



Activity 2 – Defining Sea Traffic Management

STM Architecture Framework

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Document Status

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1 General information

MONALISA 2.0 is a project with 39 private, public and academic partners from 10 different countries. Its overall objective is to strengthen efficiency, safety and environmental performance in maritime transportation. Coordinated by the Swedish Maritime Administration, the project is co-financed by TEN-T under the Motorways of the Sea Programme and is part of the EU's e-Maritime initiative. MONALISA 2.0 follows on from the MONALISA project (2010-EU-21109-S) and also incorporates results and experiences from the SESAR Programme (Single European Sky Air Traffic Management Research) in the aviation sector. MONALISA 2.0 is divided into four Activities: Activity 1, STM Operations and Tools; Activity 2, STM Definition Phase; Activity 3, Safer Ships; and Activity 4, Operational Safety.

This report is a deliverable from Activity 2 of the MONALISA 2.0 project. The objective of Activity 2 is to outline a framework for Sea Traffic Management (STM), elaborate its target concept, and develop a plan for further development and deployment. Activity 2 is divided into 7 sub-activities:

- **SA2.1 Current Situation Analysis** describes today's maritime transport industry, focusing on information sharing. It highlights its strengths, weaknesses, and current development, as well its needs. The results of this analysis are presented in report D2.1.1 STM The Current Situation.
- **SA2.2 STM Performance Target Development** is an analysis and elaboration of a performance framework including: performance targets, key performance areas, vision and goals. Its results are presented in the report, D2.2.1 STM Performance Framework.
- **SA2.3 STM Target Analysis** develops the target concept(s) of Sea Traffic Management based on the current situation analysis and performance targets. The results of this work are summarised in the report D2.3.1 STM - The Target Concept.
- **SA2.4, 2.5 & 2.6 STM Strategic Roadmap and Master Plan Development and Work Programme for Development Phase** is a combination of three sub-activities that together establish a shared vision of the overall transition sequence for implementing the STM Target Concept. Results are described in report D2.4.2/D2.5.1/2.6.1 STM Master Plan.
- **SA2.7 Port CDM Demonstrator** developed and demonstrated initial versions of some information sharing services used in the Port CDM concept. Results are presented in the report D2.7.1 Port CDM Report.

This report describes the framework that the STM Architecture Description is based on.

2 Introduction

2.1 Scope and purpose

The purpose of this document is to describe the framework that the STM Architecture Description is based on.

The STM Architecture Framework serves both as a planning tool and as documentation of the basis of the STM Architecture Description. The content in this document has been used for the elaboration of the STM Architecture Description and has also influenced the elaboration of the STM Performance Framework (D2.2.1), the STM Target Concept (D2.3.1) and the STM Master Plan (D2.4.2 and D2.5.1).

This document is primarily aimed at the reader who needs a detailed understanding of the STM Architecture Description for upcoming architecting work and involved architects. The detailed content in this document has been elaborated and documented in an STM Architecture Description repository with a model based approach.

2.2 Document structure

This document contains the following chapters.

1. Introduction (this chapter)
2. Overview of STM Architecture Framework
Gives background information to the concept of architecture framework based on ISO 42010
3. Structure of the STM Architecture Description
Describes the structure of the STM Architecture Description reported in separate deliverables
4. Architecture Description Language
Describes in detail the metamodel of the STM Architecture Description
5. STM Architecture Framework for vantage points
Describes the metamodel for each vantage point (as-is and to-be model)
6. Graphical and Model Notation
7. Report Generation
8. Tools

2.3 Abbreviations

Name	Description
ADL	Architecture Description Language
e-Master Plan	Electronic Master Plan
ICAO	International Civil Aviation Organisation

ISO	International Standard Organisation
SESAR	Single European Sky ATM Research
STM	Sea Traffic Management
STM EA	STM Enterprise Architecture

3 Overview of STM Architecture Framework

3.1 Introduction

Architecture frameworks and architecture description languages are two mechanisms that are widely used in architecting (ref ISO 42010).

In the following sections, the STM Architecture Framework and the STM Architecture Description Language and their relationships are described.

3.2 STM Architecture Framework

An architecture framework establishes a common practice for creating, interpreting, analysing and using architecture descriptions within a particular domain of application or stakeholder community (ref ISO 42010).

The foundation of the STM Architecture Framework is inspired by ISO 42010. This international architecture framework standard includes conventions, principles and practices for the description of architectures established within a specific domain of application and/or community of stakeholders.

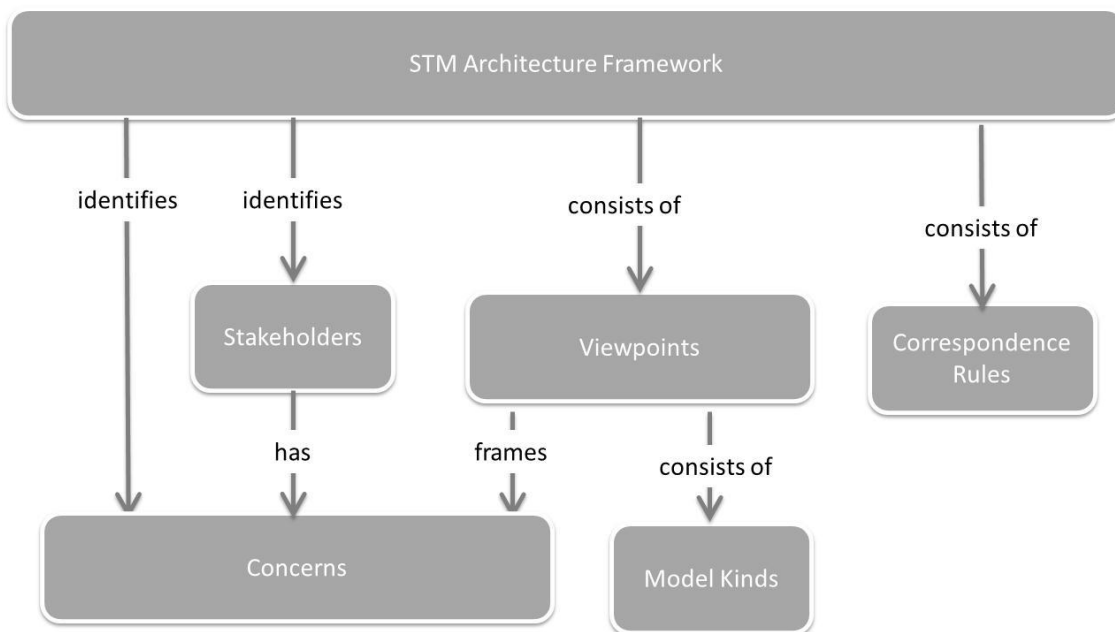


Figure 1 STM Architecture Framework

The figure above covers the core architecture components of the STM Architecture Framework.

Stakeholders within the European sea traffic domain have concerns. Concerns could be raised and held by one or several stakeholders. A concern can be manifested in various ways, such as in relation to for example other stakeholders’ needs, goals, and expectations. In the current version of the STM Architecture the stakeholders’ concerns have been divided into various layers; e.g. Performance, Business or Operational.

Viewpoints are used to frame one or more stakeholders' concerns. Each viewpoint establishes conventions for construction, interpretation and analysis. The viewpoint conventions include for example notations, model kinds and/or modelling methods.

Model kinds can for example be tables, excel sheets, maps, information models and process diagrams. The current version of the STM Architecture has so far solely used UML notation and a map approach.

One specific kind of model in the STM Architecture Framework is the metamodel of the architecture description elements, see section 4.2. An architecture description element is any construct in an architecture description. The correspondence rules; i.e. how the architecture description elements in the architecture are related to each other is governed by the underlying metamodel, see section 4.4 in this document. These relationships are used to express, and to enforce, the architecture relations such as for example composition, consistency, traceability and dependencies.

3.3 STM Architecture Description

An architecture description shall identify the system-of-interest and include supplementary information as determined by the project and/or organisation (ref ISO42010).

The STM Architecture Descriptions are work products (depicted in darker colour in Figure 2) used to express the STM Architecture based on interested parties and stakeholders' particular viewpoints. The figure below provides an overview of how the STM Architecture Description is related to the STM Architecture Framework.

