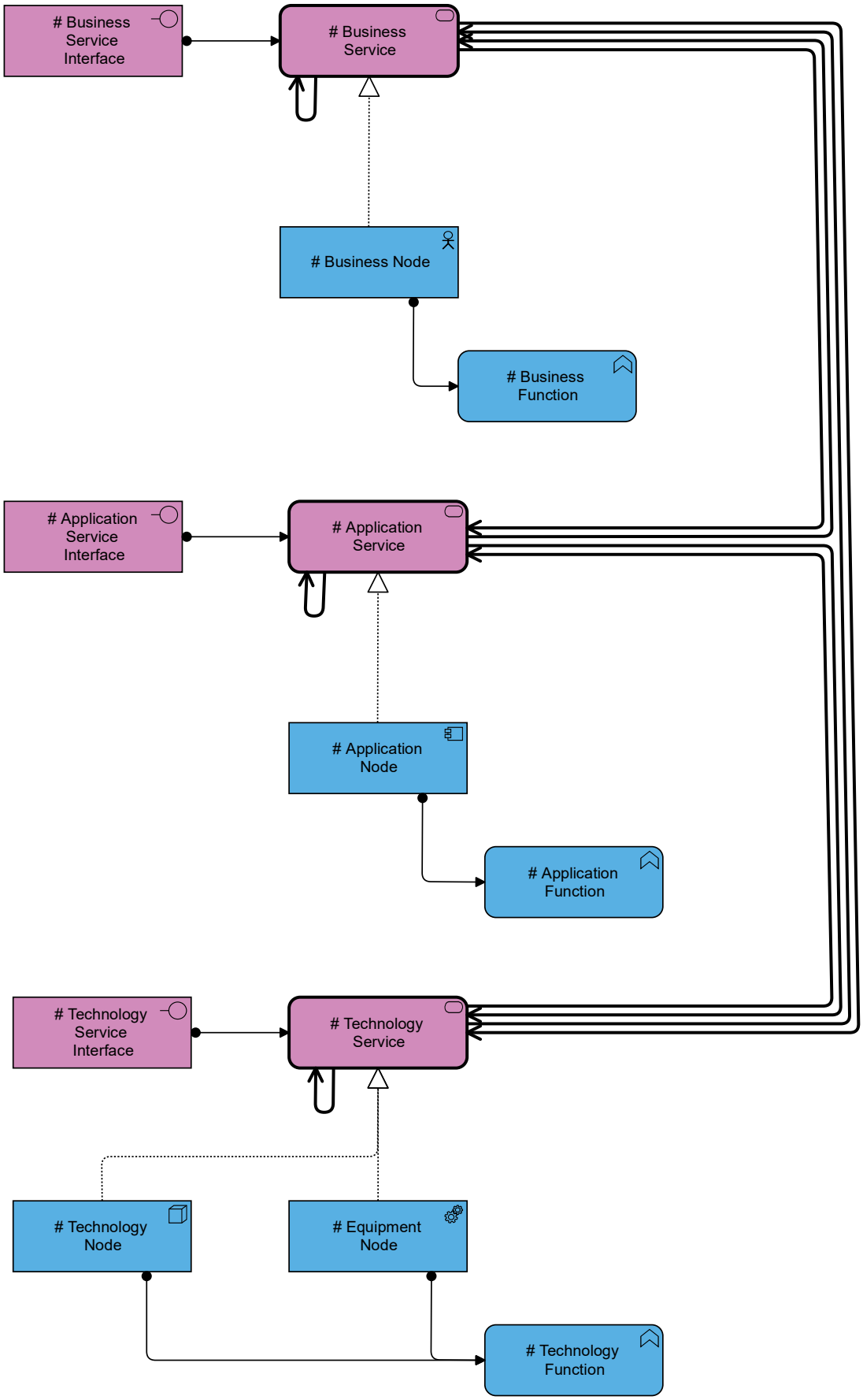
Services exist at 3 layers within ArchiMate. Where the layering of services is applicable to the architecture, they must be present on the viewpoint.
Hierarchical relations of ***Services*** are represented using the *specialization* relation. Each ***Service*** may also be dependent upon other ***Services*** in the direction shown by the *serving* relations.
Each ***Service*** may have attributes which may include appropriate **Measures** for the ***Service.***

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Service Specification	# Application Service	Application service
Service Specification	# Business Service	Business service
Service Specification	# Technology Service	Technology service

12 S2 - SERVICE STRUCTURE

S2– Service Structure	NAFv3: NSV-12/NSOV-2, 6
The S2 Viewpoint is concerned with the identification and specification of how services are structured to create higher-aggregated services. To provide high-level views, dependencies to other services, nodes and resources as well as service interfaces and service functions can be represented. Views implementing this Viewpoint: • Shall identify the structure of aggregated services. • Shall identify dependencies between services. • May specify dependencies between services and nodes or resources. • May include service interfaces defined in S3. • May include service functions defined in S4.	
CONCERNS ADDRESSED	**USAGE**
• Detailed Service Specifications. • Requirements for Service compatibility. • Service implementation guidance.	• Service composition. • Service dependency analysis. • Service-oriented architecture governance. • Service interoperability.
REPRESENTATION	
• Tabular. • Matrix. • Dependency graph. • Diagram.	

12.1 S2 Objects [by NAF Layer]



12.2 S2 Implementation Guidance

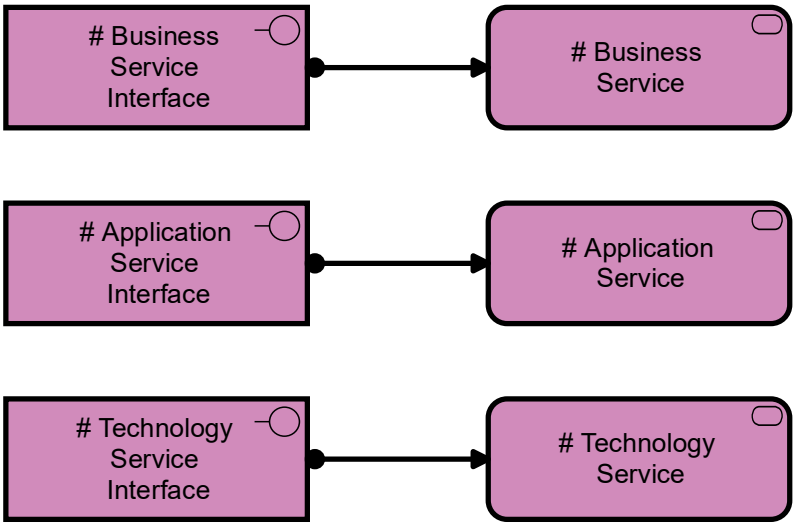
Services, **Service *Interfaces*** and ***Functions*** exist at 3 layers within ArchiMate. Where this layering is applicable to the architecture, this must be present in this viewpoint.
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Dependency relations are represented by *serving* relations between ***Services*** with each ***Service*** describing at least one **Service *Interface*** and *realized* by one or more **Nodes**. The **Service *Interface*** is *assigned* to the ***Service***.
A **Node** may have *assigned Functions,* in this context ArchiMate *Functions* are used to represent **Service Functions**.
Further traceability to resources should be defined in the P2 viewpoint.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
OperationalPerformer	# Application Node	Application component
OperationalPerformer	# Business Node	Business actor
OperationalPerformer	# Equipment Node	Equipment
OperationalPerformer	# Technology Node	Node
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Function	# Application Function	Application function
Service Function	# Business Function	Business function
Service Function	# Technology Function	Technology function
Service Interface	# Application Service Interface	Application interface
Service Interface	# Business Service Interface	Business interface
Service Interface	# Technology Service Interface	Technology interface
Service Specification	# Application Service	Application service
Service Specification	# Business Service	Business service
Service Specification	# Technology Service	Technology service

13 S3 - SERVICE INTERFACES

S3– Service Interfaces	NAFv3: NSOV-2
The S3 Viewpoint is concerned with the identification and specification of service interfaces. Views implementing this Viewpoint: • Shall identify service interfaces provided by a service. • May identify service interfaces required by a service. • May identify operations for service interfaces. • May specify service operations.	
CONCERNS ADDRESSED	**USAGE**
• Detailed Service Specifications. • Requirements for Service compatibility. • Service implementation guidance.	• Service-oriented architecture governance. • Detailed Service specification. • Service interoperability.
REPRESENTATION	
• Tabular. • Diagram.	

13.1 S3 Objects [by NAF Layer]



13.2 S3 Implementation Guide

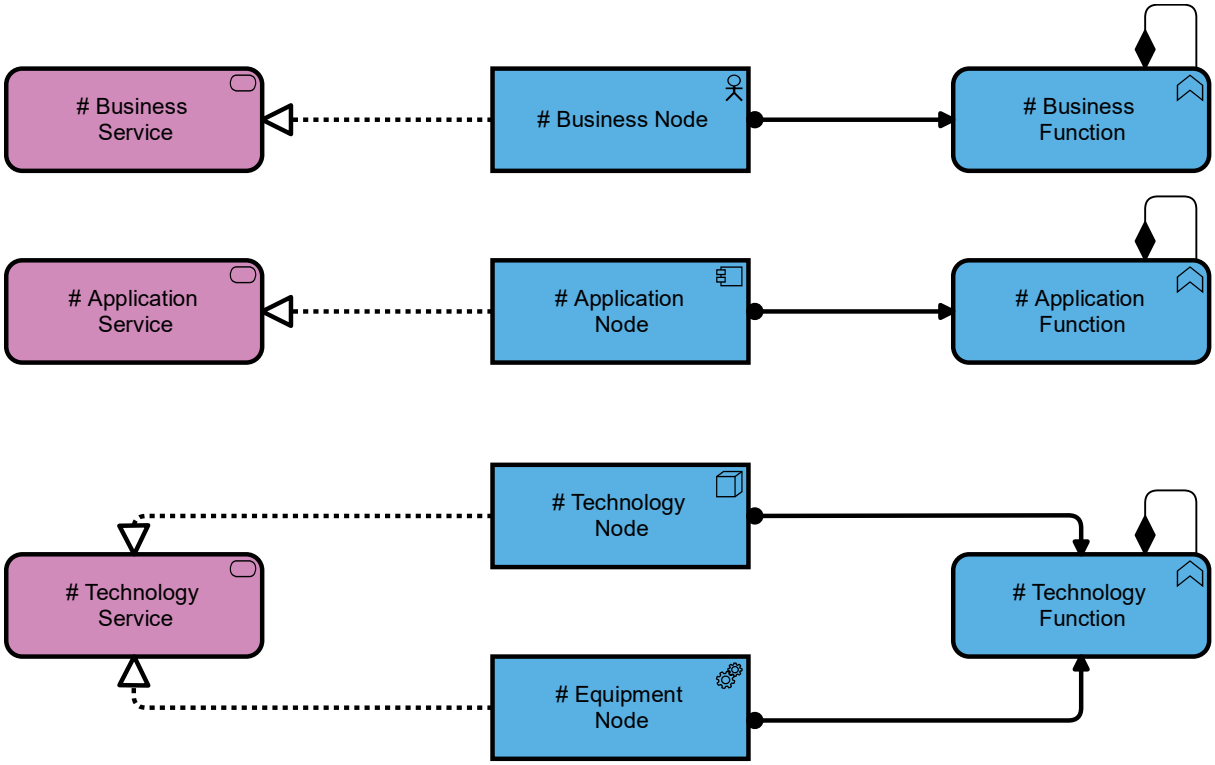
Services and **Service *Interfaces*** exist at 3 layers within ArchiMate. Where this layering is applicable to the architecture, they must be present in this viewpoint.
Each ***Service*** must have a*ssigned* one or more **Service *Interfaces***.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Interface	# Application Service Interface	Application interface
Service Interface	# Business Service Interface	Business interface
Service Interface	# Technology Service Interface	Technology interface

14 S4 - SERVICE FUNCTIONS

S4 – Service Functions	NAFv3: NSOV-3
The S4 Viewpoint is concerned with the definition of the behavior of a service in terms of the functions it is expected to perform. Views implementing this Viewpoint: • Shall identify all functions a service is performing. • May specify composition of service functions.	
CONCERNS ADDRESSED	**USAGE**
• Detailed Service Specifications. • Outline requirements for Service behavior. • Service implementation guidance.	• Service specification & planning. • Governance.
REPRESENTATION	
• Tabular. • Diagram.	

14.1 S4 Objects [by NAF4 Layer]



14.2 S4 Implementation Guidance

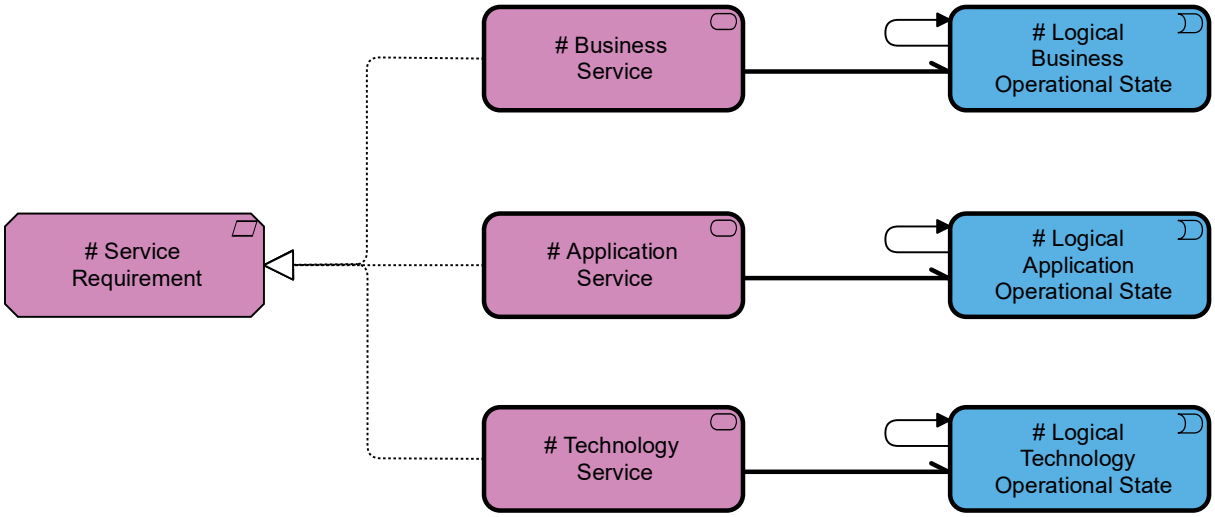
Services and **Service *Functions*** exist at 3 layers within ArchiMate. Where this layering is applicable to the architecture, they must be present in this viewpoint.
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Services are *realized* by **Nodes**. Therefore traceability between services and functions is derived through nodes.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Function	# Application Function	Application function
Service Function	# Business Function	Business function
Service Function	# Technology Function	Technology function

15 S5 - SERVICE STATES

S5– Service States	NAFv3: NSOV-4B
The S5 Viewpoint is concerned with the identification and definition of the possible states a service may have, and the possible transitions between those states. Views implementing this Viewpoint: • Shall identify and define all allowable states of a service. • May describe possible state transitions. • May describe service constraints.	
CONCERNS ADDRESSED	**USAGE**
• Detailed Service Specifications. • Outline requirements for Service behavior. • Service implementation guidance.	• Service behavior specification.
REPRESENTATION	
• Diagram. • State transition model.	

15.1 S5 Objects [by NAF Layer]



15.2 S5 Implementation Guidance

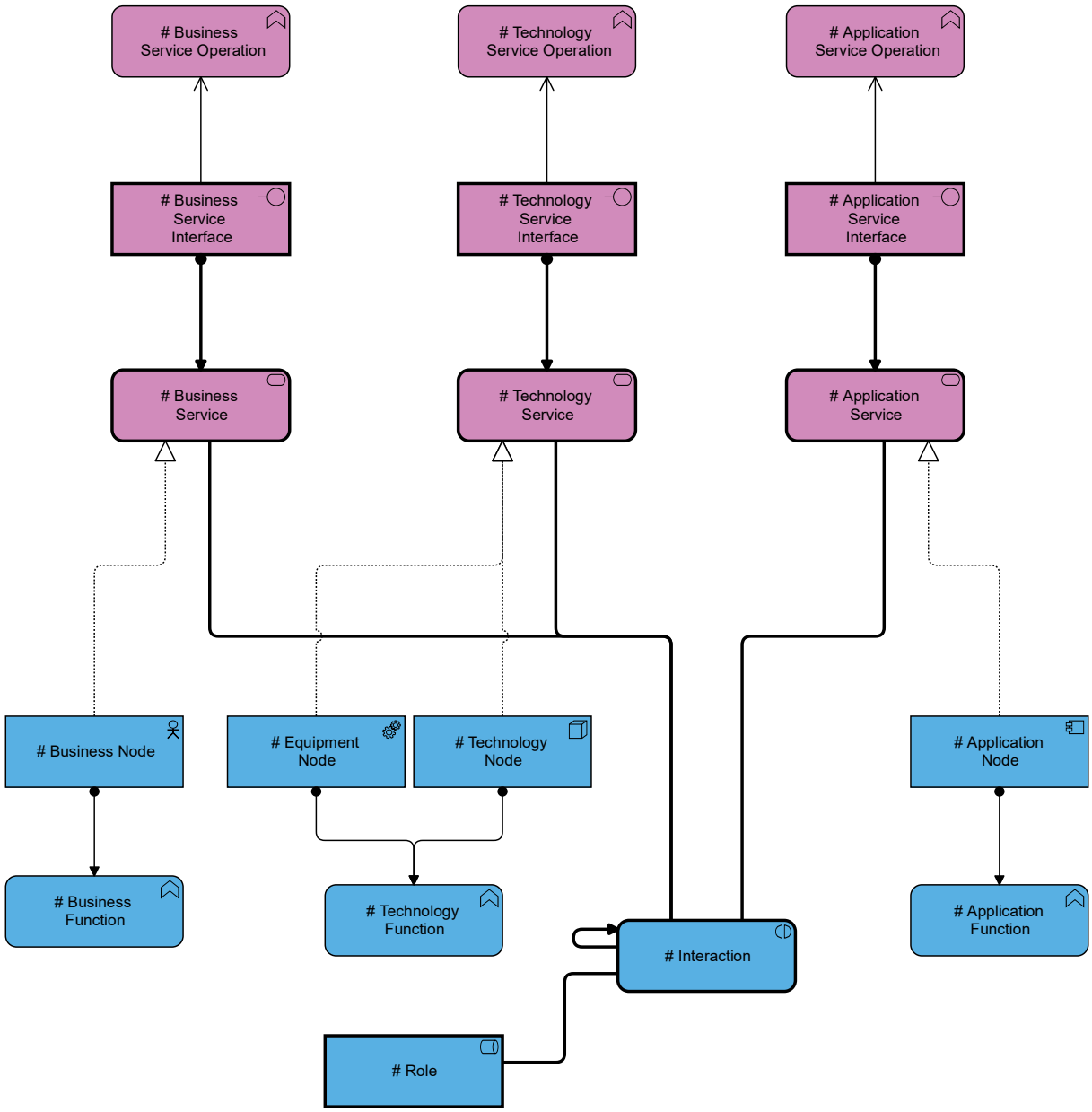
Services exist at 3 layers within ArchiMate, where this layering is applicable to the architecture, this must be present in this viewpoint.
A ***Service*** shall be *associated with* one or more **Operational States,** as *Events,* that correspond to the appropriate ArchiMate layer for the ***Service*** which may *realize* a **Service *Requirement.***
Transitions between **Operational States** may be depicted using a *triggering* relation.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Constraint	# Service Requirement	Requirement
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
State	# Logical Application Operational State	Application event
State	# Logical Business Operational State	Business event
State	# Logical Technology Operational State	Technology event

16 S6 - SERVICE INTERACTIONS

S6– Service Interactions	NAFv3: NSOV-4C
The S6 Viewpoint is concerned with describing interactions of a service with service consumers, and the sequence and dependencies of those interactions. Views implementing this Viewpoint: • Shall identify service is scope. • Shall identify service consumers. • Shall identify interactions of service consumers with the service. • May show service operations, and sequence of service operations. • May show service functions, and sequence of service functions.	
CONCERNS ADDRESSED	**USAGE**
• Detailed Service Specifications. • Outline requirements for Service behavior. • Service implementation guidance.	• Service specification.
REPRESENTATION	
• Sequence Diagram.	

16.1 S6 Objects [by NAF Layer]



16.2 S6 Implementation Guidance

Services,* Service *Interfaces,* Service *Functions and **Service Operations** (modeled as *functions*) exist at 3 layers within ArchiMate. Where this layering is applicable to the architecture, they must be present in this viewpoint.

Nodes exist at 4 ArchiMate layers, depending on their layer are represented by *Business Actor, Application Component, Technology Node* and *Equipment.* ***Nodes*** *realize* ***Services.***

A **Service Operation** is *served* by the **Service *Interface*** which is in turn *assigned* to the ***Service.***

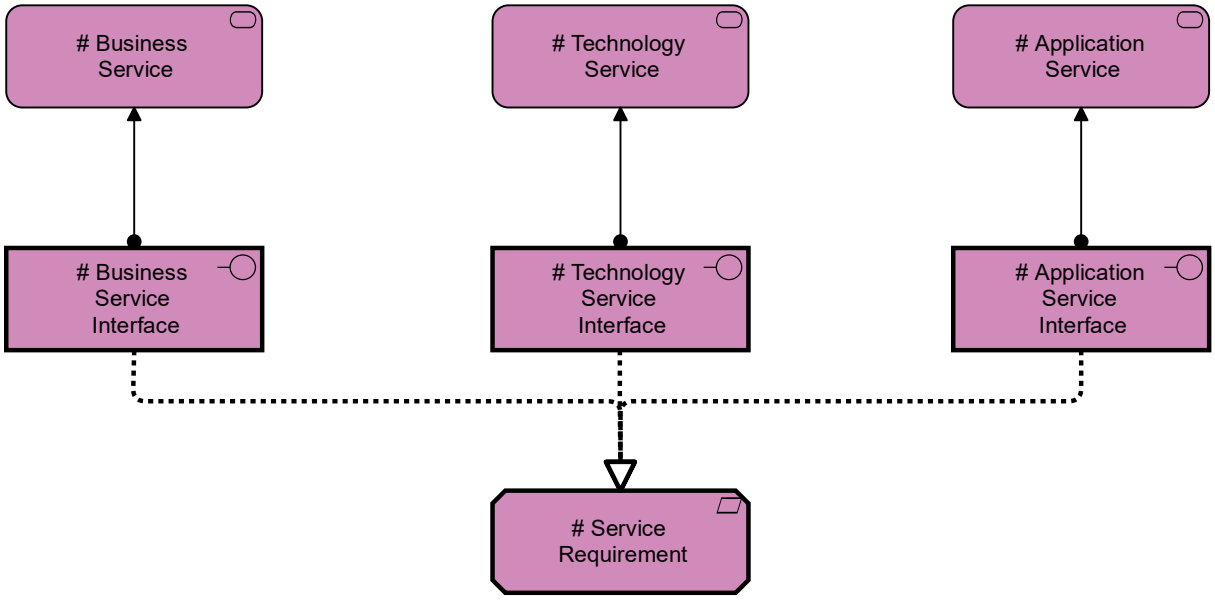
A ***Business Role*** or a ***Service*** can *interact* with any other ***Service*** and/or ***Business Role***, via an *association* relation. Each ***Interaction*** can have attributes to mark the start and end points. Visually this will be similar to a UML sequence diagram. The description here is for modelling purposes only.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Interaction	# Interaction	Business interaction
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Role	Business role
Node	# Technology Node	Node
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Consumer	# Role	Business role
Service Function	# Application Function	Application function
Service Function	# Business Function	Business function
Service Function	# Technology Function	Technology function
Service Interface	# Application Service Interface	Application interface
Service Interface	# Business Service Interface	Business interface
Service Interface	# Technology Service Interface	Technology interface
Service Operation	# Application Service Operation	Application function
Service Operation	# Business Service Operation	Business function
Service Operation	# Technology Service Operation	Technology function

17 S7 SERVICE I/F PARAMETERS

S7– Service Interface Parameters	NAFv3: NSOV-2
The S7 Viewpoint is concerned with identification and specification of all the parameters used in service operations. Views implementing this Viewpoint: • Shall identify parameters of service operations relevant for the architecture. • May specify the data types of each parameter. • May show the assignment of service operations to service interfaces.	
CONCERNS ADDRESSED	**USAGE**
• Detailed Service design. • Service compatibility analysis.	• Service-oriented architecture governance. • Detailed service specification. • Service interoperability.
REPRESENTATION	
• Tabular. • Diagram.	

17.1 S7 Objects [by NAF Layer]



17.2 S7 Implementation Guidance

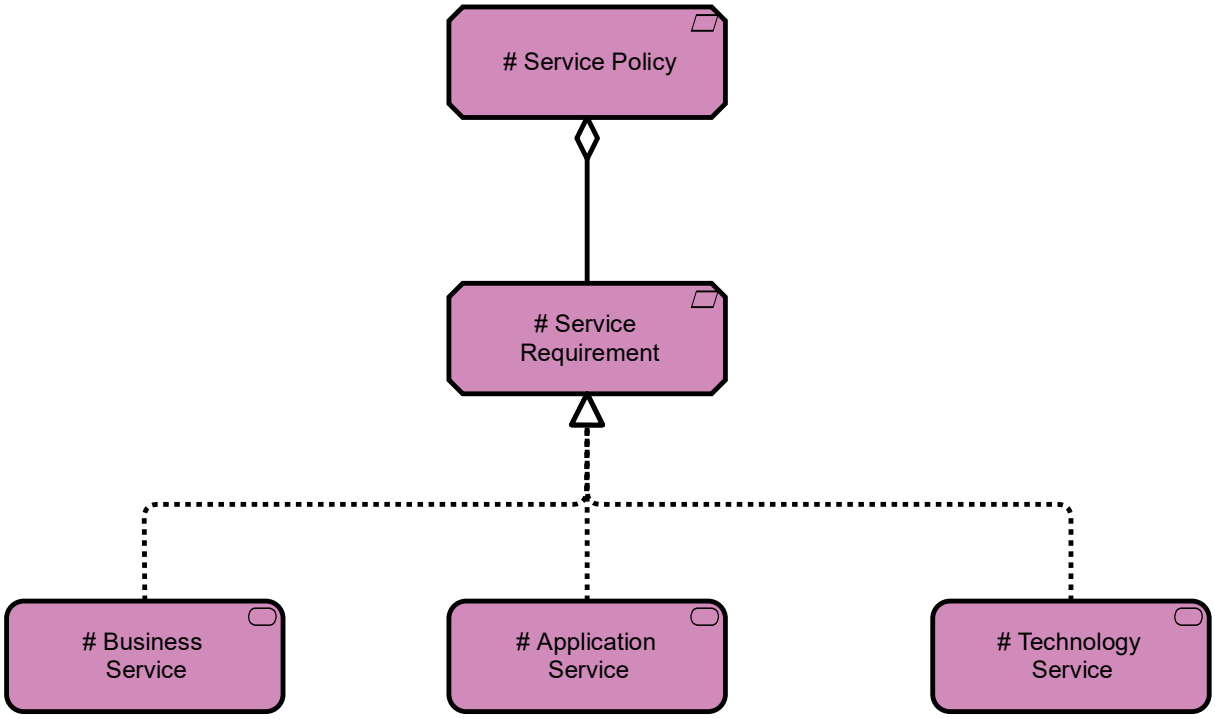
Services and **Service *Interfaces*** exist at 3 layers within ArchiMate. Where this layering is applicable to the architecture, they must be present in this viewpoint.
Each ***Service*** may *have assigned* at least one **Service *Interface*** which shall *realize* a **Service *Requirement*** via the parameters of the interface.
Services in this viewpoint are equivalent to **Service Operation** in the NAF description and are visualized as such, the parameters themselves should be modelled as attributes of the interface.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Constraint	# Service Requirement	Requirement
Service Interface	# Application Service Interface	Application interface
Service Interface	# Business Service Interface	Business interface
Service Interface	# Technology Service Interface	Technology interface

18 S8 - SERVICE POLICY

S8– Service Policy	NAFv3: NSOV-4C
The S8 Viewpoint is concerned with the identification and description of rules that apply to service implementations. Views implementing this Viewpoint: • Shall define constraints that shall apply for implementations of each service specifications relevant for the architecture. • May include measures for the service specifications. • May include attributes for the service specifications.	
CONCERNS ADDRESSED	**USAGE**
• Service Specifications. • Contracting for Services. • User / System Requirements.	• Service design. • Service governance.
REPRESENTATION	
• Tabular. • Diagram.	

18.1 S8 Objects [by NAF Layer]



18.2 S8 Implementation Guidance

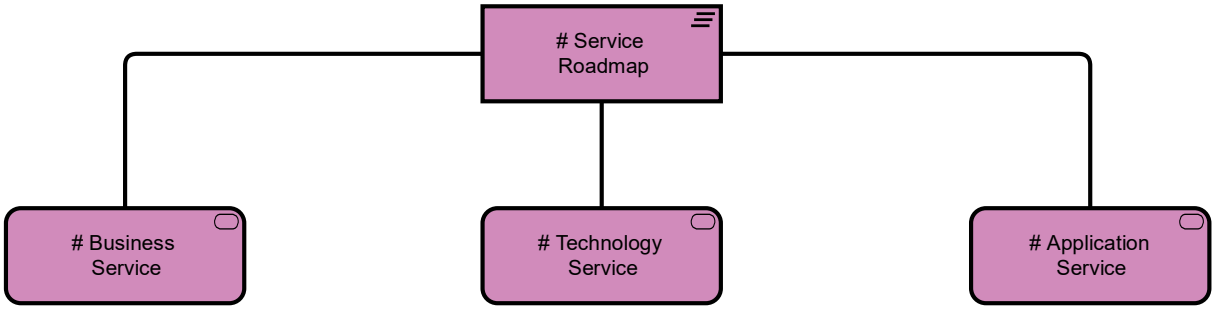
Services exist at 3 layers within ArchiMate. Where the layering of services is applicable to the architecture, they must be present on the viewpoint.
The ***Service***(s) shall *realize* a **Service Requirement** [a defined set of requirements], represented as a *Requirement*, itself being *aggregated* by **Service *Policy***.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Constraint	# Service Requirement	Requirement
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Policy	# Service Policy	Requirement
Service Specification	# Application Service	Application service
Service Specification	# Business Service	Business service
Service Specification	# Technology Service	Technology service

19 SR - SERVICE ROADMAP

Sr– Service Roadmap	NAFv3: NONE
The Sr Viewpoint is concerned with the identification and description of life cycle information of service specifications. Views implementing this Viewpoint: • Shall identify service specifications related to the roadmap • Shall define start and end date of service specification support. • May identify programs or projects associated with the service specification delivery/withdrawal. • May identify service levels. • May identify service attributes. • May associate measures to service attributes.	
CONCERNS ADDRESSED	**USAGE**
• Service Life Cycle Planning. • Acquisition Management.	• Service phasing. • Service gap/surplus analysis. • High-level dashboard for acquisition management.
REPRESENTATION	
• A time based chart in the style of a Gantt chart. • Tabular.	