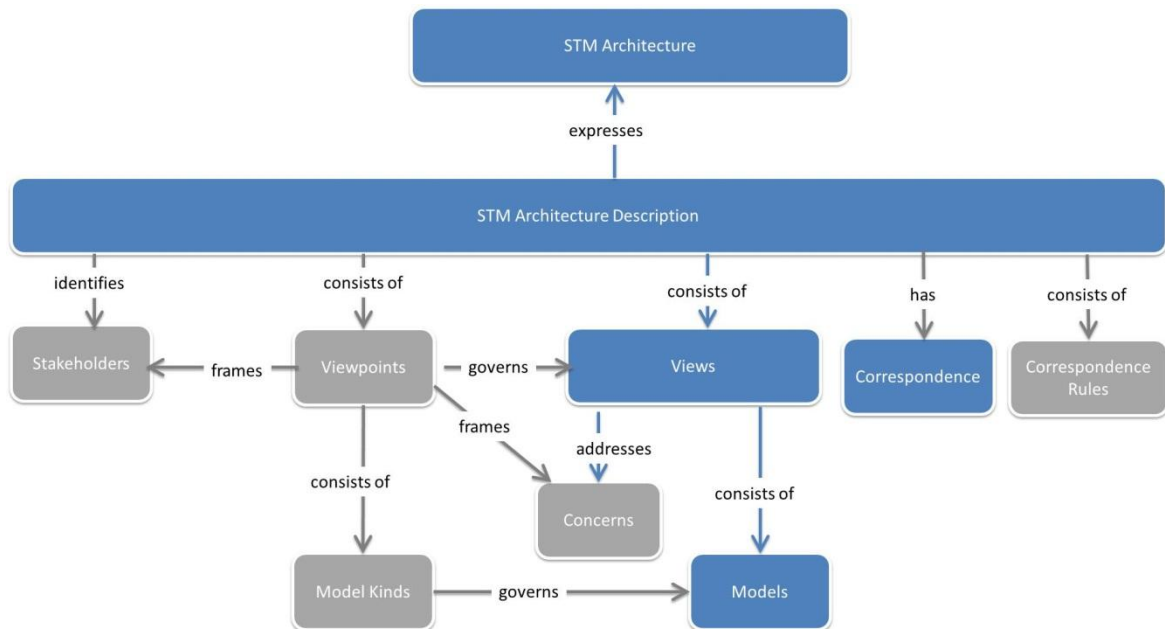


Figure 2 STM Architecture Description

A view in a work product expresses (describes) the architecture in accordance with the viewpoint. Each view is governed by a defined viewpoint in the STM Architecture Framework: e.g. the STM Performance Framework view is governed by the Performance layer.

A view can consist of one or several kinds of models. In the current STM Architecture are models expressed by using Unified Modelling Language (UML) notation. Some models kinds are based on elaborated approaches; e.g. the Performance Framework inspired by ICAO and SESAR.

The correspondence between the architecture description elements in each view and related models are defined in the STM Metamodel, see section 4.4. The correspondence is determined via various kinds of relationships; e.g. “consists of”, generalisation-specialisation.

4 Structure of the STM Architecture Description

4.1 Overall structure

The overall structure of the STM EA is based on the structure of the work packages in Activity 2.

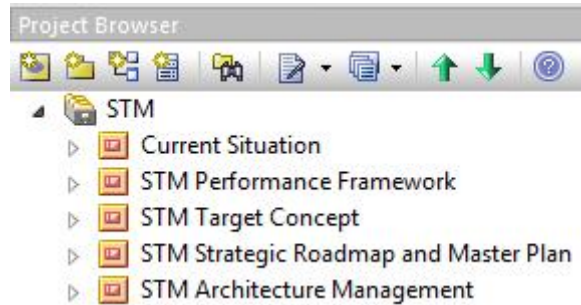


Figure 3 Overall structure

Current Situation

The Current Situation contains a description of today’s situation of sea transportation and the weaknesses that have been identified. The main source of information is the D2.1.1 Current Situation from WP1. The content represents an “as-is” architecture description, a baseline.

STM Performance Framework

Contains the performance target defined for the STM, from expectations to performance objectives mapped to strategic enablers, that are further defined in STM Target Concept. The information supports the D2.2.1 STM Performance Target from WP2. The content represents the performance target to achieve for the concept.

STM Target Concept

Contains the target concept descriptions based on the strategic enablers and objectives given by the STM Performance Target. The concept descriptions that are compiled into D2.3.1 STM Target Concept from WP3 are the main source of information. The content represents “to-be” architecture description for the defined concept of STM.

STM Strategic Roadmap and Master Plan

This section contains the proposed transition from the current situation and the step-by-step implementation of the STM Target Concept over time.

STM Architecture Management

Contains terminology and the STM Architecture Description language (metamodel).

5 Architecture Description Language

5.1 The STM Architecture Description Language

An architecture description language (ADL) is any form of expression used in architecture descriptions, ref ISO 42010. According to ISO 42010 an architecture description language shall specify;

- the identification of one or more concerns to be expressed by the ADL;
- the identification of one or more stakeholders having those concerns;
- the model types implemented by ADL which frame those concerns;
- any architecture viewpoints; and
- corresponding rules relating its model kinds.

The purpose of an STM Architecture Description Language is to define what architecture description elements are included and how they are related to each other. This will establish and guide the composition, consistency, traceability, dependency and constraints of the architecture content.

An architecture description element is any construct in an architecture description; e.g. every model kind, model, view, viewpoint is considered to be an architecture element. They are the most primitive constructs in architecture.

5.2 The STM Metamodel

When viewpoints and model kinds have been defined, and their models have been populated, additional architecture elements will be introduced.

The STM metamodel is a specific model kind that describes the introduced specific STM architecture description elements and their relationships. These relationships are the correspondence rules for the architecture description elements that is used when populating the STM architecture.

When populating the STM architecture with various information it will support the development and analysis of the coverage, gaps, overlaps, consistency and coherency of the material developed by the various tasks within MONALISA Activity 2.

In chapter 4.4 there is a detailed overview of the STM Metamodel and in the subsections the architecture descriptions elements are listed and described.

5.3 Architecture perspectives

The structure is mainly based on the identified perspectives that have been chosen to describe the STM Target Concept from a/an:

- Institutional perspective,
- Business perspective,
- Operational perspective,
- Information management & sharing perspective,
- System & technology perspective and
- Transversal perspective
- Performance perspective
- Transition perspective

The colours of the blocks have been used consistently in the model in order to provide visual information about what area is in focus.

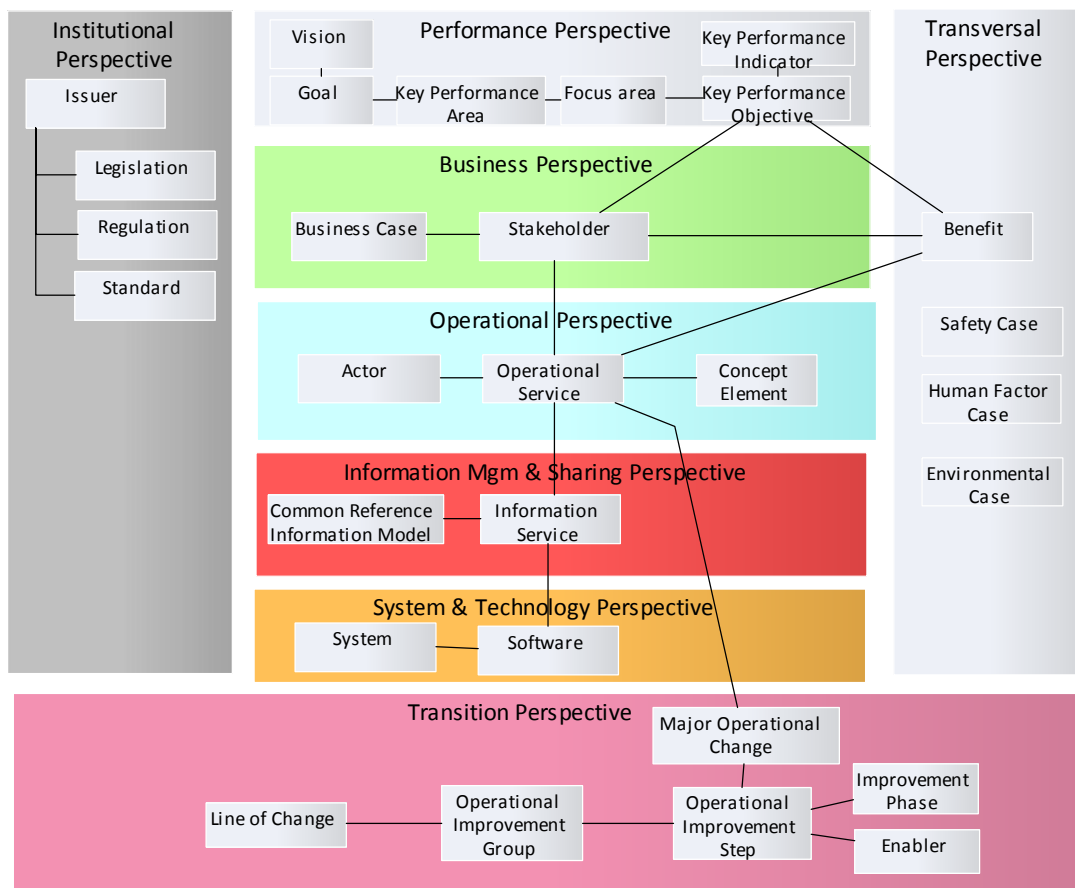


Figure 4 Architecture perspectives and core elements

5.4 Architecture description elements

This section provides an explanation for each architecture description element used in the STM Architecture Description.