19.1 Sr Objects [by NAF Layer]



19.2 Sr Implementation Guidance

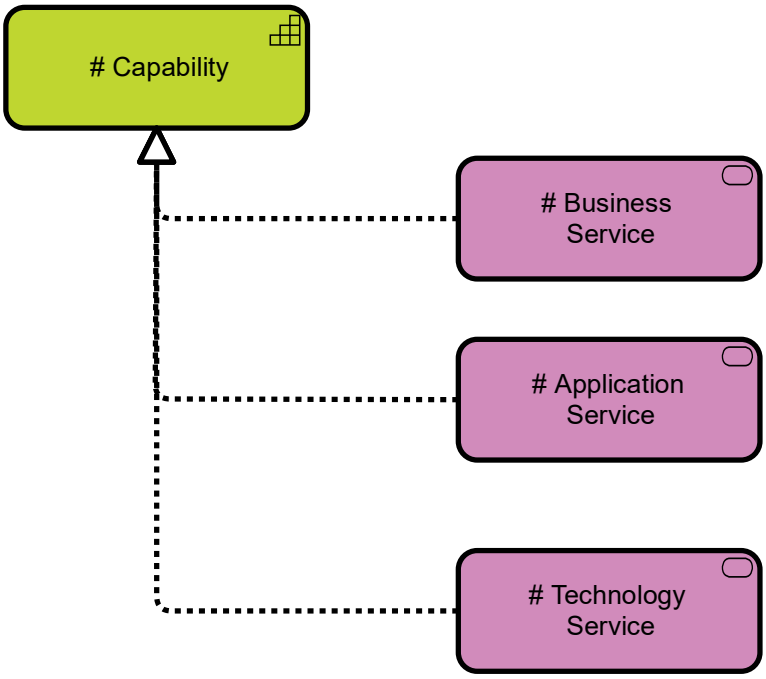
Services exist at 3 layers within ArchiMate. Where the layering of services is applicable to the architecture, they must be present on this viewpoint.
The **Service Roadmap** is the roadmap canvas on which the ***Service*** is laid out as a Gantt chart, represented here as a *Plateau*.
Each ***Service*** can have an attribute for start and end date for the readiness level appropriate to the ***Service.***
Visually this will be similar to a Gantt chart. The description here is for modelling purposes only.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Service Roadmap	# Service Roadmap	Plateau
Service Specification	# Application Service	Application service
Service Specification	# Business Service	Business service
Service Specification	# Technology Service	Technology service

20 C1-S1 SERVICE TO CAPABILITY MAPPING

4.10 C1-S1 – Capability to Service Mapping	NAFv3: NSOV-3
The C1-S1 Viewpoint is concerned with identification and description of services that enable capabilities. Views implementing this Viewpoint: • Shall contain service specifications relevant for the architecture. • Shall contain capabilities relevant for the architecture. • Shall associate services to capabilities they enable.	
CONCERNS ADDRESSED	**USAGE**
• Mapping of capabilities to services that they are supported by.	• Service Specification & Planning. • Governance.
REPRESENTATION	
• Matrix (with capabilities on one axis, and services on the other one). • Diagram.	

20.1 C1-S1 Objects [by NAF Layer]



20.2 C1-S1 Implementation Guidance

Services exist at 3 layers within ArchiMate. Where the layering of services is applicable to the architecture, they must be present on this viewpoint. ***Services*** *realize* a ***Capability.***

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Specification	# Application Service	Application service
Service Specification	# Business Service	Business service
Service Specification	# Technology Service	Technology service

21 LOGICAL GLOSSARY

21.1 Logical Layer Glossary

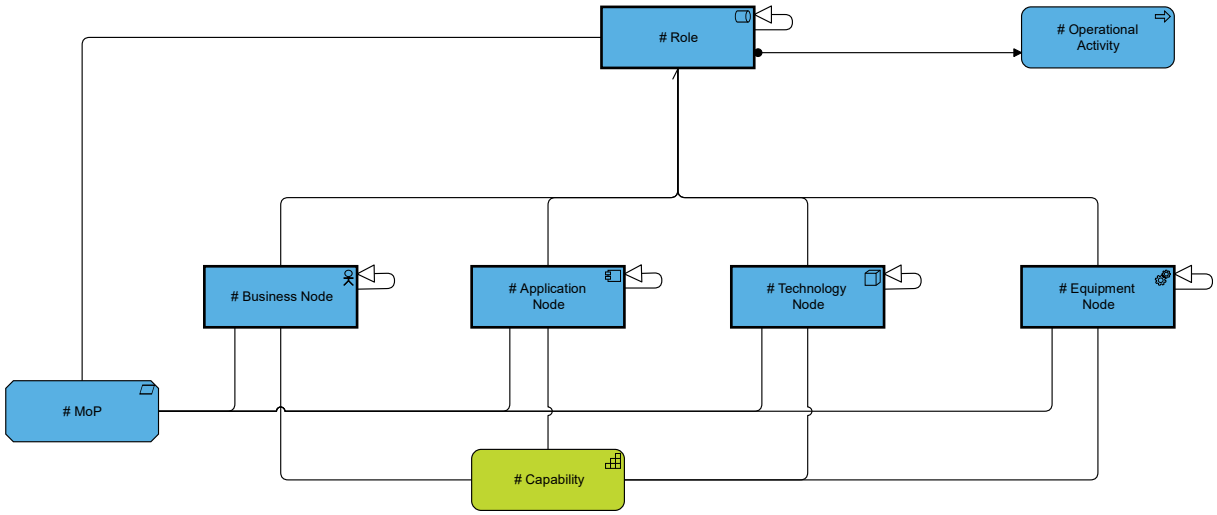
NAFv4 ArchiMate Name	ArchiMate Name	Description
# Event	Business event	An external trigger to start a [sequence of] Interaction[s] at the logical level. Example: Casualty at the point of injury.
# Equipment Node	Equipment	The logical class of Active Resource of type Equipment. e.g. Tent, Helicopter, Jet Plane.
# Logical Material	Material	A Passive Resource that may be produced, consumed or conveyed at the logical layer.
# Technology Node	Node	The logical class of Active Resource of type Technology. e.g. Network Switch, Server.
# Logical Location	Location	The place a logical element [can] exist[s]. A hospital, a field.
# Logical Requirement	Requirement	A constraint specified at the service level.
# Business Node	Business actor	The logical class of Active Resource of type Business. e.g. Company, Battalion, Team.
# Business Function	Business function	An internal behavioral 'Feature' of a Business Node.
# Role	Business role	The responsibilities and characteristics of a Node.
# Technology Function	Technology function	An internal behavioral 'Feature' of a Technology Node.
# Logical Business Operational State	Business event	A functional condition of an Business Node at a point in time. There is no natural mapping of an ArchiMate element to a State. However, states are linked to events in that an event needs to occur to move from one state to another.
# MoP	Requirement	Type of measurement specifically of Performance [of a Node].
# Information Element	Data object	An identified unit or piece of Knowledge that is exchangeable amongst users, about things, facts, concepts, and so on, in a universe of discourse.
# Information Attribute	Requirement	A representation of a property of an [Information Entity].
# Application Node	Application component	The logical class of Active Resource of type Application. e.g. CRM System, ERP System.
# Logical Application Operational State	Application event	A functional condition of an Application Node at a point in time. Example: the state of an application could be unstable. There is no natural mapping of an ArchiMate element to a State. However, states are linked to events in that an event needs to occur to move from one state to another.
# Application Function	Application function	An internal behavioral 'Feature' of an Application Node.
# Operational Activity	Business process	An element of logical behavior, specified independently of how it is carried out.

# Interaction	Business interaction	An [Interaction] between two or more Services or Active Resources at the Service or Logical Layer, conveying Passive or Data Resources.
# Logical Technology Operational State	Technology event	A functional condition of an Technology or Equipment Node at a point in time. Example: the state of software might be out of date. There is no natural mapping of an ArchiMate element to a State. However, states are linked to events in that an event needs to occur to move from one state to another.
# Standard Operational Activity	Business process	An [Operational Activity] that is a standard procedure specified by policies (e.g. doctrine).

22 L1 - NODE TYPES

L1– Node Types	NAFv3: NOV-2
The L1 Viewpoint is concerned with the identification of nodes, and their organization into specialization hierarchies (taxonomies). In the NAF, nodes are logical entities (i.e. defined independent of their implementation) that are able to perform behavior. Views implementing this Viewpoint: • Shall identify all nodes relevant for the architecture. • May show a specialization hierarchy for nodes. • May trace nodes to capabilities they need. • May trace nodes to roles they are performing in activities. • May include Measures of Performance (MoP). A node taxonomy, in whole or parts, may be referenced by, or used in describing, multiple architectures (e.g. a L1 View at enterprise-level will be referenced by L1 Views at the capability-level).	
CONCERNS ADDRESSED	**USAGE**
• User Requirements. • Operational Planning. • High-Level Systems Requirements.	• Initial set up of a Logical Architecture. • Defining MoP for requirements specification purposes. • Defining the types of environment in which Nodes may operate.
REPRESENTATION	
• Topological (connected shapes). • Tabular.	

22.1 L1 Objects [by NAF Layer]



22.2 L1 Implementation Guidance

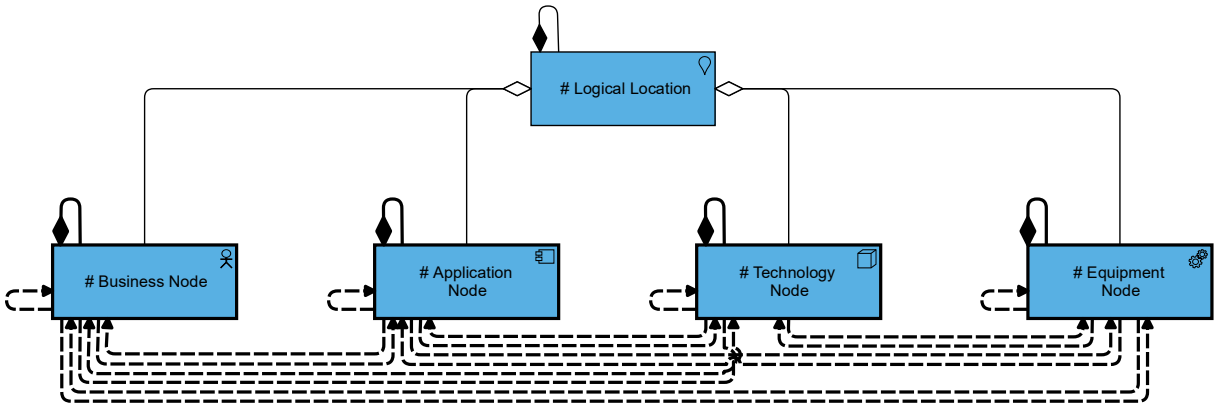
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Active Resources at the logical layer are either a *Business* ***Role*** or **Node**. Any **Active Resource** can be a *specialization* of its own **Node** type. **Nodes** are *associated with Business* ***Roles***.
A *Business* ***Role*** may be *assigned to* an **Operational Activity.**
Nodes may be *associated with* a ***Capability*** when they are dependent on it, and *Business* ***Role*** to represent their 'usage' in the **Operational Activity**.
All **Active Resources** may have an **MoP** (Measure of Performance)**,** represented as a *Requirement.*

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
MoP	# MoP	Requirement
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Role	Business role
Node	# Technology Node	Node
OperationalActivity	# Operational Activity	Business process

23 L2 - LOGICAL SCENARIO

L2 – Logical Scenario	NAFv3: NOV-2
The L2 Viewpoint is concerned with identifying key or aggregated interactions between nodes. Views implementing this Viewpoint: • Shall include nodes relevant for the architecture. • Shall define logical flows (e.g. logical flow of information) independent of their implementation. • Shall only include key individual and/or aggregated logical flows between nodes. • May include a mapping of nodes to locations.	
CONCERNS ADDRESSED	**USAGE**
• User Requirements. • Operational Planning. • Scenario Specification.	• Definition of operational concepts. • Elaboration of capability requirements. • Definition of collaboration needs. • Associating capability with a location. • Problem space definition. • Operational planning. • Supply chain analysis. The L2 Viewpoint can be enhanced with additional features for modelling security: • Security domain specification. • Logical entity trust models. • Threat specification (e.g. threat vectors) and counter-capability specifications.
REPRESENTATION	
• Topological (connected shapes). • Composite structure diagram.	

23.1 L2 Objects [by NAF Layer]



23.2 L2 Implementation Guidance

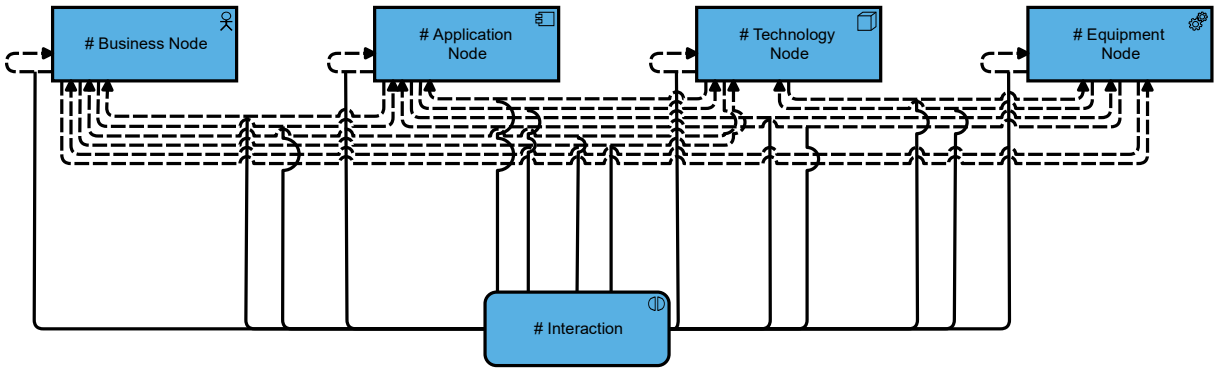
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Active Resources at the logical layer are either a ***Business Role*** or **Node**. Each **Node** can be *composed of* other **Nodes**, of the same type. **Nodes** may also be *aggregated by* a **Logical *Location.***
Flow relations represent flow of information between **Nodes** (as **Active Resources**) of any type as part of the scenario.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Logical Location	# Logical Location	Location
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node

24 L2-L3 - LOGICAL CONCEPT

L2-L3 – Logical Concept	NAFv3: NOV-1
The L2-L3 Viewpoint is concerned with providing an executive level, scenario-based communication of the architecture purpose, scope and content. A View implementing this Viewpoint: • Shall show the main elements in scope of the Architecture Description. • Shall show the main interactions of these elements. • May show interactions of the main elements with elements outside the scope. • May include any meta-model element. • May include rich picture or graphics.	
CONCERNS ADDRESSED	**USAGE**
• High-Level Communication of Architecture. • Senior Stakeholder Engagement.	• Puts an operational situation or scenario into context. • Provides a tool for discussion and presentation; e.g. aids industry engagement in acquisition. • Provides an overview of more detailed information in published architectures.
REPRESENTATION	
• Graphic. • Rich Picture. • Concept diagram. • Project context diagram.	

24.1 L2-L3 Objects [by NAF Layer]



24.2 L2-L3 Implementation Guidance

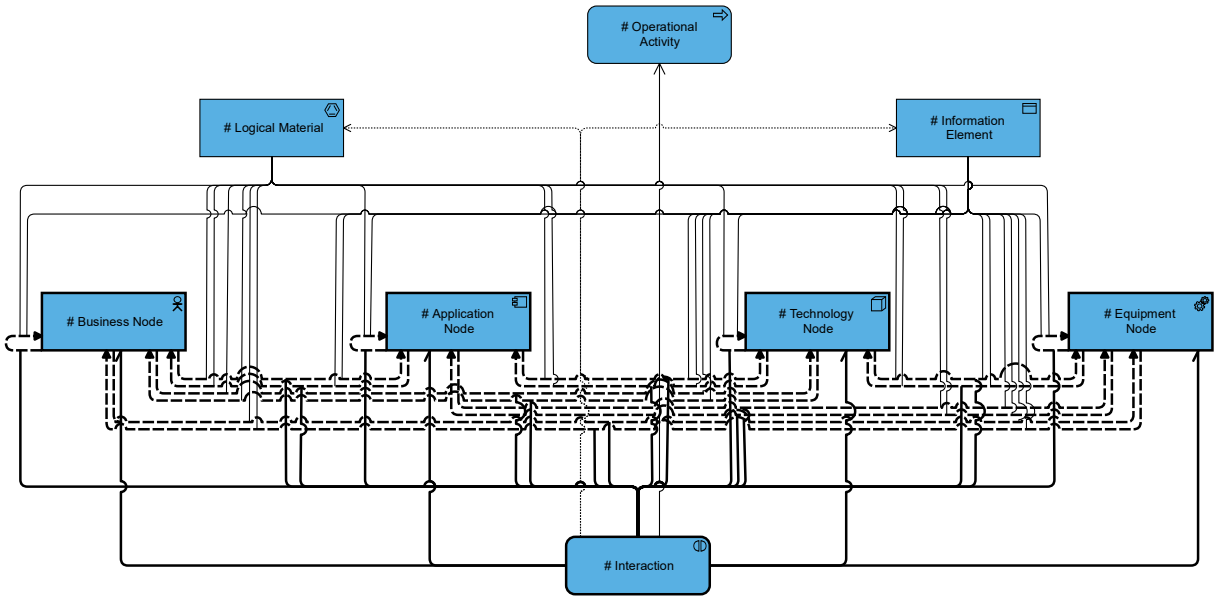
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Business ***Interactions*** are *associated with flow* relations between **Nodes** for modelling purposes only. Each ***Interaction*** may have attributes that define its properties. Visually this will be a rich picture containing only **Nodes** and *flows.*

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Interaction	# Interaction	Business interaction
Logical Flow	# Interaction	Business interaction
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node

25 L3 - NODE INTERACTIONS

L3 – Node Interactions	NAFv3: NOV-2, 3
The L3 Viewpoint is concerned with identifying all relevant interactions between nodes. Views implementing this Viewpoint: • Shall include nodes relevant for the architecture. • Shall include all logical flows (e.g. logical flow of information) between nodes relevant to the architecture. • Shall define logical flows independent of their implementation. • May associate the logical flows to logical activities. • May define properties of the logical flows. • May define measure of the logical flows.	
CONCERNS ADDRESSED	**USAGE**
• Interoperability Requirements.	• Definition of interoperability requirements.
REPRESENTATION	
• Tabulation. • Information flow diagram.	

25.1 L3 Objects [by NAF Layer]



25.2 L3 Implementation Guidance

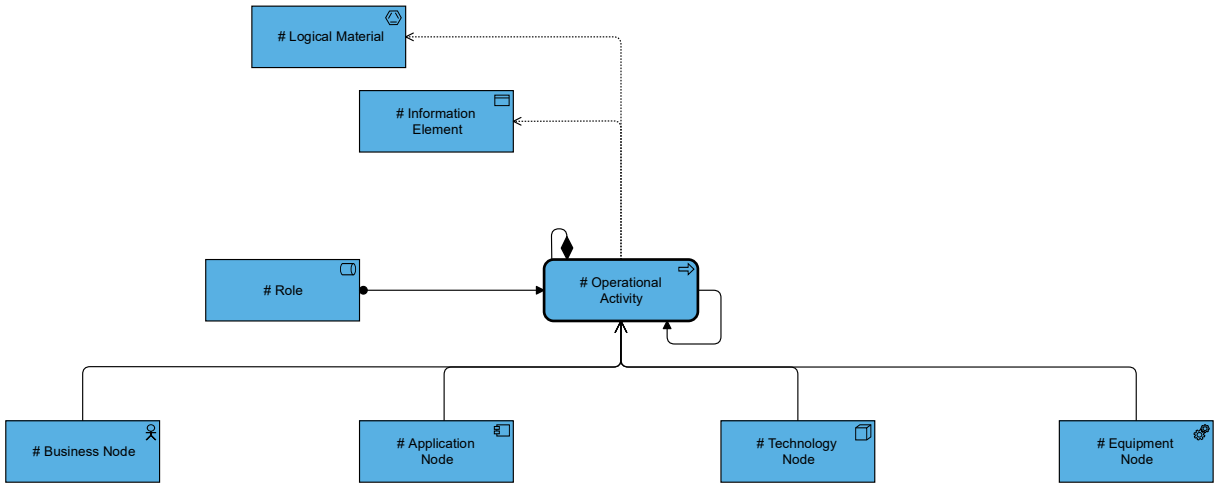
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Business ***Interactions*** are *associated with* **Nodes** and the *flow* relations between them, they *access* both ***Material*** and **Information Elements,** as *Data Objects,* during the **Interaction.**
Attributes may be added to ***Interactions*** to describe their properties with *association* relations between **Passive Resources** and *flows* as part of the ***Interaction***, which is in turn *associated* with the *flow* relation.
This viewpoint also visualizes how the **Interaction** *serves* the **Operational Activity.**

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Logical Activity	# Operational Activity	Business process
Logical Flow	# Interaction	Business interaction
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node

26 L4 - LOGICAL ACTIVITIES

L4 – Logical Activities	NAFv3: NOV-5
The L4 Viewpoint is concerned with the identification of logical (i.e. implementation independent) activities, grouping and composition of these activities, and logical flows between the activities. Views implementing this Viewpoint: • Shall identify logical activities relevant for the architecture. • May identify groupings of activities. • May identify composition of activities. • May associate logical activities to nodes. • May identify logical flows between activities.	
CONCERNS ADDRESSED	**USAGE**
• Process Modelling. • Operational Planning. • Concept of Operations. • Service Orchestration.	• Requirements capture. • Description of business processes and workflows. • Operational planning. • Logistics support analysis. • Information flow analysis. • Support task analysis to determine training needs.
REPRESENTATION	
• Hierarchy chart. • Activity diagram. • Collaboration Diagram.	

26.1 L4 Objects [by NAF Layer]



26.2 L4 Implementation Guidance

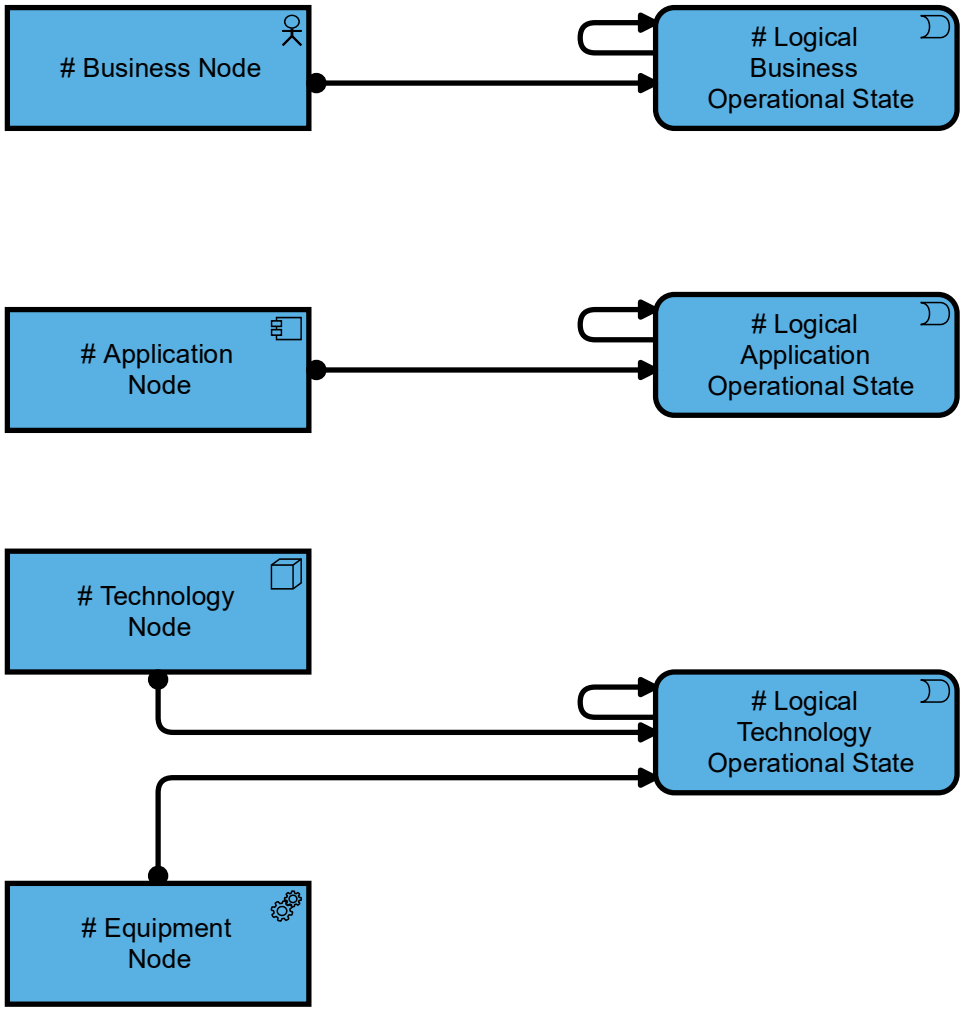
Nodes exist at 4 ArchiMate layers, and depending on their layer are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
One or more **Nodes** play a part in performing an **Operational Activity** via a *serving* relation through the conveyance of ***Material*** and/or **Information Elements,** as *Data Objects.*
Roles are *assigned to* the **Operational Activity** and represent the 'swimlane' in a process/activity diagram.
Grouping of **Operational Activities** is shown via a *composition* relation. A *triggering* relation is used to represent the logical flow between activities.
The specific flows between nodes are not shown here since they are adequately covered in **L2** and **L3.**

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Logical Activity	# Operational Activity	Business process
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Role	Business role
Node	# Technology Node	Node

27 L5 - LOGICAL STATES

L5 – Logical States	NAFv3: NOV-6b
The L5 Viewpoint is concerned with the identification and definition of the possible states a node may have, and the possible transitions between those states. Views implementing this Viewpoint: • Shall identify and define all states of a node relevant for the architecture. • May describe possible state transitions.	
CONCERNS ADDRESSED	**USAGE**
• Scenario Specification. • User Requirements Specification.	• Analysis of business events. • Behavioral analysis. • Identification of constraints.
REPRESENTATION	
• Topological (Connected Shapes). • State diagram.	

27.1 L5 Objects [by NAF Layer]



27.2 L5 Implementation Guidance

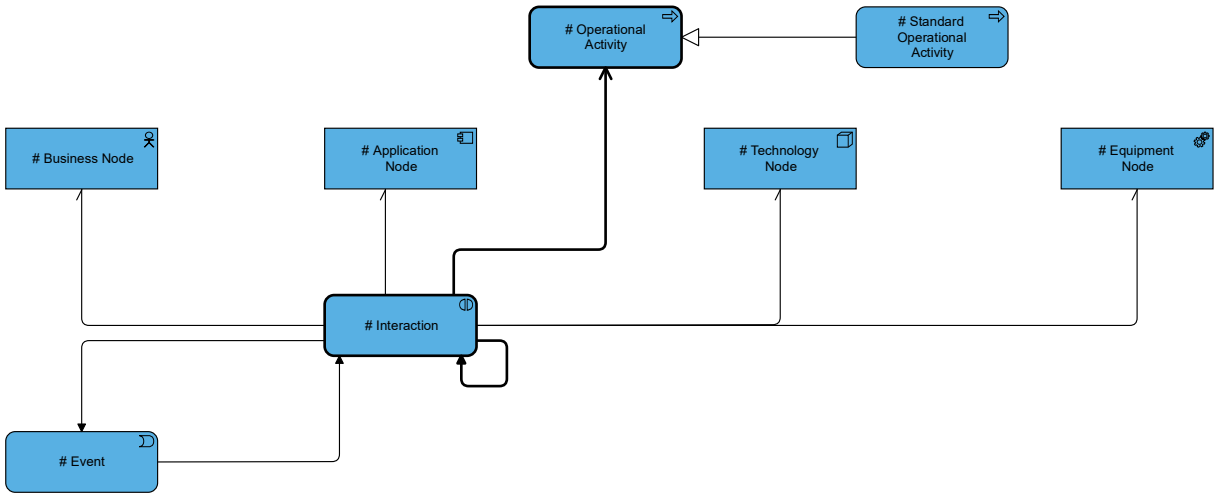
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Each **Node** *is assigned to* one or more **Operational States** that correspond to the *ArchiMate Layer* of the relevant **Node**. *Triggering* relations between the **Operational States** show **State Transitions** of the **Node** during operation.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
OperationalStateDescription	# Logical Application Operational State	Application event
OperationalStateDescription	# Logical Business Operational State	Business event
OperationalStateDescription	# Logical Technology Operational State	Technology event
State	# Logical Application Operational State	Application event
State	# Logical Business Operational State	Business event
State	# Logical Technology Operational State	Technology event

28 L6 LOGICAL SEQUENCE

L6 – Logical Sequence	NAFv3: NOV-6c
The L6 Viewpoint is concerned with identifying and describing the chronological sequence of activities and/or logical flows in a scenario. Views implementing this Viewpoint: • Shall identify the activities and/or logical flows relevant for a scenario. • Shall identify the chronological sequence of activities and/or logical flows. • May identify source and target nodes of logical flows • May identify start and end events of a sequence.	
CONCERNS ADDRESSED	**USAGE**
• Operational Planning. • User Requirements Specification. • Service Orchestration.	• Analysis of operational events. • Sequences of interactions between nodes. • Behavioral analysis. • Identification of non-functional user requirements. • Operational test scenarios.
REPRESENTATION	
• Sequence diagram. • Event-trace diagram. • Timing diagram.	