5.4.1 Performance Perspective

The performance framework describes elements of the STM Performance Target, such as Key Performance Area, Key Performance Objective and Key Performance Indicator.

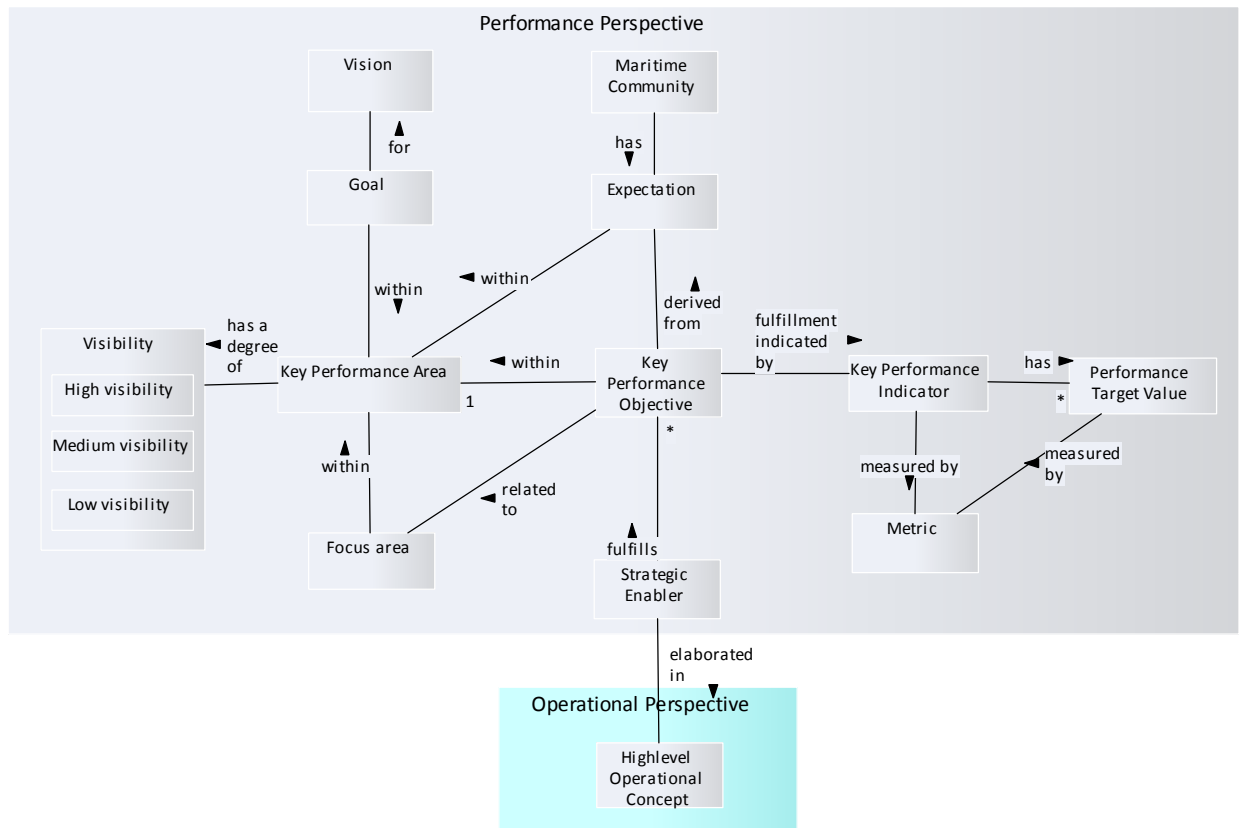


Figure 5 Metamodel for Performance perspective

Architecture Element	Description
Expectation	Global expectations, high-level statements from Maritime Community
Focus area	Within each KPA, a number of more specific ‘Focus Areas’ are identified in which there are potential intentions to establish performance management. Focus Areas are typically needed where performance issues have been identified. There may be a need to define hierarchical groupings of Focus Areas.

Architecture Element	Description
Goal	A specified and measurable goal quantifying the visi
High visibility	<p>High visibility means that the KPA is highly importa communicate to decision makers and the world out of MONALISA.</p> <p>Effects are of a political nature and are even visib those who are not users of the STM Transport Sys (Societal Outcome)</p>
Key Performance Area	Key Performance Areas are a way of categori performance subjects related to high-level ambit and expectations.
Key Performance Indicator	<p>Current/past performance, expected future perform (estimated as part of forecasting and perform modelling), as well as actual progress in achie performance objectives is quantitatively expresse means of indicators (sometimes called Performance Indicators, or KPIs). To be relev indicators need to correctly express the intention of associated performance objective. Since indica support objectives, they should not be defined wit having a specific performance objective in n Indicators are not often directly measured. They calculated from supporting metrics according to cle defined formulas, e.g. cost-per-flight-indicator = (cost)/Sum (flights). Performance measurement therefore done through the collection of data for supporting metrics.</p>
Key Performance Objective	Performance objectives define, in a qualitative focused way, a desired trend from today's perform (e.g. improvement).
Low visibility	<p>Low visibility means less/not visible outside of MONALISA context but still as important as the c KPAs. Often the medium and low visible K underpins the highly visible KPAs.</p> <p>These are not of direct interest to sea space customers and the KPAs play their roles mostly at voyage planning stage. (Performance Enablers)</p>

Architecture Element	Description
Maritime Community	The aggregation of organisations, associations (agencies) or others that may participate, collaborate and cooperate in the planning, development, regulation, operation and maintenance related to Traffic Management.
Medium visibility	<p>Medium visibility means less visible outside MONALISA but still as important as the other KPAs. Often medium and low visible KPAs underpins the high visible KPAs.</p> <p>Visibility of the effects stops generally at the level of Authorities, Terminal Operators, sea space users and sea space user customers (e.g. passengers) (Operational Performance)</p>
Metric	Used to calculate the values of the performance indicators. For example cost-per-voyage-indicator = $\frac{\text{Sum (cost)}}{\text{Sum (Voyages)}}$.
Performance Target Value	Performance targets are closely associated with performance indicators: they represent the value of performance indicators that need to be reached or exceeded to consider a performance objective as fully achieved.
Strategic Enabler	A strategic enabler in this context is an essential enabler to meet the performance objectives. Enabler can be of different types e.g. institutional, procedural, technical and human.
Visibility	The visibility of the KPA relates to the communication with the stakeholders. The decision criteria for groups are based on the "highest" degree of visibility of KPA outcome and impact, rather than on how performance is achieved.
Vision	A visionary statement setting a target to strive for and to achieve an interoperable global STM for all users during all operational phases, that meet agreed levels of safety, provides optimum economic operations, is environmentally sustainable and meets national security requirements.

5.4.2 Institutional perspective

The Institutional perspective focuses on the legislative, regulatory and standardisation in sea transportation.

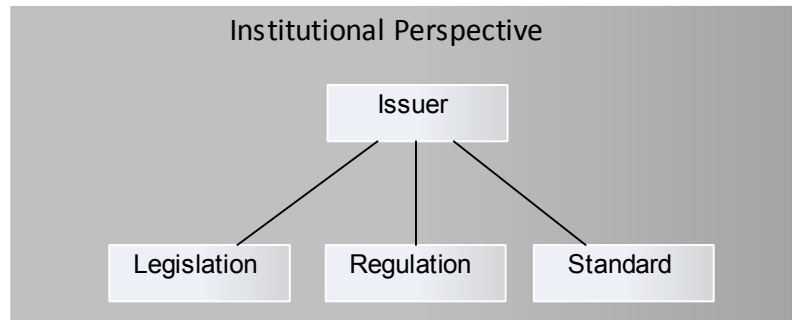


Figure 6 Metamodel for Institutional perspective

Architecture Element	Description
Issuer	An organisation or associations that issues e.g. legisla regulation, directive, standard etc.
Legislation	A law, or set of laws made by a government.
Regulation	An official rule or law that says how something should be d
Standard	Document, established by consensus and approved b recognized body, that provides, for common and repeated rules guidelines or characteristics for activities or their res aimed at the achievement of the optimum degree of order given context.