28.1 L6 Objects [by NAF Layer]



28.2 L6 Implementation Guidance

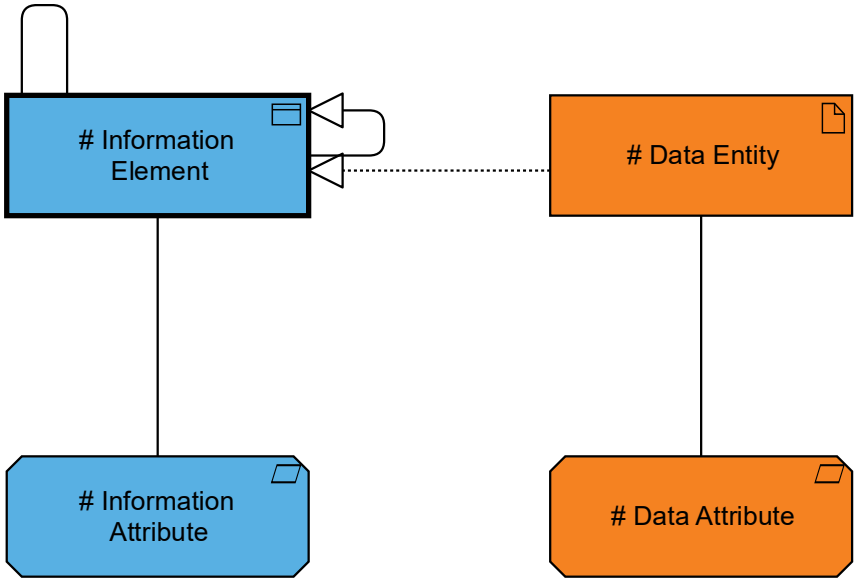
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Any **Node** can interact with any other **Node**, via an *association* relation with a *Business* ***Interaction*** the same ***Interaction*** as at the NAFv4 Service layer.
Each ***Interaction*** has attributes, not visualized here, that mark the start and end points of an ***Interaction*** in a sequence. The external **Event** that *triggers* the initial **Interaction,** as part of the sequence, is also shown as well as *triggering* relations between ***Interactions*** as part of the sequence.
The viewpoint also describes the part in the **Operational Activity** that the ***Interaction*** plays via a *serves* relation.
Visually this will be similar to a UML sequence diagram. The description here is for modeling purposes only.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Event	# Event	Business event
Logical Activity	# Operational Activity	Business process
Logical Flow	# Interaction	Business interaction
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
Standard Operation Activity	# Standard Operational Activity	Business process

29 L7 - INFORMATION MODEL

L7 – Information Model	NAFv3: NOV-7
The L7 Viewpoint is concerned with identifying information elements, and describing their relationships. Views implementing this Viewpoint: • Shall identify information elements relevant for the architecture. • May identify relationships between information elements. • May identify attributes of information elements. • May associate attributes with data entities.	
CONCERNS ADDRESSED	**USAGE**
• Information Requirements. • Message Requirements. • Information Models.	• Information architecture. • Information product hierarchy.
REPRESENTATION	
• Entity-Relationship diagram. • Class diagram.	

29.1 L7 Objects [by NAF Layer]



29.2 L7 Implementation Guidance

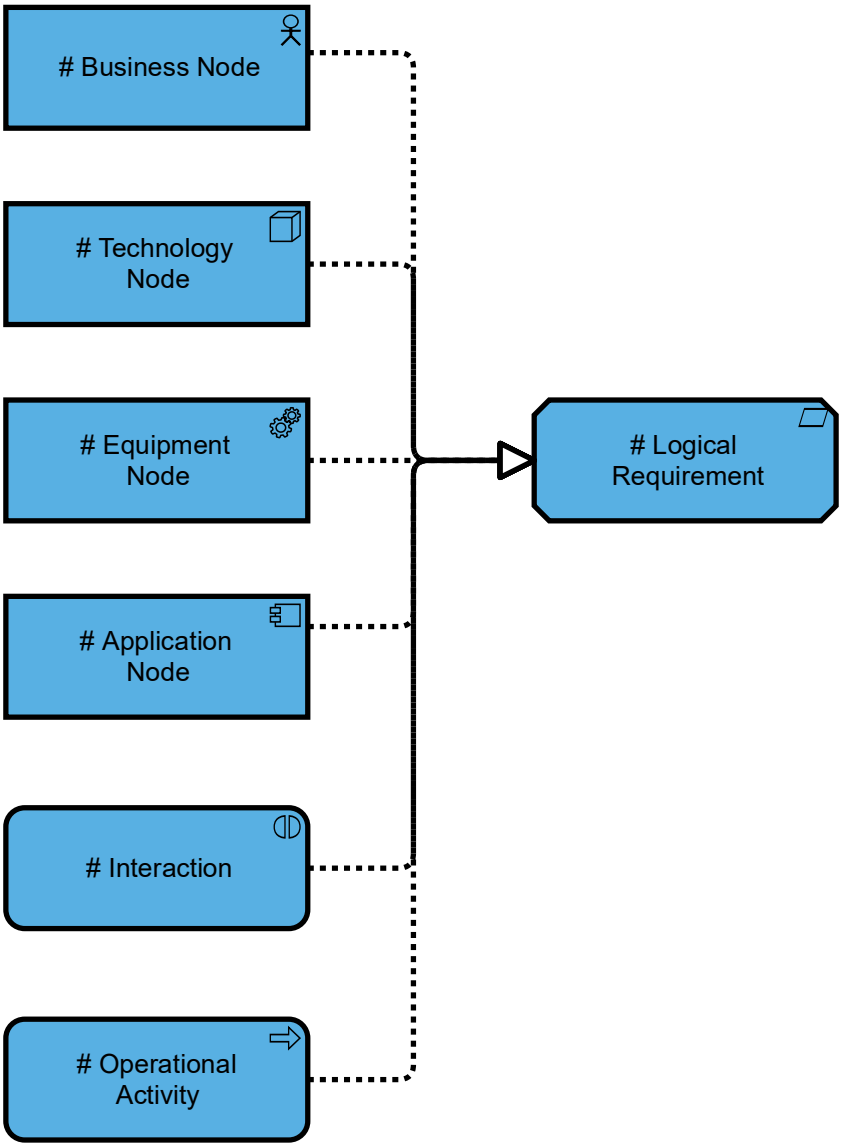
How **Information Elements** are related to each other, either hierarchically (*specialization*) or with other **Information Elements** (*association*) are shown in this viewpoint, alongside their **Information Attributes**, represented here as a *Requirements.*
How **Data Entities** *realize* the **Information Element** are also optionally described, as well as the **Data Attributes** of the **Data Entity,** represented here as a *Requirements.*
Whilst these *Requirements* are not expected to be modelled visually they are present here for completeness.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Attribute	# Data Attribute	Requirement
Attribute	# Information Attribute	Requirement
Data Element	# Data Entity	Artifact
Data Entity	# Data Entity	Artifact
Information Element	# Information Element	Data object

30 L8 - LOGICAL CONSTRAINTS

L8 – Logical Constraints	NAFv3: NOV-6A
The L8 Viewpoint is concerned with identification and description of operational or business rules. Views implementing this Viewpoint: • Shall identify operational or business rules relevant for the architecture. • Shall assign these rules to nodes, activities and/or logical flows.	
CONCERNS ADDRESSED	**USAGE**
• User Requirements Specification (Non-Functional). • Operational Constraints.	• Definition of business rules. • Identification of operational constraints.
REPRESENTATION	
• Structured Text. • Business rules diagram.	

30.1 L8 Objects [by NAF Layer]



30.2 L8 Implementation Guidance

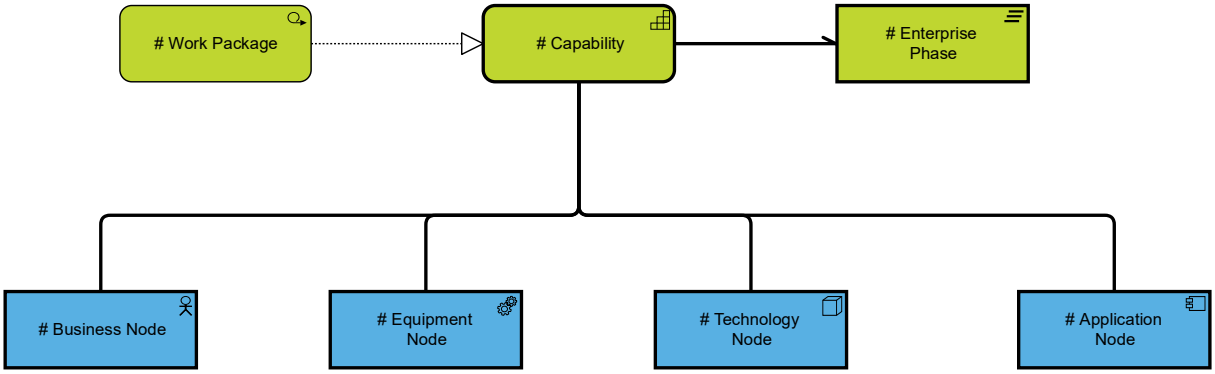
Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
All **Active Resources, Operational Activities** *(Business Process)* and *Business* ***Interactions*** can realize a **Logical *Requirement.***

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Logical Flow	# Interaction	Business interaction
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
Operational Constraints	# Logical Requirement	Requirement
OperationalActivity	# Operational Activity	Business process
Rule	# Logical Requirement	Requirement

31 LR - LINES OF DEVEOPMENT

Lr – Lines of Development	NAFv3: NPV-2
The Lr Viewpoint is concerned with identifying and defining logical threads (lines of developments) for a set of projects and/or programs. Views implementing this Viewpoint: • Shall identify project deliverables (e.g. capability increments, services or resource packages). • Shall associate project deliverables to project milestones. • May show states of deliverables at project milestones. • May associate project deliverables to enterprise phases. • May show project milestone dependencies.	
CONCERNS ADDRESSED	**USAGE**
• Acquisition Planning. • Portfolio / Program Management. • Project Performance Reporting / Dash boarding.	• Project management and control (including delivery timescales). • Project dependencies and the identification of associated risk. • Portfolio management. • Through Life Management Planning.
REPRESENTATION	
• Timeline View. • Augmented chart in style of a Gantt Chart.	

31.1 Lr Objects [by NAF Layer]



31.2 Lr Implementation Guidance

Nodes exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.* The evolution of these nodes is modeled as start and end dates as attributes of the **Nodes** that can subsequently be related to the **Enterprise Phase** via the **Capability Increment.**
The roadmap is the canvas on which the ***Capability Increment*** as a specialization of ***Capability*** (**C1**) is laid out as a Gantt chart, represented here as the **Enterprise Phase** *Plateau* associated with the ***Capability***.
Visually this will be similar to a Gantt chart. The description here is for modeling purposes only.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability Increment	# Capability	Capability
EnterprisePhase	# Enterprise Phase	Plateau
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
Program	# Work Package	Work package
Project	# Work Package	Work package

32 PHYSICAL GLOSSARY

32.1 Physical Layer Glossary

NAFv4 ArchiMate Name	ArchiMate Name	Description
# Protocol	Artifact	A kind of [Standard] specifying how two entities communicate or interact with each other. {NAF4IM}
# Resource Rationale	Principle	A [Rationale] that is applied at the resource level.
# Capability Configuration	Grouping	A solution building block that combines physical resources (people, technology) and implements processes to realize a [Capability].
# Distribution network	Distribution network	A mechanism for conveyance of Passive Resources between Active Resources, Can be used to represent the pathway for an actual Resource Interaction
# Trigger	Application event	An external Application trigger to start a [sequence of] Resource Interaction[s] at the Physical level.
# Resource Interaction	Technology interaction	A [Resource Interaction] between two or more Active Resources at the physical layer, conveying Passive or Data Resources
# Equipment Resource	Equipment	An identifiable instance of an [Equipment Node] at the logical level. Example: The Challenger tank with the plate number H-235.
# Technology Resource State	Technology event	A [State] specified for a [Resource]. Example: an application could be unavailable.
# Organisation	Business actor	An Actual instantiation of a Business Node. e.g. specific Company, Regiment
# Material	Material	A concrete and tangible piece of material. Examples: Monkey 47 (Gin), HP Inkjet Cartridge Type 305, Inconel-718+ (nickel alloy).
# Technology Resource	Node	Any one of; Technology Concept A [Technology] specified at the conceptual level. Technology Class A set of [Technology]s that are linked to a particular application domain. Examples: medical technologies, mechanical technologies, information technology, etc.
# Application	Application component	An actual Application as an instantiation of a logical Application Node e.g. Dynamics
# Technology Resource Function	Technology function	One or more expected behavior(s), as features of Equipment or Technology
# Data Attribute	Requirement	A representation of a property of a [Data Entity].
# Data Model	Artifact	A [Model] describing the [Data] referring to a specific Application Domain. Note: An Data Model typically describes the structure of the [Data] in terms of entities, relationships and their attributes.

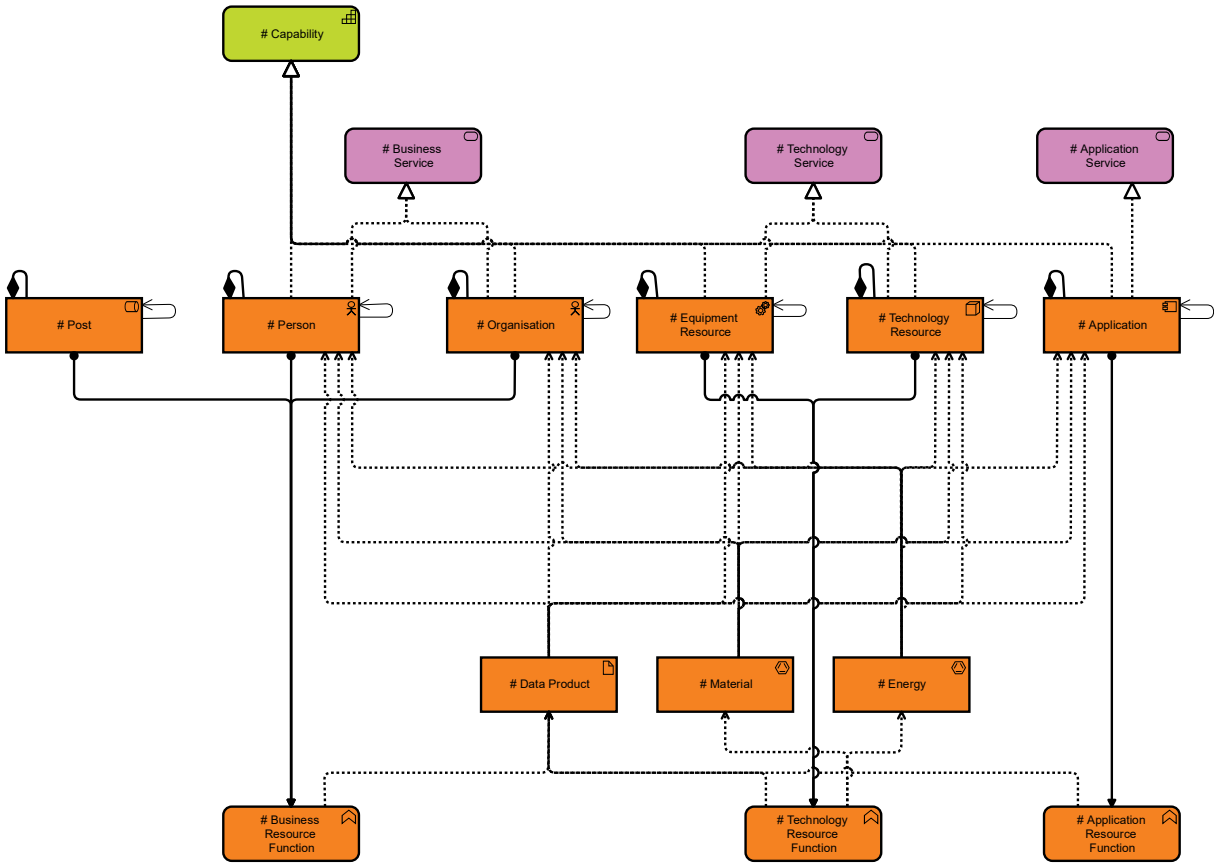
# Business Resource Function	Business function	One or more expected behavior(s), or skills, as features of an Organisation or Person
# Energy	Material	A concrete and deliverable instance of energy. Examples: Red Diesel, AC 220V 50Hz.
# Resource Requirement	Requirement	A [Constraint] specified at the resource level. Functional and non-functional [Requirement]s describing a system. Example: the requirements expressed in a System Requirements Document (SRD).
# Data Product	Artifact	An item that is elaborated from one or more sources of [Data] to meet a specific purpose. Note: quality assurance aspects are frequently associated to a Data Product which is delivered to a decision maker (e.g. integrity and credibility).
# Business Resource State	Business event	A [State] specified for an Business Resource
# Trigger	Technology event	An external Technological trigger to start a [sequence of] Resource Interaction[s] at the Physical level.
# Application Resource State	Application event	A [State] specified for an Application Resource Example: an application could be unavailable.
# Data Entity	Artifact	An identified unit or piece of digital or analogue representation of [Information] which is stored in or transferred via a medium. Note: a language is a logical medium while a piece of paper is a physical medium
# Path	Path	A mechanism for conveyance of [Data] between Active Resources, can be used to represent the pathway for an actual Resource Interaction
# Application Resource Function	Application function	One or more expected behavior(s), as features of an Application
# Person	Business actor	An Actual Person. An identifiable instance of a Person Type. Example: Goalkeeper of the BSC Young Boys, Rowan Atkinson.
# Trigger	Business event	An external Business trigger to start a [sequence of] Resource Interaction[s] at the Physical level.
# Post	Business role	An actual Post. An identifiable instance of a role. Examples: The Pilot of the helicopter crew