5.4.3 Business perspective

The Business Perspective focuses on the business aspects of the sea transport sector, business descriptions, stakeholders, benefits and business cases.

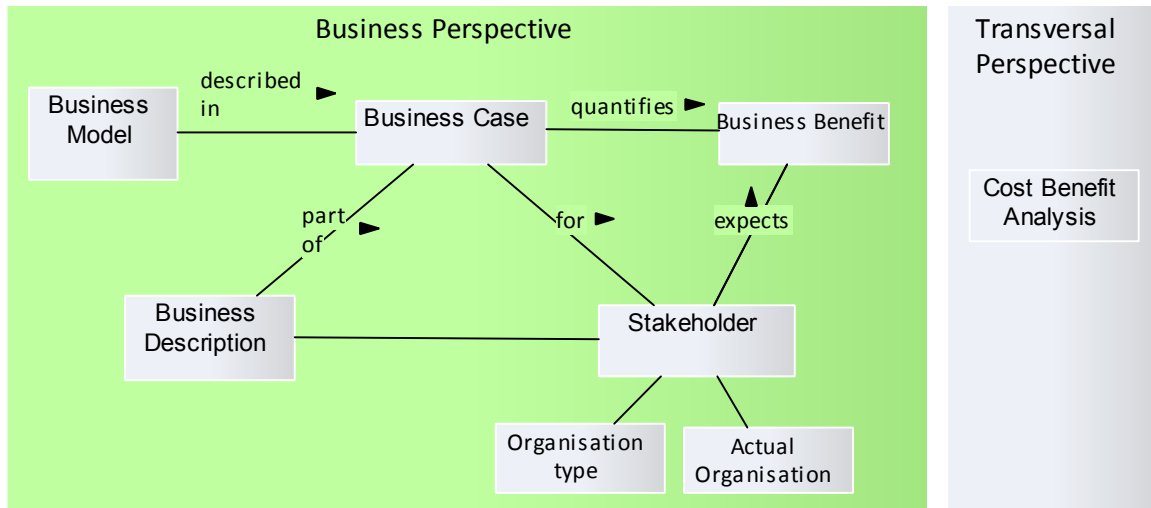


Figure 7 Metamodel for Business perspective

Architecture Element	Description
Actual Organisation	An actual (real) organisation.
Business Benefit	A business benefit from the target concept of Sea Transport Management related to a KPA (primarily cost/economic safety and environment).
Business Case	Business cases are created to help decision-makers ensure that: <ul style="list-style-type: none"> - the proposed initiative will have value and relative priority compared to alternative initiatives based on the objectives and expected benefits laid out in the business case -the performance indicators found in the business case identified to be used for proactive realisation of the business and behavioural change.
Business Description	Textual description of the business performed
Business Model	A business model describes the rationale of how organization creates, delivers, and captures value, economic, social, cultural or other contexts.
Organisation type	Abstract (generic) type of organisation.
Stakeholder	An organisation, association or community that have a str

	interest in (e.g. cost, safety, environment), or will be impacted by, Sea Traffic Management.
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5.4.4 Operational perspective

The Operational perspective focuses on the operational characteristics in the area of sea transportation, such as actors and their activities, roles and responsibilities, collaborations and interactions, provided operational services, and information exchange.

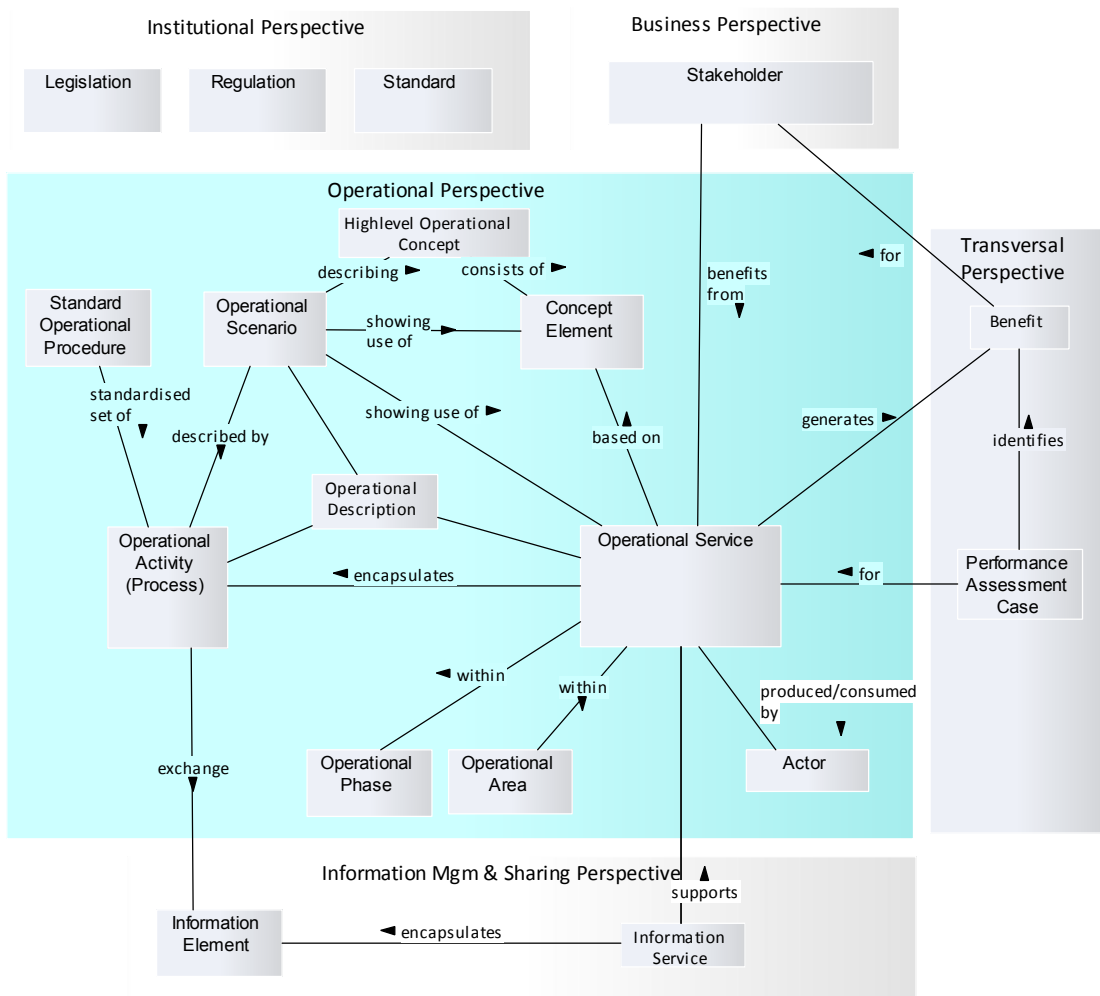


Figure 8 Metamodel for Operational perspective

Architecture Element	Description
Actor	An organisation, association or community that perform operational activities.

Concept Element	A concept element is a part of the concept that is essential and characterizes the concept. The concept element is represented by a term, which shall be defined. The concept element can also be further elaborated as an information element, process, service etc.
Geographical Area	A defined sea area in which sea operations are conducted. The area may be static or temporarily in time.
High-level Operational Concept	A high-level description of the STM services necessary to accommodate traffic at a given time horizon; a description of the anticipated level of performance required from, and interaction between, the STM services, as well as the objects they affect, and a description of the information to be provided to agents in the STM and how that information may be used for operational purposes. The operational concept is neither a description of the sea navigation infrastructure nor a technical system description nor a detailed description of how a particular functionality or technology could be used.
Information Element	Knowledge communicated or received concerning a particular fact or circumstance.
Operational Activity (Process)	An activity, or sequence of activities, that produces operational value (processes and activities). Can be decomposed to the level of detail that is required. Can be formalised into Standard Operational Procedure.
Operational Area	An area of responsibility relevant for the operations of sea traffic.
Operational Benefit	Operational benefit is value (time, cost, satisfaction and business revenue) gained from capabilities/services in use.
Operational Characteristic	A characteristic (attribute) describing an operational environment for sea operation.
Operational Description	Textual operational description of the concept.
Operational Environment	Operational environment is the context within the business and operation is performed within the sea traffic domain.
Operational Phase	A phase related to a (relative) timeframe within operational activities is performed (e.g. Planning phase, Execution phase).
Operational Role	An operational role is a role that an actor (as organization, position, technical system and/or organisation) undertakes, on behalf of an organisation/association or community, performing operational activities. Compare 'position' where actors hold a certain role (e.g. captain).

	assigned expectations, responsibilities and mandates to
Operational Scenario	A textual outline of expected or agreed sequence of traffic operations events.
Operational Service	<p>A service that encapsulates an operational part independent of technical solution in order to deliver operational value.</p> <p>An operational service can be further described by the sectors and operational activities that are encapsulated by operational service.</p>

5.4.5 Information management & sharing perspective

The Information Management and Sharing perspective focuses on understanding, defining, and describing how information is managed and shared, including governance, principals and information security.

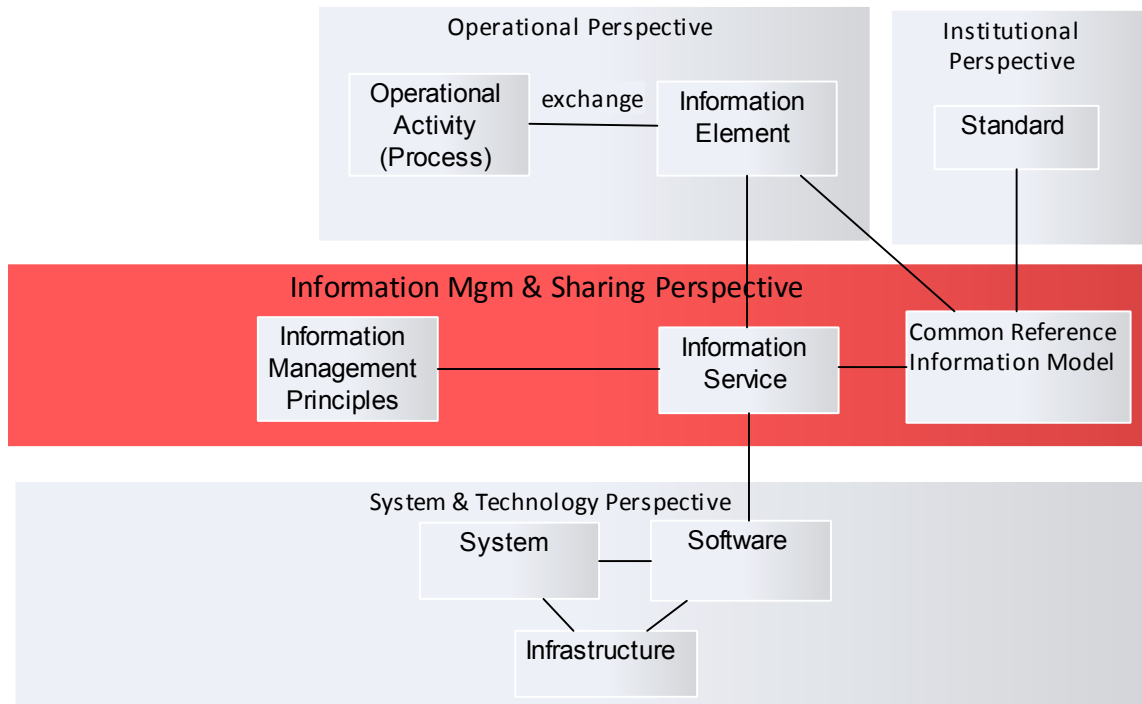


Figure 9 Metamodel for Information management & sharing perspective

Architecture Element	Description
Common Reference Information Model	A common reference information model refers to a common abstract framework or domain-specific ontology consisting of an interlinked set of clearly defined information elements.
Information Management Description	Textual description of the information management
Information Management Principles	The collection and management of information from one or more sources and the distribution of information to one or more audiences. This sometimes involves those who have a stake in, or a right to information.
Information Service	An information service provides both simple and complex information.

5.4.6 System & technology perspective

The System and Technology perspective focuses on understanding, defining and describing the parts and structures from a system technical point of view.

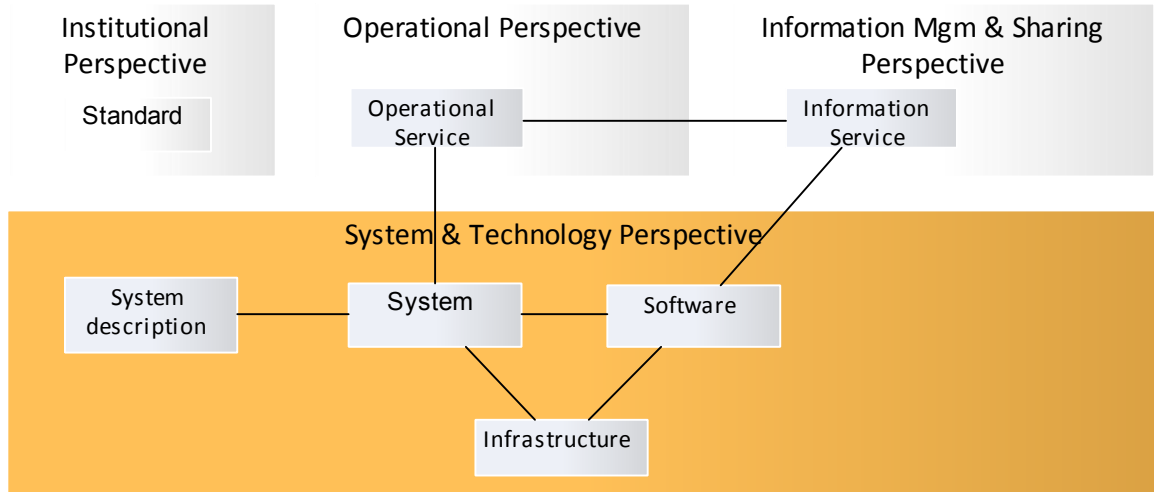


Figure 10 Metamodel for System & technology perspective

Architecture Element	Description
Infrastructure	A combined set of hardware, software, networks, facilities, (including all of the information technology), in order to develop, test, deliver, monitor, control or support IT services.
Software	Organized information in the form of operating systems, utility programs, and applications that enable work.
System	A technical system is a set of interacting or interdependent technical components forming an integrated whole. Every system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure, purpose and expressed in its functioning.
System description	Textual description of the technical system (system-of-systems).

5.4.7 Transversal perspective

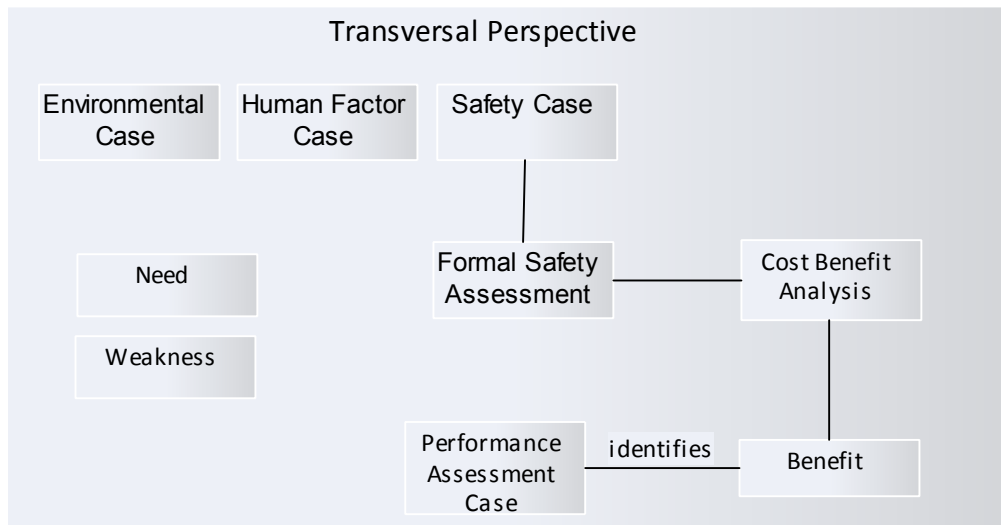


Figure 11 Metamodel for Transversal perspective

Architecture Element	Description
Benefit	A value (benefit) produced for the customer and other beneficiaries.
Cost Benefit Analysis	A systematic approach to estimating the strengths and weaknesses of alternatives that satisfy transactions, activities or functional requirements for a business. It is a technique that is used to determine options that provide the best approach for the adoption and practice in terms of benefits in labour, time and cost savings etc.
Formal Safety Assessment	A rational and systematic process for assessing the risks associated with shipping activity and for evaluating the costs and benefits of IMO's options for reducing these risks.
Human Factor Case	The objective of Human Factors is to find an optimal trade-off between automation and human tasks whilst respecting human and exploiting the unique human capabilities and skills in the best possible way in order to ensure safe and efficient operations at all times.
Need	A need of some kind expressed by, or identified from, stakeholders and users.
Performance Assessment Case	Used to denote the documentation that contains all the reasons and arguments used to demonstrate that the performance objectives (and performance targets) will be met. A performance case can be seen as the combination of the various cases that together address and balance all areas in which the system

	Community has expectations, e.g. safety case, together with business case, together with the environment case.
Safety Case	A Safety Case is a structured argument, supported by evidence intended to justify that a system is acceptably safe for a specific application in a specific operating environment.
Weakness	Weakness (concern) identified in current situation that is addressed

5.4.8 Transition perspective

The main purpose is to package and communicate the operational changes and to plan the step-by-step increase of the benefit generated by STM until it reaches the full effect to maritime transportation.