33 P1 - RESOURCE TYPES

P1 - Resource Types	NAFv3: NAV-2/NCV-3/NSV-2A, 7, 9, 12
The P1 Viewpoint is concerned with specification of the types of resources and identifying required technologies and competences. Views implementing this Viewpoint: • Shall include all Resource Types relevant for the architecture together with a depiction of their performance characteristics. • Shall describe the interface protocols and hardware specifications of each port on a system and include properties of Resource ports exposed by technical resources. • Shall map the described Resource Types back to the Capabilities and/or Services they implement (without specifying these Services themselves). • Shall provide a summary of the technologies and competences that impact on the Resources constituting the architecture. • Shall specify Service Levels for the implemented Services and for other Services (effectively a composition of services) required for their implementation. • May include descriptions of relevant emerging and current technologies, industry trends, predictions of the availability and readiness of specific hardware/software products, current and possible future skills. • May organize the Resources into a specialization hierarchy. • May give forecasts of relevant technologies and competences in short, mid and long-term timeframes and include an assessment of the potential impact of the forecast items on the enterprise.	
CONCERNS ADDRESSED	**USAGE**
• Capability Delivery. • Service Implementation. • Interface Specification.	• Identifying Resource Taxonomies. • Interface specification. • Identification of applicable protocols. • Service implementation. • Tracing business processes to the resources that support them. • Forecasting technology readiness against time. • HR trends analysis. • Recruitment planning. • Planning technology insertion. • Input to options analysis. • Definition of performance characteristics. • Identification of non-functional requirements.
REPRESENTATION	

- Tabular.
- Mapping (matrix).
- Topological – connected shapes.
- Composite Structure Diagram.
- Block diagram.
- Timeline View.
- Herringbone style diagram.

33.1 P1 Objects [by NAF Layer]



33.2 P1 Implementation Guidance

Nodes and **Resources** exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Active Resources at the Physical layer are *assigned* to the **Resource *Functions*** in their own *ArchiMate layer* and are the actual **Active Resources** that *realize* a ***Capability***, and/or a ***Service*** also in their own *ArchiMate layer.*
Resource *Functions* exist at 3 layers within ArchiMate, they can *access* (deliver) a **Data Product,** represented as an *Artefact*, but only **Resource Functions** in the *ArchiMate Technology layer* can *access* **Actual *Material*** or **Energy** (also represented as *Material*).
Interface Protocols and System Ports are omitted from this viewpoint.

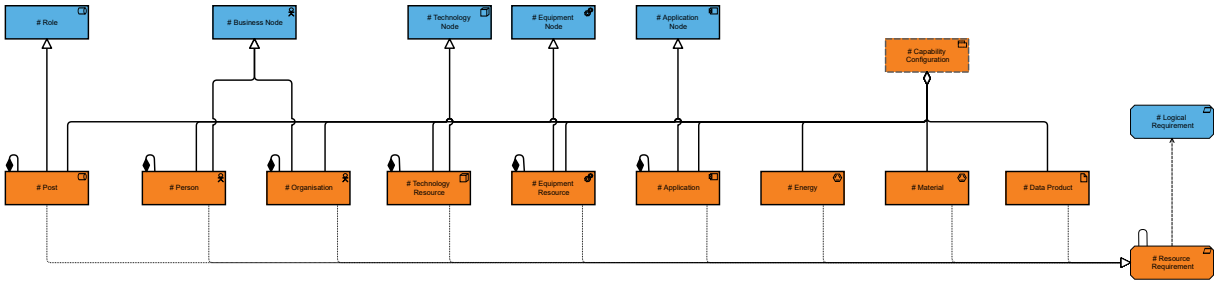
NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Capability	# Capability	Capability
CapabilityConfiguration	# Capability	Capability
Competence	# Application Resource Function	Application function
Competence	# Business Resource Function	Business function
Competence	# Technology Resource Function	Technology function
Resource	# Application	Application component
Resource	# Data Product	Artifact
Resource	# Energy	Material
Resource	# Equipment Resource	Equipment
Resource	# Material	Material
Resource	# Organisation	Business actor

Resource	# Person	Business actor
Resource	# Post	Business role
Resource	# Technology Resource	Node
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service

34 P2 - RESOURCE STRUCTURE

P2 – Resource Structure	NAFv3: NSV-1/NOV-4
The P2 Viewpoint is concerned with the composition and (high-level) interaction of resources. Views implementing this Viewpoint: • Shall link together the operational and physical Architecture Views by depicting how types of Resource are structured and interact to realize the logical architecture specified in L2, Logical Scenario. • Shall describe the structure of resources, decomposed to any suitable level, by identifying the primary sub-systems, posts/roles and their interactions (e.g., data, materiel, human resources, energy). • Shall gather systems meeting a specific capability as Capability Configurations. • May represent the realization of a requirement specified in a L2, maybe as several alternative Resource Views suites which could realize the operational requirement. • May specify typical (or template) organizational structures, and also identify how human resources interact with each other and with systems. • May identify the artefacts upon which resources are deployed and can show the nodes that the resources realize.	
CONCERNS ADDRESSED	**USAGE**
• Physical Architecture. • Systems Engineering / Design. • Organizational Design. • Systems Integration. • System Requirements Specification.	• Definition of system concepts. • Definition of system options. • Human – System interactions. • Typical Organization structures. • Interface requirements capture. • Capability integration planning. • System integration management. • Operational planning (capability configuration definition).
REPRESENTATION	
• Topological (connected shapes). • Composite structure diagram. • Block diagram.	

34.1 P2 Objects [by NAF Layer]



34.2 P2 Implementation Guidance

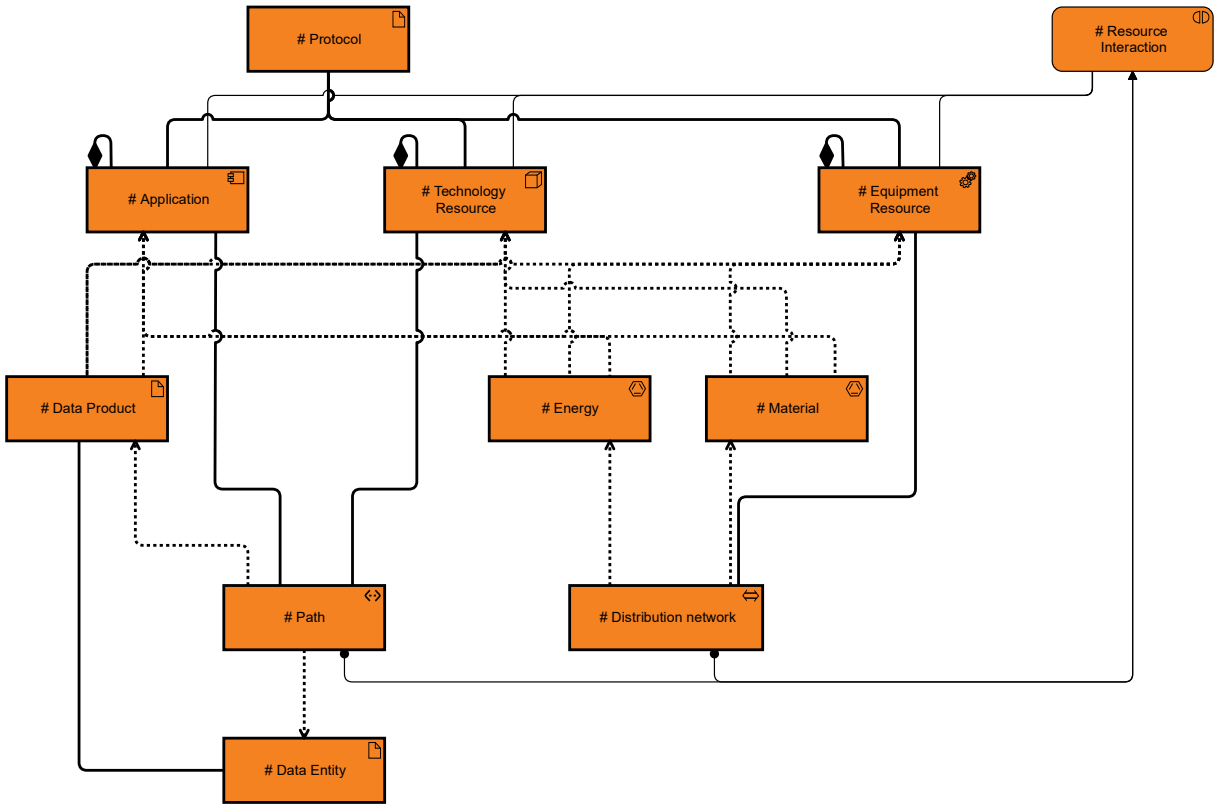
Nodes and **Resources** exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Active Resources are *assigned* to the **Resource *Functions*** in their own *ArchiMate layer* and are the actual **Active Resources** that *realize* a ***Capability***, and/or ***Service*** in their own *ArchiMate layer.* They also *specialize* their equivalent **Active Resources** (**Nodes**) at the Logical layer.
Traceability to the **Logical *Requirement*** defined in L2 is shown through the **Resource *Requirement***.
A **Capability Configuration** *aggregates* **Active Resources** and/or **Data Resources** and/or **Passive Resources** in any combination.
Resource Interactions are adequately covered in P3, P4 and P6, so are not present here.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
CapabilityConfiguration	# Capability Configuration	Grouping
Data	# Data Product	Artifact
Energy	# Energy	Material
Human Resources	# Person	Business actor
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Role	Business role
Node	# Technology Node	Node
Operational Constraints	# Logical Requirement	Requirement
Operational Requirement	# Resource Requirement	Requirement
Post	# Post	Business role
Resource	# Application	Application component
Resource	# Data Product	Artifact
Resource	# Energy	Material
Resource	# Equipment Resource	Equipment
Resource	# Material	Material
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Post	Business role
Resource	# Technology Resource	Node
Subsystem	# Application	Application component
Subsystem	# Equipment Resource	Equipment
Subsystem	# Organisation	Business actor
Subsystem	# Person	Business actor
Subsystem	# Technology Resource	Node

35 P3 - RESOURCE CONNECTIVITY

P3 – Resource Connectivity	NAFv3: NSV-2B, 2C, 6
The P3 Viewpoint is concerned with communication networks and pathways that link communications systems, details regarding their configuration and characteristics of the data exchanged between systems. Views implementing this Viewpoint: • Shall represent the physical implementation of the logical flows (L2, Logical Scenario, or L3, Node Interactions View) by specifying how systems are connected. • Shall provide more technical detail than P2, including the protocols (specified in the P1 View) implemented by systems and used by the connections between those systems. • Shall focus on the physical characteristics of each link by specifying attributes (e.g., geographic location, layout of network components such as routers, switches, amplifiers and repeaters). • Shall include capacities (e.g. bandwidth, throughput), frequencies used, security encryption methods used and other descriptive information as attributes. • Shall only feature physical architectures, software and artefacts (as systems) and no organizational resources. • Shall show flows (as data elements relating to the P4, Resource Function Viewpoint) across system boundaries and no internal flows which so not correspond to system port connections.	
CONCERNS ADDRESSED	**USAGE**
• Interface Specification. • Systems Engineering. • System Requirements.	• Interface specification. • Identification of applicable protocols. • Description of system communication paths. • Bandwidth and capacity analysis. • Detailed definition of data flows.
REPRESENTATION	
• Topological (connected shapes). • Composite structure diagram. • Structural diagram. • Tabular.	

35.1 P3 Objects [by NAF Layer]



35.2 P3 Implementation Guidance

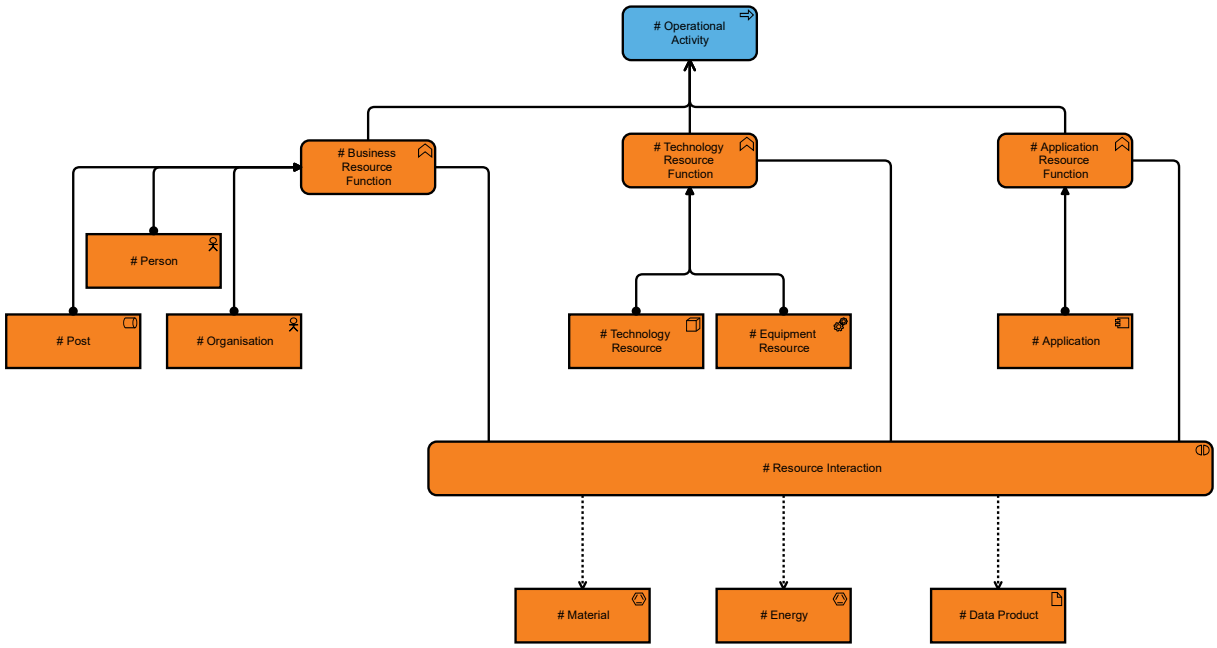
Resources exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Non-organizational **Active Resources** at the physical layer are *associated* with a **Protocol** to enable inter-resource communication or transport. **Protocols** are represented using an *Artefact.*
These **Active Resources** *access* (depend on) **Passive Resources** and/or **Data Resources** which as an implementation of a **Resource *Interaction*** are *accessed* over a *Distribution Network* (**Energy** or **Material**) or *Path* (**Data Product** or **Data Entity**).
Data Entities are *associated with* specific attributes (**Properties** and **Characteristics**). Other attributes may be added as necessary to any of the objects within the viewpoint (e.g. locations, capacities, frequencies, encryption methods etc.).