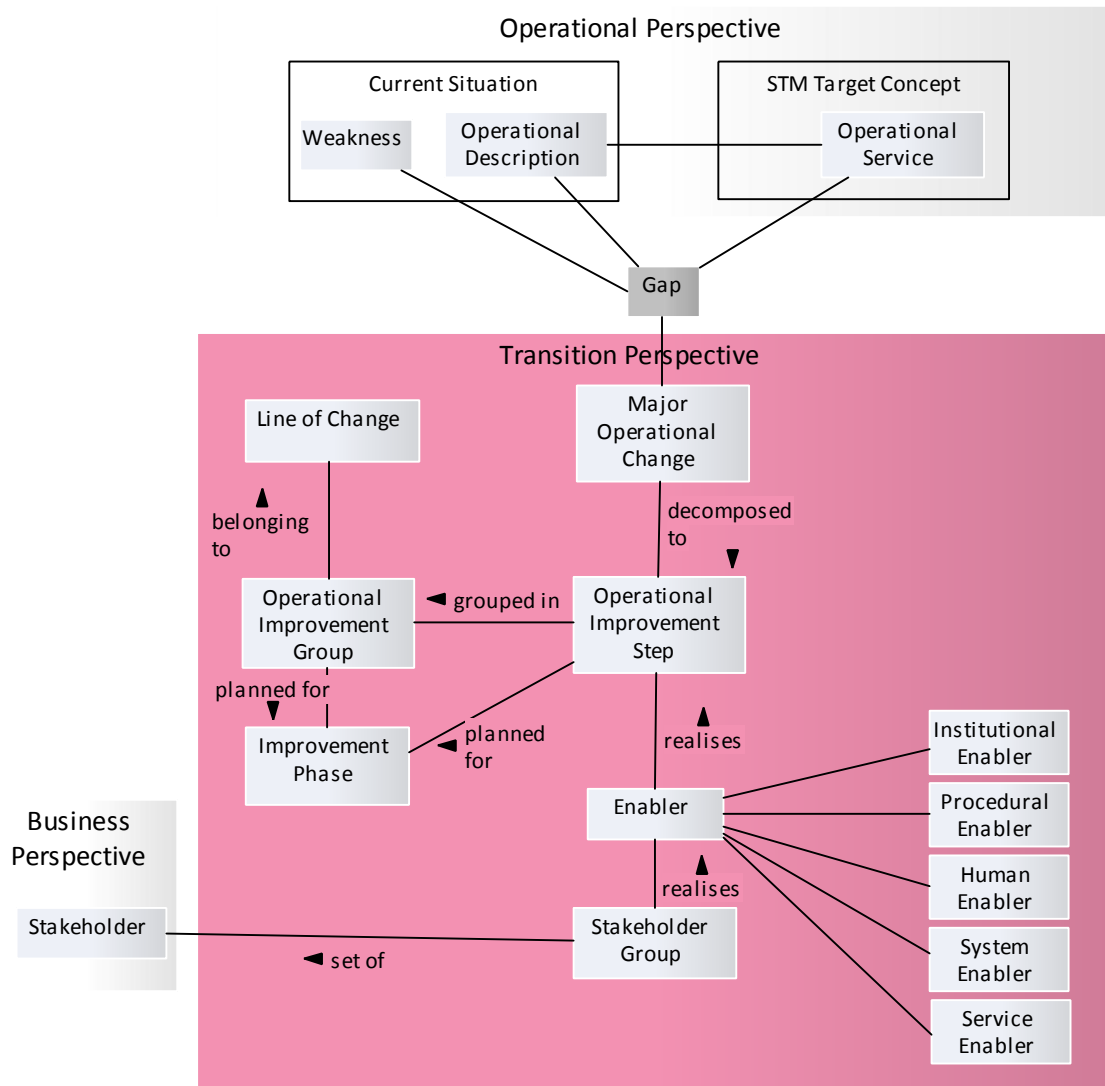


Figure 12 Metamodel for Transition perspective

Architecture Element	Description
Improvement Phase	The transition from today's situation to the STM Target Concept is formulated through a sequence of Improvement Phases describing the evolution of STM.
Major Operational Change	A major operational change is what is needed to be changed operationally based on the gap between the current situation and the STM Target Concept. Each identified major operational change reflects a specific Operational Service within the STM Target Concept.
Operational Improvement Group	A grouping of Operational Improvement Steps that are related or contributing to the same benefit or process.
Operational Improvement Step	An Operational Improvement Step describes a specific operational change that can be implemented in a given period of time, and results in a performance enhancement.
Enabler	An Enabler is a change to the supporting infrastructure. These changes are actions proposed to be performed by various Stakeholders – i.e. an identification of Stakeholders who may contribute to the evolution of the maritime domain. Enablers are what need to be done when implementing an Operational Improvement Step.
Line of Change	A grouping of related Operational Improvement Groups. A Line of Change that affects a certain operational area. The Line of Changes is a support to ensure that the planning of the evolution to the STM Target Concept meets the required performance over time.

6 STM Architecture Framework for vantage points

The following vantage points (various positions from which the domain has been viewed) have been considered:

- Current Situation
- STM Performance Target
- STM Target Concept
- STM Strategic Roadmap and Master Plan
- STM E-Master Plan

6.1 Current Situation (D2.0.3)

The following set of architectural information has been captured regarding the current situation.

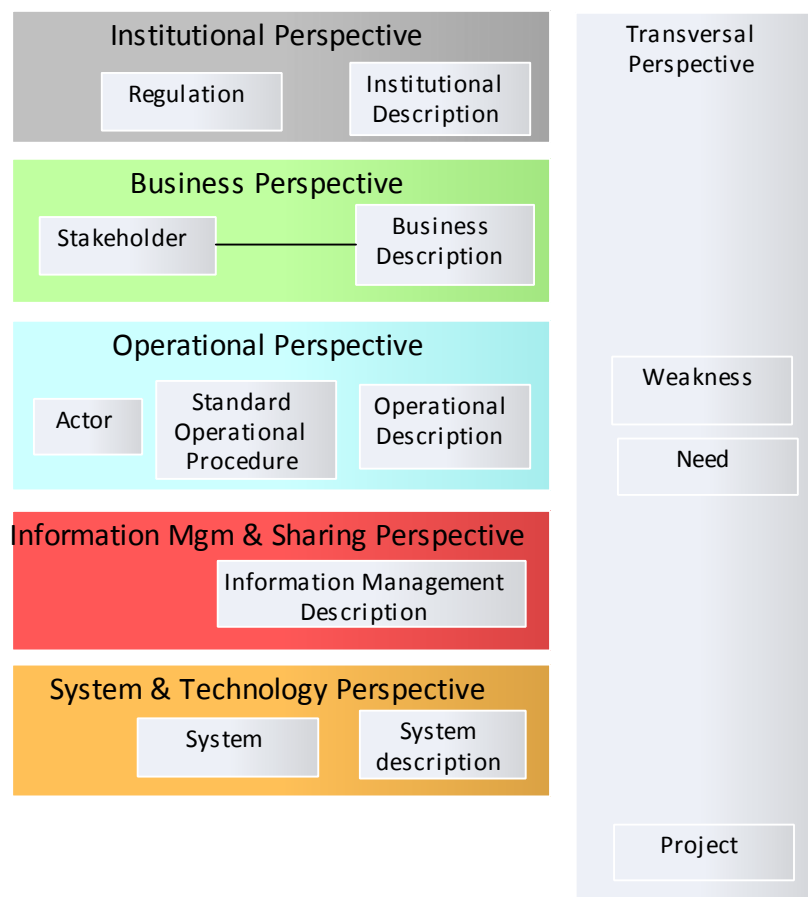


Figure 13 Metamodel for Current Situation modelling

6.2 STM Performance Framework (D2.2.2)

The following set of architectural information has been captured regarding the STM Performance Target.

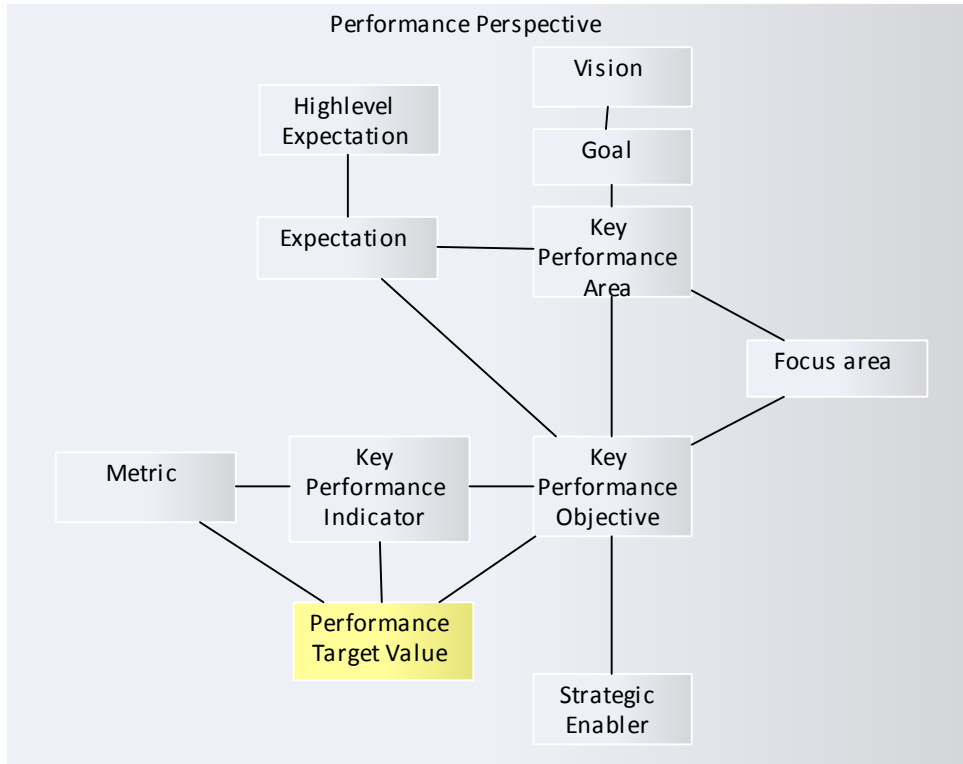


Figure 14 Metamodel for STM Performance Framework modelling

6.3 STM Target Concept

The following set of architectural information has been captured regarding the STM Target Concept.

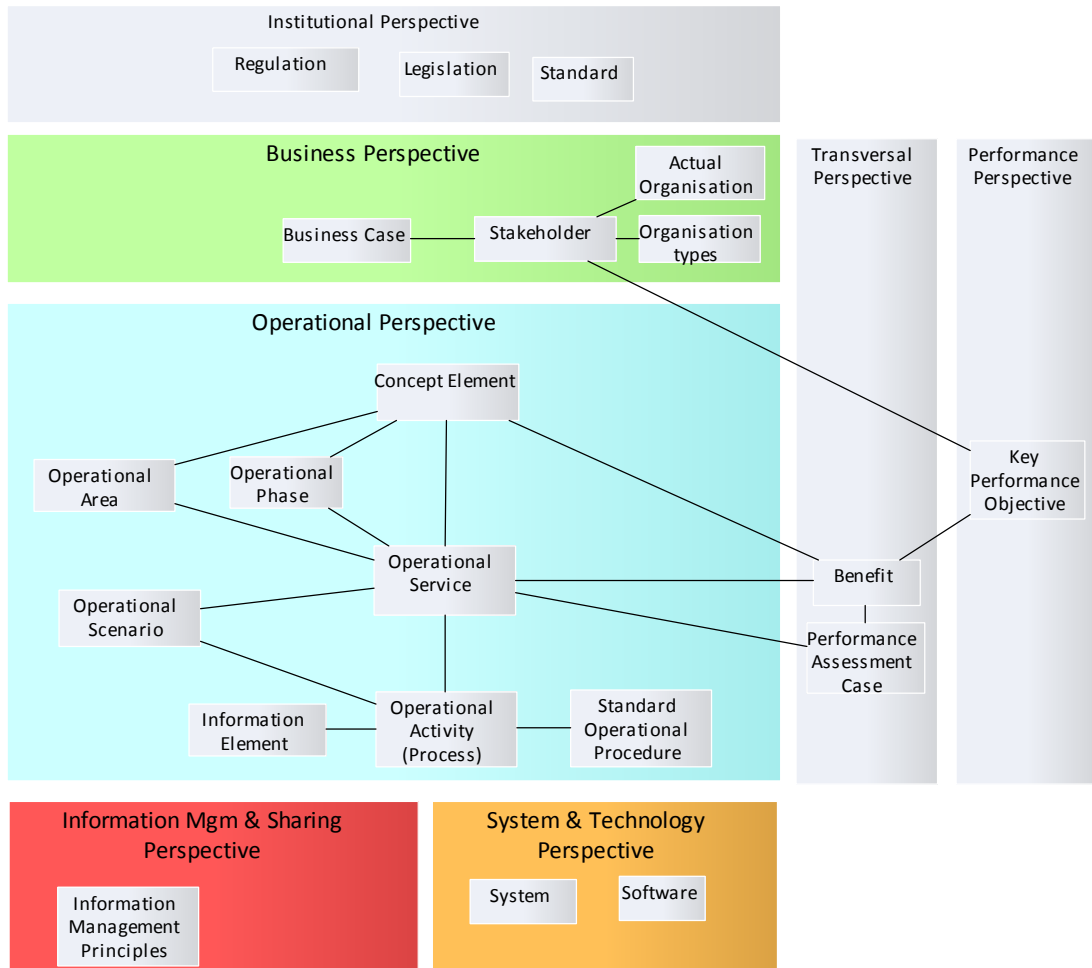


Figure 15 Metamodel for STM Target Concept modelling

6.4 STM Strategic Roadmap and Master Plan (D2.4.3, D2.5.3 and D2.6.2)

The following set of architectural information has been captured regarding the STM Strategic Roadmap and Master Plan.