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
[derived from] Data Architecture	# Data Product	Artifact
Data Element	# Data Entity	Artifact
Data Element	# Data Product	Artifact
Energy	# Energy	Material
Flow	# Resource Interaction	Technology interaction
Protocol	# Protocol	Artifact
System	# Application	Application component
System	# Equipment Resource	Equipment
System	# Technology Resource	Node

36 P4 - RESOURCE FUNCTIONS

P4 – Resource Functions	NAFv3: NSV-4
The P4 Viewpoint is concerning the Resource Functions carried out by all types of Resource (human and non-human), including organizational resources. Views implementing this Viewpoint: • Shall specify the functionality of resources in the architecture as the functional counterpart to the structures specified in the P2, Resource Structure Views. • Shall include detailed information regarding the allocation of functions to resources, and the flow of data between Resource Functions as the Physical Resource counterpart to the L4, Logical Activities Views. • Shall describe implementation-specific realizations of the operational activities specified in the L4, Logical Activities Viewpoint. • Shall include the complete functional connectivity (i.e. a resource's required inputs are all satisfied).	
CONCERNS ADDRESSED	**USAGE**
• Capability-Based Acquisition. • Business Process Modelling. • Workflow Modelling. • Human-Machine Interaction Specifications.	• Description of task workflow. • Identification of functional system requirements. • Functional decomposition of systems. • Relate human and system functions.
REPRESENTATION	
• Topological (connected shapes). • Activity diagram. • Collaboration diagram (with swim lanes to represent resources). • Functional Breakdown (decomposition).	

36.1 P4 Objects [by NAF Layer]



36.2 P4 Implementation Guidance

Resources exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Active Resources at the Physical layer are *assigned* to the **Resource *Functions*** in their own *ArchiMate layer,* they *serve* an **Operational Activity** *(Business Process).*
Resource *Functions* are *associated with* a **Resource *Interaction*** which *accesses* (conveys) any or all of a **Data Product, Actual *Material*** or **Energy.**

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Data	# Data Product	Artifact
Energy	# Energy	Material
Flow	# Resource Interaction	Technology interaction
Function	# Application Resource Function	Application function
Function	# Business Resource Function	Business function
Function	# Technology Resource Function	Technology function
OperationalActivity	# Operational Activity	Business process
Resource	# Application	Application component
Resource	# Data Product	Artifact
Resource	# Energy	Material
Resource	# Equipment Resource	Equipment
Resource	# Material	Material
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Post	Business role
Resource	# Technology Resource	Node
Resource Function	# Application Resource Function	Application function
Resource Function	# Business Resource Function	Business function
Resource Function	# Technology Resource Function	Technology function

37 L4-P4 - ACTIVITY TO FUNCTION MAPPING

6.10 L4-P4 – Activity to Function Mapping	NAFv3: NSV-5

The L4-P4 Viewpoint is concerned with:

- Addressing the linkage between functions described in P4, Resource Functions, and operational activities specified in L4, Logical Activities.
- Addressing the Resource Functions from the P4 Viewpoint and the Service Functions from the S4 Viewpoint.

Views implementing this Viewpoint:

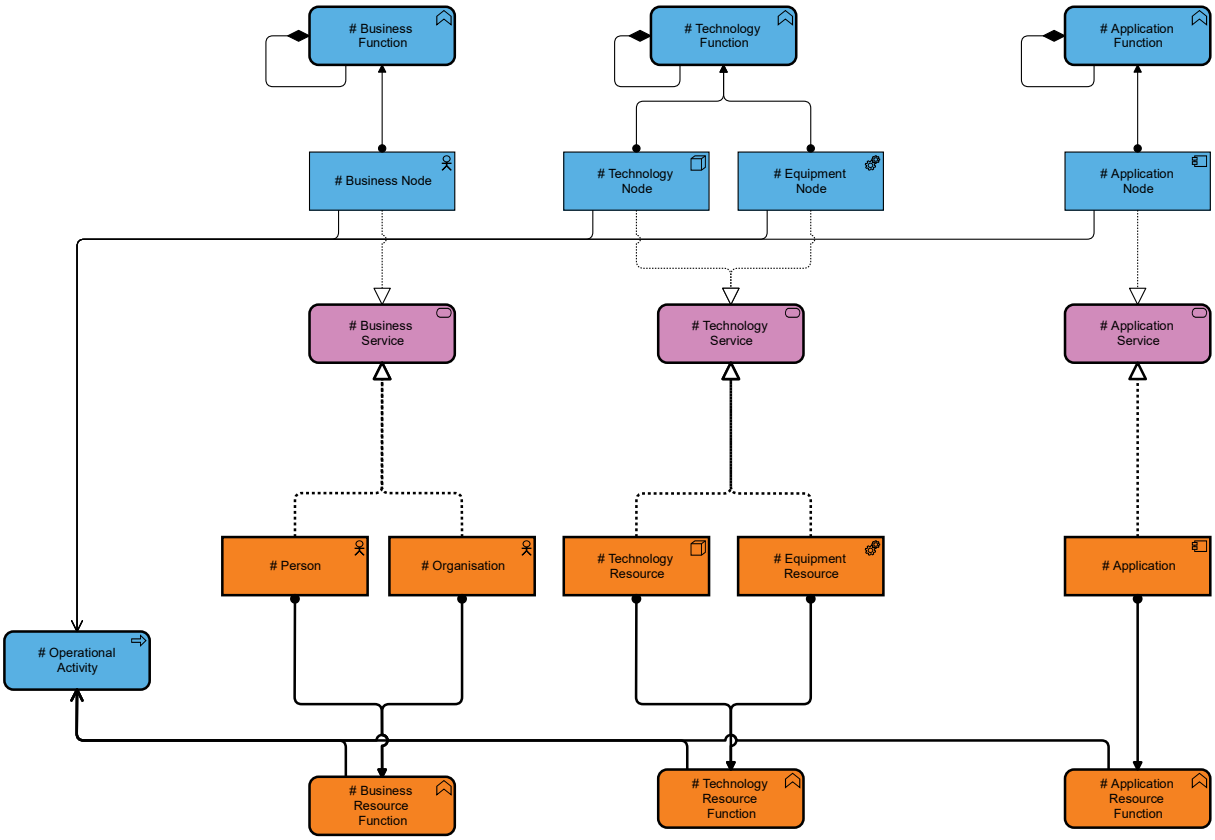
- Shall depict the mapping of Resource Functions (and optionally, the resources that provide them) to operational activities or service functions.
- Shall identify the transformation of an operational need into a purposeful action performed by a system or solution.
- Shall provide the link between the services used at the operational level and the specific Resource Functions provided by the resources supporting the services.

CONCERNS ADDRESSED	USAGE
• Requirements Definition. • Process Mapping.	• Tracing functional system requirements to user requirements. • Tracing solution options to requirements. • Identification of overlaps.

REPRESENTATION

- Tabular.
- Matrix.
- Diagram.

37.1 L4-P4 Objects [by NAF Layer]



37.2 L4-P4 Implementation Guidance

Services, **Service *Functions*** and **Resource *Functions*** exist at 3 layers within ArchiMate. **Nodes** and **Resources** exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*

Active Resources at the Physical layer are *assigned* to the **Resource *Functions***, the **Active Resources** *realize* a ***Service,*** this ***Service*** is also *realized by* the **Node** at the Logical layer, which is *assigned to* the equivalent **Service *Function.***

Operational Activities are *served by* **Resource *Functions*** at the Physical layer, and by **Nodes** at the Logical layer.

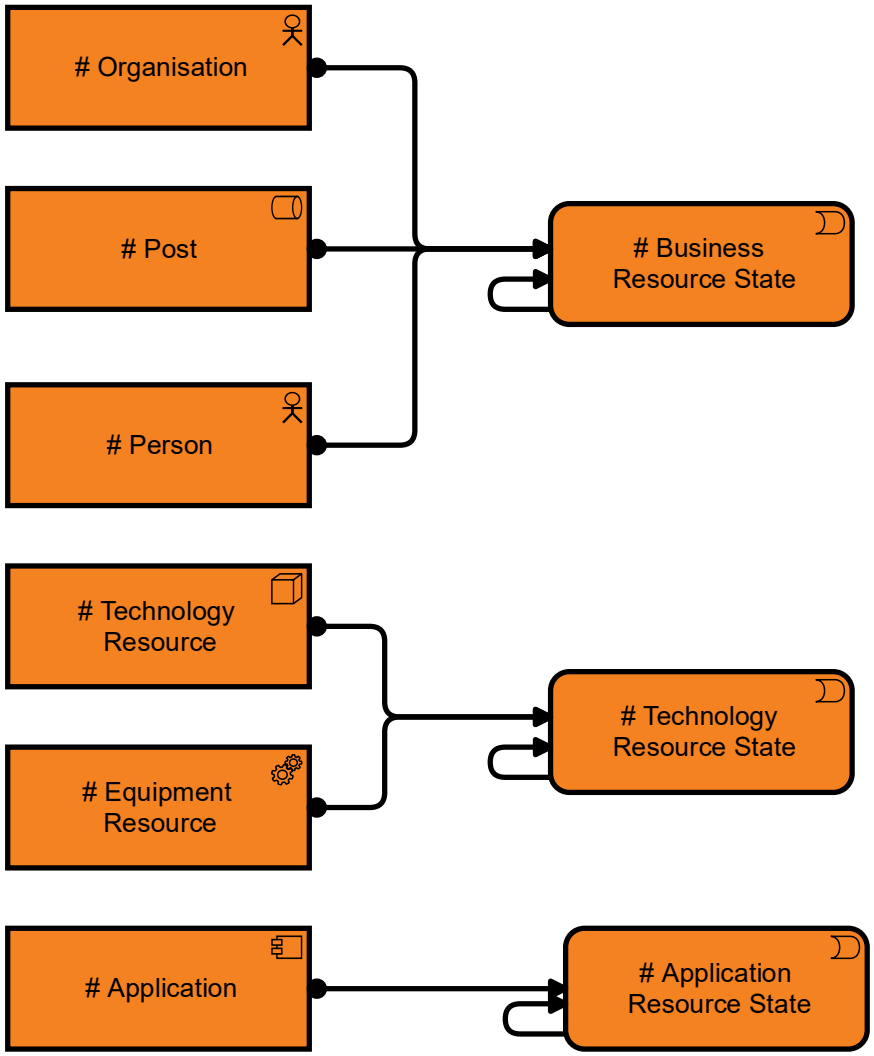
NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Function	# Application Resource Function	Application function
Function	# Business Resource Function	Business function
Function	# Technology Resource Function	Technology function
Node	# Application Node	Application component
Node	# Business Node	Business actor
Node	# Equipment Node	Equipment
Node	# Technology Node	Node
OperationalActivity	# Operational Activity	Business process
Resource	# Application	Application component
Resource	# Equipment Resource	Equipment
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Technology Resource	Node

Resource Function	# Application Resource Function	Application function
Resource Function	# Business Resource Function	Business function
Resource Function	# Technology Resource Function	Technology function
Service	# Application Service	Application service
Service	# Business Service	Business service
Service	# Technology Service	Technology service
Service Function	# Application Function	Application function
Service Function	# Business Function	Business function
Service Function	# Technology Function	Technology function

38 P5 - RESOURCE STATES

P5 – Resource States	NAFv3: NSV-10B
The P5 Viewpoint is concerned with Resource Types changing state in response to events and other stimuli. Views implementing this Viewpoint: • Shall identify the states a Resource Type can be, the allowable changes between those states, and the triggers that cause the state changes. • Shall relate events to Resource Type states and describe the transition from one state to another from a resource perspective, with a focus on how the Resource Type responds to stimuli (e.g. triggers and events). • May describe different responses depending upon the rule set or conditions that apply, as well as the	
CONCERNS ADDRESSED	**USAGE**
• Systems Engineering. • Safety Cases.	• Definition of states, events and state transitions (behavioral modelling). • Identification of constraints.
REPRESENTATION	
• State diagram.	

38.1 P5 Objects [by NAF Layer]



38.2 P5 Implementation Guidance

Resources exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
States exist at 3 ArchiMate layers, represented by *Events*, where relevant to the architecture it must be present in this viewpoint.
An **Active Resource** shall be *associated with* one or more **States** that correspond to the appropriate layer for the **Active Resource**. Transitions between **States** are depicted through the use of a *triggering* relation.

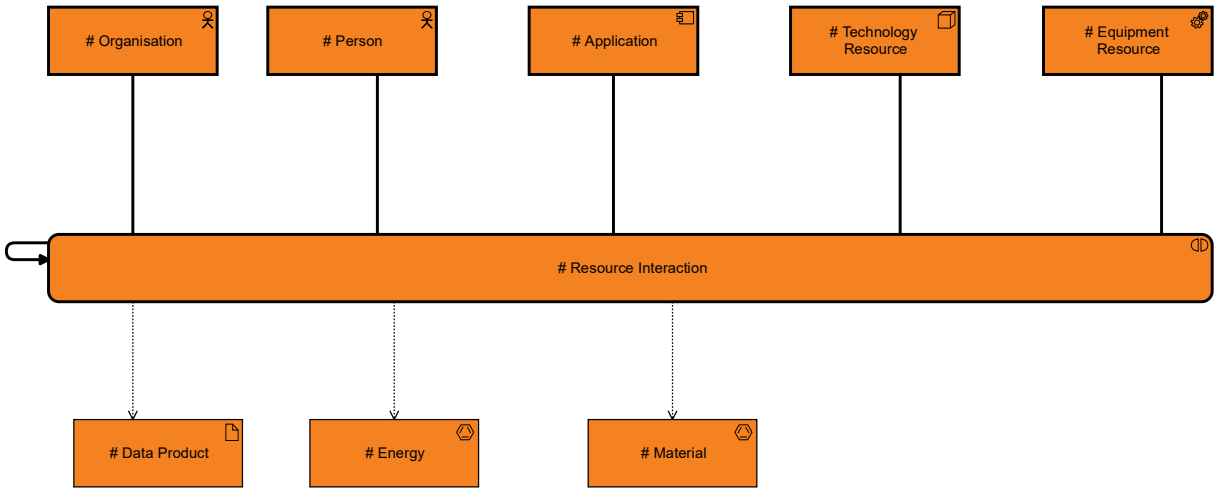
NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Resource	# Application	Application component
Resource	# Equipment Resource	Equipment
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Post	Business role
Resource	# Technology Resource	Node
ResourceStateDescription	# Application Resource State	Application event
ResourceStateDescription	# Business Resource State	Business event

ResourceStateDescription	# Technology Resource State	Technology event
State	# Application Resource State	Application event
State	# Business Resource State	Business event
State	# Technology Resource State	Technology event

39 P6 RESOURCE SEQUENCE

P6 – Resource Sequence	NAFv3: NSV-10C
The P6 Viewpoint is concerned with the time-ordered examination of the interactions between Resource Types. Views implementing this Viewpoint: • Shall specifies sequences in which data elements are exchanged in context of a Resource Type or Port. • Shall include a time-ordered representation of the data elements exchanged between participating Resource Type or Ports. • May represent flows of materiel, human resources or energy as interactions.	
CONCERNS ADDRESSED	**USAGE**
• Message Handling. • Complex System Behaviors. • Security Modelling.	• Analysis of resource events impacting operation. • Behavioral analysis. • Identification of non-functional system requirements.
REPRESENTATION	
• Topological (connected shapes). • Sequence Diagram (preferred).	

39.1 P6 Objects [by NAF Layer]



39.2 P6 Implementation Guidance

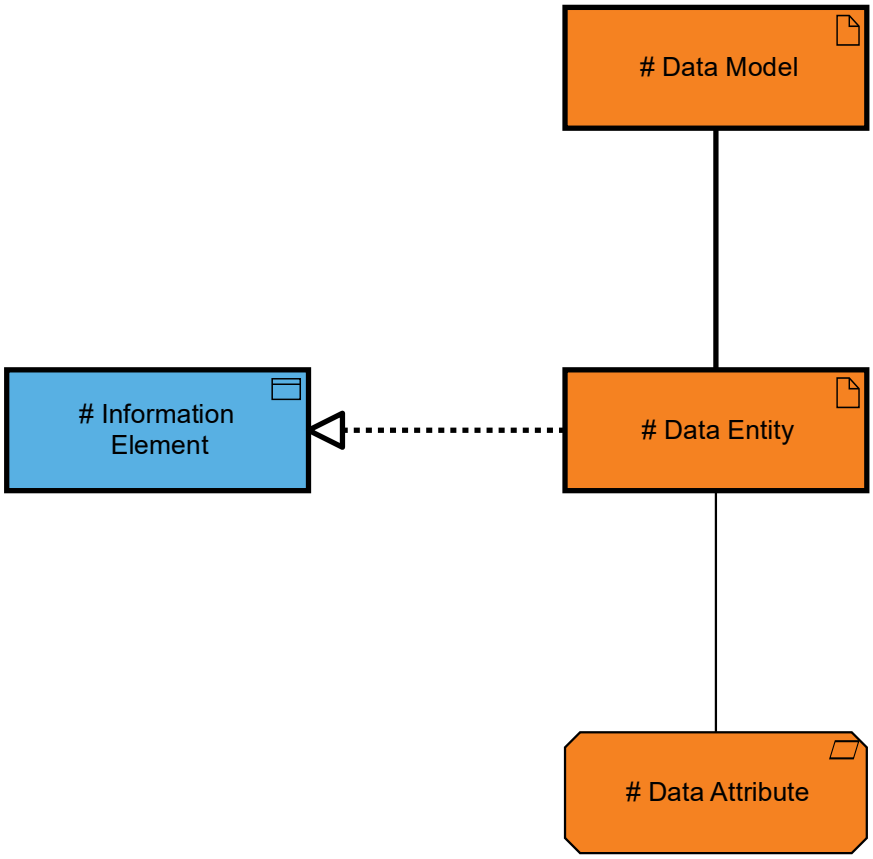
Resources exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
Active Resources are *associated with* a **Resource *Interaction*** either as the originator or the terminator of a specific **Resource *Interaction***, whilst **Passive Resources** and **Data Resources** are *accessed* (conveyed) during the **Resource *Interaction.*** Specific **Ports** have not been included in this viewpoint as P2 covers them in sufficient detail.
Attributes for **Resource *Interactions*** can be added for the start and end point [in time] of the **Resource *Interaction*** in the sequence, although these will be evident as part of the *triggering* relation between **Resource *Interactions.***

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Data Element	# Data Product	Artifact
Energy	# Energy	Material
Resource	# Application	Application component
Resource	# Data Product	Artifact
Resource	# Energy	Material
Resource	# Equipment Resource	Equipment
Resource	# Material	Material
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Technology Resource	Node
Resource Interaction	# Resource Interaction	Technology interaction

40 P7 - DATA MODEL

P7 – Data Model	NAFv3: NSV-11A, B
The P7 Viewpoint is concerned with the structure of data used by the resource types in the architecture. Views implementing this Viewpoint: • Shall map a given information model (L7) to the logical or physical data model (P7) if both models are used. • Shall describe how the information represented in the L7 Information Model Viewpoint is implemented for a given solution. • May also simply be a text schema (e.g. in the case of SQL or ISO10303-11).	
CONCERNS ADDRESSED	**USAGE**
• System Design. • Data Schema Design. • Message / Protocol Specification. • Data Architecture. • Database Design.	• Specifying the data elements exchanged between systems (thus reducing the risk of interoperability errors). • Definition of logical or physical data structure (input to system design).
REPRESENTATION	
• Formal text data modelling language. • Topological (connected shapes). • Class diagram.	

40.1 P7 Objects [by NAF Layer]



40.2 P7 Implementation Guidance

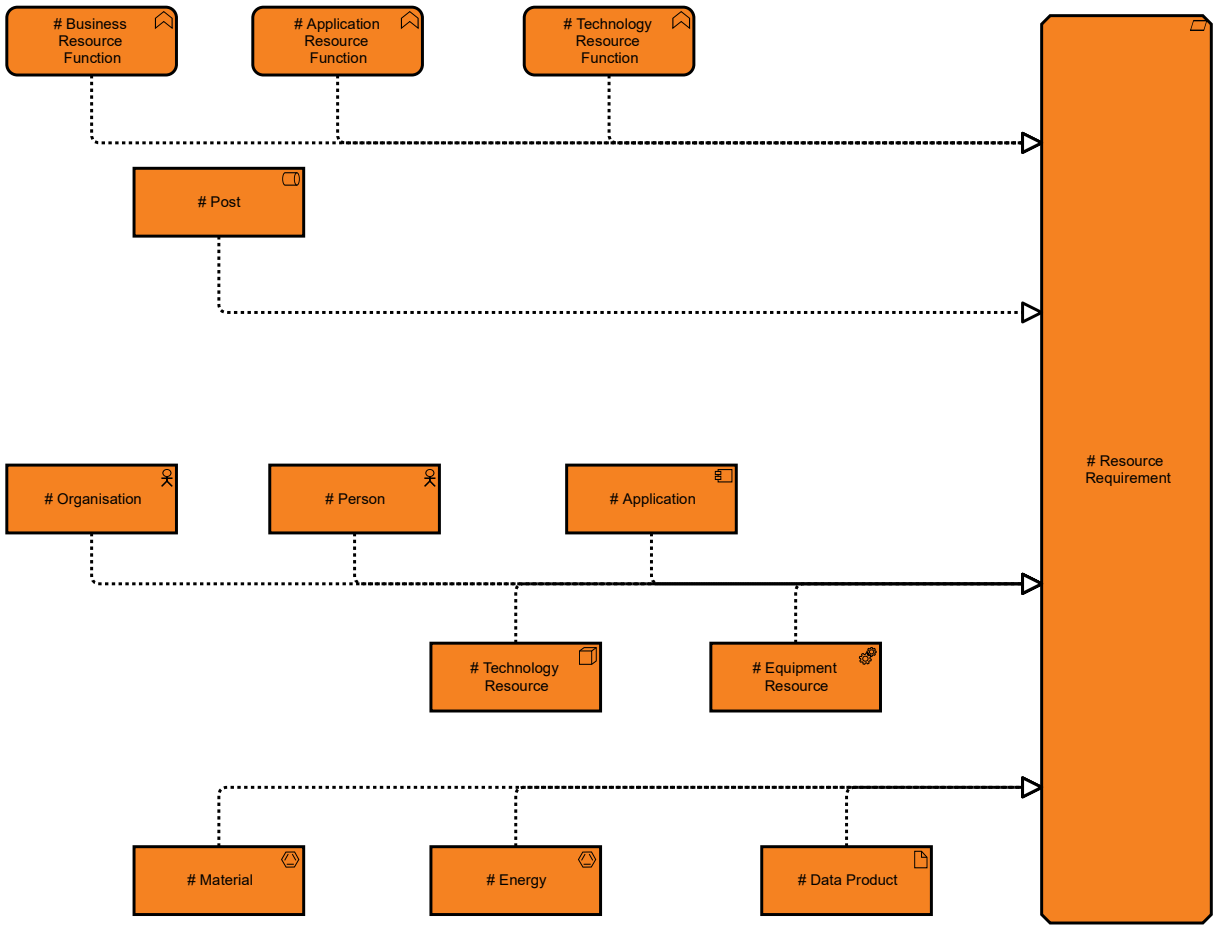
Data Entities are *associated with* a **Data Model** in this viewpoint, both represented as *Artefacts*. The **Data Entity** can be traced back to the logical **Information Element** via a *realization* relation. The **Data Attributes** of the **Data Entity** are represented visually here by the use of *Requirement*.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Attribute	# Data Attribute	Requirement
Data Element	# Data Entity	Artifact
Data Model	# Data Model	Artifact
Information Element	# Information Element	Data object

41 P8 - RESOURCE CONSTRAINTS

P8 – Resource Constraints	NAFv3: NSV-10A
The P8 Viewpoint is concerned with functional and non-functional constraints on the implementation aspects of the architecture (i.e. the structural and behavioral elements of the Resource layer). Views implementing this Viewpoint: • Shall include constraints on the resource types, resource functions, data and ports. • Shall include the rules that control, constrain or otherwise guide the implementation aspects of the architecture.	
CONCERNS ADDRESSED	**USAGE**
• Non-Functional Requirements. • Safety Cases.	• Definition of implementation logic. • Identification of resource constraints.
REPRESENTATION	
• Text (preferably specified in a computer-interpretable constraint language such as OCL). • Tabular.	

41.1 P8 Objects [by NAF Layer]



41.2 P8 Implementation Guidance

Resources exist at 4 ArchiMate layers, and depending on their layer they are represented by *Business Actor, Application Component, Technology Node* and *Equipment.*
All **Active Resources, Data Resources** *(Artefacts)*, **Passive Resources** *(Material)* and **Resource *Functions*** can *realize* a **Resource *Requirement***. Rules that 'guide the implementation' may be modeled as an attribute of the requirement.

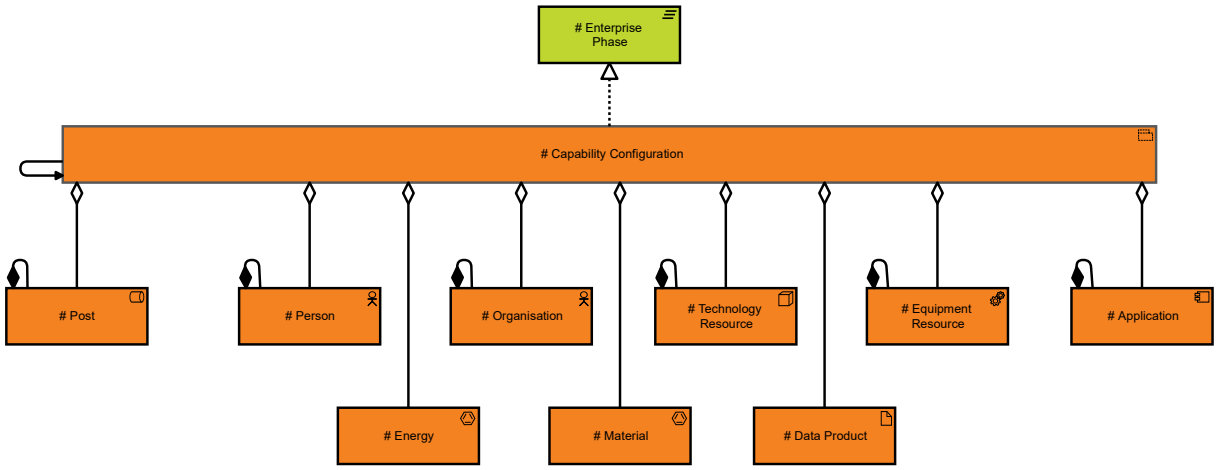
NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
Constraint	# Resource Requirement	Requirement
Data	# Data Product	Artifact
Function	# Application Resource Function	Application function
Function	# Business Resource Function	Business function
Function	# Technology Resource Function	Technology function
Resource	# Application	Application component
Resource	# Data Product	Artifact
Resource	# Energy	Material
Resource	# Equipment Resource	Equipment
Resource	# Material	Material
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Post	Business role
Resource	# Technology Resource	Node

Resource Function	# Application Resource Function	Application function
Resource Function	# Business Resource Function	Business function
Resource Function	# Technology Resource Function	Technology function
Rule	# Resource Requirement	Requirement

42 PR - CONFIGURATION MANAGEMENT

Pr – Configuration Management	NAFv3: NSV-8
The Pr Viewpoint is concerned with the whole lifecycle View of a resource, describing how its configuration changes over time. Views implementing this Viewpoint: • Shall include an overview of how a Resource Type structure changes over time (open to all Resource Types). • Shall include the structure of different versions of Resource Type (usually Capability Configurations or Service Implementations) mapped against a timeline. A Pr View can be used as an architecture evolution project plan or transition plan. In meta-model terms, a Pr View is constructed from data specified in the Lr, Lines of Development, and P2, Resource Structure Views, though there may be several P2 Views – one for each version of the configuration. Using similar modelling elements as those used in the P2, Resource Structure Views, this View shows the structure of the Resource Types under configuration control. Resource interactions which take place within the Resource Type boundaries may also be shown. The changes depicted in the Pr View are derived from the project milestones that are also shown in Lr, Lines of Development.	
CONCERNS ADDRESSED	**USAGE**
• Product Lifecycle Management. • Version Control. • Release Scheduling.	• Development of incremental acquisition strategy. • Configuration Management. • Planning technology insertion.
REPRESENTATION	
• Timeline view. • Herringbone style diagram. • Augmented chart in style of a Gantt Chart.	

42.1 Pr Objects [by NAF Layer]



42.2 Pr Implementation Guidance

A **Capability Configuration** must be present on this viewpoint, as a *Grouping.* The **Capability Configuration** must have attributes for the start and end dates of any readiness level appropriate for it, these are not shown on the viewpoint. These dates can then be linked to the **Enterprise Phase** via a *realization* relation.
Visually this will be similar to a Gantt chart. The description here is for modelling purposes only.

NAFv4 Name	NAFv4 ArchiMate Name	ArchiMate Name
CapabilityConfiguration	# Capability Configuration	Grouping
Resource	# Application	Application component
Resource	# Data Product	Artifact
Resource	# Energy	Material
Resource	# Equipment Resource	Equipment
Resource	# Material	Material
Resource	# Organisation	Business actor
Resource	# Person	Business actor
Resource	# Post	Business role
Resource	# Technology Resource	Node
Timeline	# Enterprise Phase	Plateau