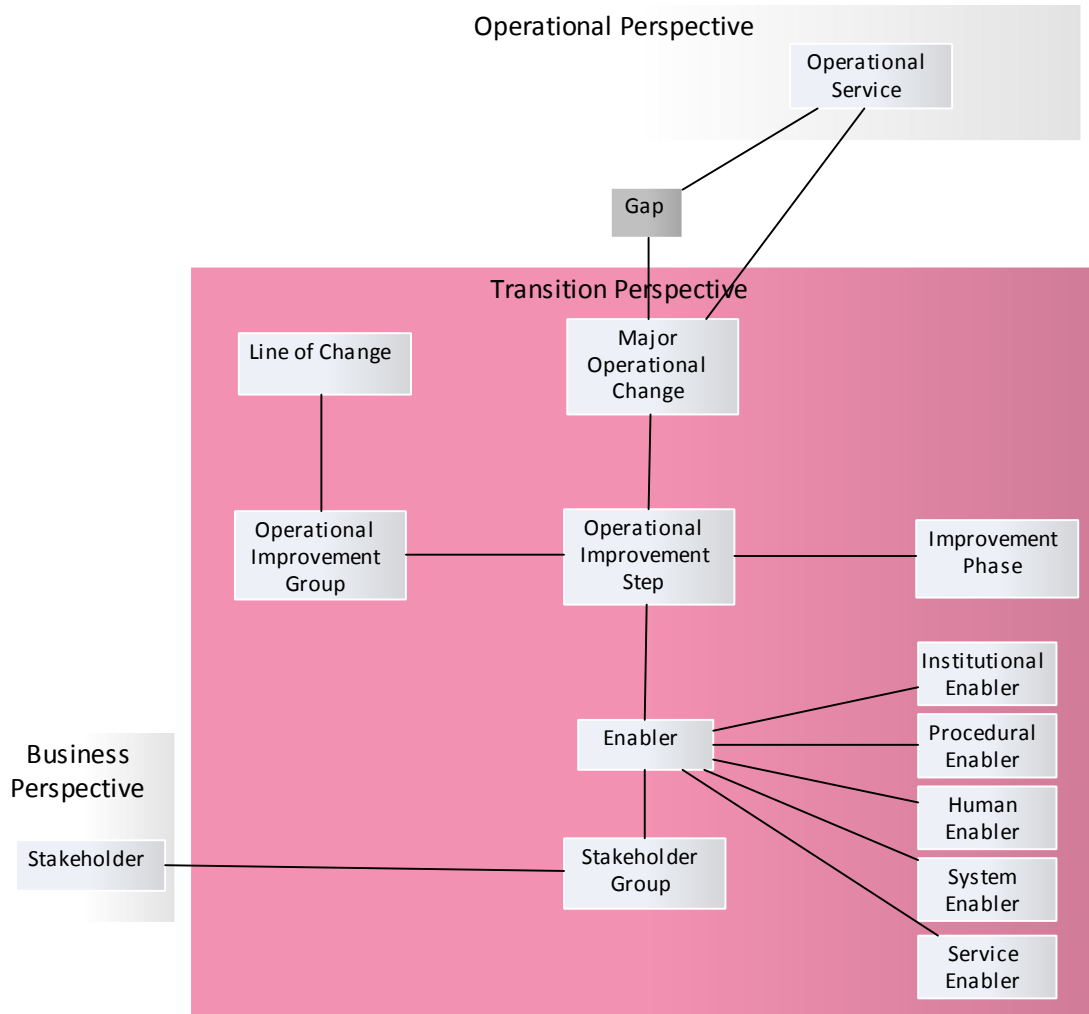


Figure 16 Metamodel for STM Strategic Roadmap and Master Plan modelling

6.5 STM e-Master Plan

The following set of architectural information has been captured regarding the STM E-Master Plan.

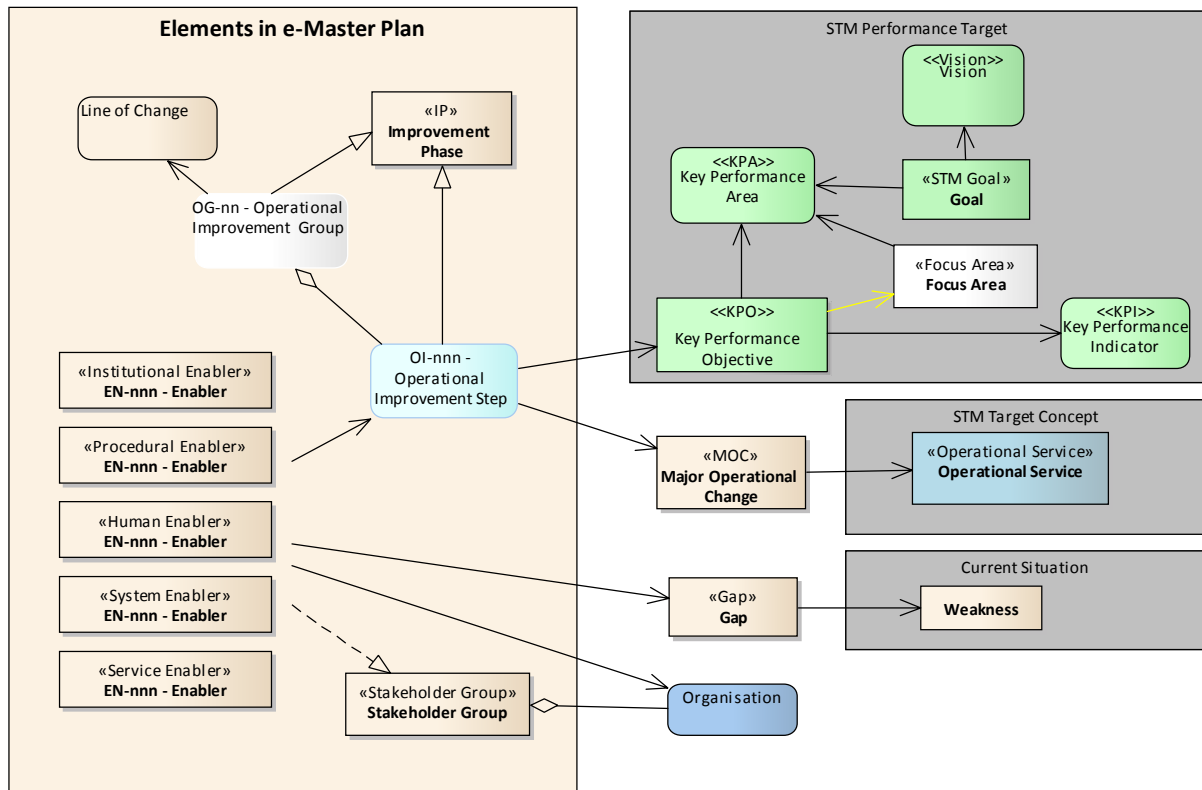


Figure 17 Metamodel for e-Master Plan modelling part

7 Graphical and Model Notation

The main part of the STM Architecture Description has been modelled using simple UML class notation and associations between architectural elements. Stereotypes have been used for setting colour and form.

8 Report generation

8.1 Document reports

Reports are generated to be included in documents (such as this document) and for working material.

8.2 Excel

Information has been generated in Excel sheets to be included in documents and as working material.

9 Tools

Enterprise Architect from Sparx systems version 10 has been used as the main repository.

MS Office has been used for supplementary modelling.

10 References

ISO, 2012, ISO 42010:2012 Systems and software engineering – Architecture description

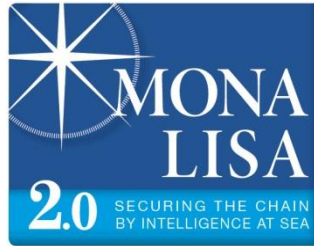
MoD UK, n d, Ministry of Defence Architecture Framework

NATO, n d, NATO Architecture Framework

Appendix A Activity 2 Deliverables

This appendix lists the MONALISA 2.0 Activity 2 deliverables.

- ATM report for MONALISA 2.0, MONALISA 2.0 – D2.0.7, 2015
- Collaboration in the Maritime Transport Ecosystem, MONALISA 2.0 – D2.3.1-12-3, 2015
- Dynamic Voyage Management Concept Description, MONALISA 2.0 – D2.3.1-4.2, 2015.
- Electronic STM Master Plan, MONALISA 2.0 – D2.5.2, <http://stmmasterplan.com>
- Envisioning Sea Traffic Management 2030, MONALISA 2.0 – D2.3.1-12-4, 2015
- Finding Information in the Maritime Transport Ecosystem, MONALISA 2.0 – D2.3.1-12-2,
- Flow Management Concept Description, MONALISA 2.0 – D2.3.1-4.3, 2015.
- Formal Safety Assessment Case, MONALISA 2.0 – D2.3.1-11, 2015
- Green Steaming: A Methodology for Estimating Carbon Emissions (2015) Avoided, Watson, R., H. Holm, and M. Lind, Thirty Sixth International Conference on Information Systems, Fort Worth
- Performance Assessment Case, MONALISA 2.0 – D2.3.1-9, 2015
- Port CDM Concept Description, MONALISA 2.0 – D2.3.1-4.4, 2015
- Port CDM Report, MONALISA 2.0 – D2.7.1, 2015
- Sea Traffic Management: A Holistic View, MONALISA 2.0 – D2.3.1-4.0, 2015
- Sea Voyage Costs, MONALISA 2.0 – D2.3.1-3.2, 2015
- STM – The Current situation, MONALISA 2.0 – D2.1.1, 2015
- STM – The Target Concept, MONALISA 2.0 – D2.3.1, 2015
- STM Master Plan, MONALISA 2.0 – D2.5.1, 2015
- STM Performance Framework, MONALISA 2.0 – D2.2.1, 2015
- Strategic Voyage Management Concept Description, MONALISA 2.0 – D2.3.1-4.1, 2015
- Target Business Description, MONALISA 2.0 – D2.3.1-3, 2015
- Target Concept Business Case, MONALISA 2.0 – D2.3.1-2, 2015
- Target Human Aspects Description, MONALISA 2.0 – D2.3.1-7, 2015
- Target Information-Systems and Information-Technology Description, MONALISA 2.0 – D2.3.1-6, 2015
- Target Institutional Description, MONALISA 2.0 – D2.3.1-1, 2015
- Target Systems Technical and Technology Description, MONALISA 2.0 – D2.3.1-5, 2015
- Target Transversal Aspects Description, MONALISA 2.0 – D2.3.1-8, 2015
- Understanding the Maritime Transport Ecosystem, MONALISA 2.0 – D2.3.1-12-1



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Danish Meteorological Institute ◦ GateHouse ◦ Navicon ◦ Novia University of Applied Sciences ◦
DLR ◦ Fraunhofer ◦ Jeppesen ◦ Rheinmetall ◦ Carnival Corp. ◦ Italian Ministry of Transport ◦
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Genoa ◦ VEMARS ◦ SASEMAR ◦ Ferri Industries ◦ Valencia Port Authority ◦ Valencia Port
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