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Leveraging FRAME Methodology for EU-Wide Harmonization of National Access Points

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ABSTRACT: The FRAME (FRamework Architecture Made for Europe) methodology enables consistent deployment of Intelligent Transportation Systems (ITS) services across various transport domains, cities and networks in Europe. This paper details the development and enhancement of a comprehensive National Access Point Reference Architecture (NRA) using the FRAME methodology. The reference architecture serves as a blueprint for new NAP implementations and identifies standards for existing NAPs, fostering secure and private data exchange, trust, and interoperability. The NRA, developed in the NAPCORE project, in the dedicated task led and contributed to by the authors of this paper, consist of motivational, functional, physical, organizational, and communication views created in the Enterprise Architect software. The NRA defines the architecture for two NAP types, significantly improves each view by addressing earlier limitations and by adding new features such as definition of interfaces and related standards, broader definition of agreements between actors. Additionally, the paper discusses the challenges encountered during the development process and underscores the significance of common terminology and harmonized interfaces in enhancing NAP utilization across Europe.

KEYWORDS: EU-wide harmonization; Interoperability; ITS Architecture; FRAME; NAP; NAPCORE; National Access Point

1. INTRODUCTION

The European ITS Framework Architecture, known as "FRAME" (FRamework Architecture Made for Europe), is essential for enabling consistent ITS services across various transport domains and networks in Europe (Bělinová & Bureš, 2011), (Bureš, Bělinová, & Jesty, 2010), (Becker, 2021). It provides a systematic basis for planning ITS implementations, facilitating integration when deploying multiple systems, across transportation modes, and ensuring interoperability across European countries (Tichý, et al., 2023) and cities (Růžička, Hajčiarová, & Tichý, 2022). As deployment of multiple systems is the key aspect of smart cities, using a system architecture enables processing of big amounts of data by e.g. definition of interfaces and standards and requirements to adhere to.

FRAME is a system architecture, a conceptual model that defines the structure, behaviour, and various views on a system. It is formally described and organized to support reasoning about the system's structures and behaviours. The architecture's structure can be detailed at various levels, forming a definitive and consistent framework to guide the proposal, development, implementation, and maintenance of Intelligent Transportation Systems (ITS).

A distinctive feature of FRAME is its comprehensive ITS functionality (Bossom & Jesty, 2005), from which smaller systems and subsets are created to describe specific services (FRAME, 2019). It offers multiple ways to perform a service, allowing users to select the most appropriate functionalities. FRAME uses the Enterprise Architect software for visual modelling and design. It provides a framework for creating specific models of integrated ITS, offering flexible, detailed, and standardized descriptions.

In its latest version 5.2, developed within the FRAME NEXT project (2017-2021), FRAME was aligned with the EU ITS Directive (ITS Directive 2010/40/EU) and extended to provide domain-specific reference architectures for priority areas such as e-Call, C-ITS, Truck Parking, and National Access Points (NAPs) (Froetscher, et al., 2021). These architectures offer ready-made descriptions for delivering ITS services in compliance with regulations and standards, promoting harmonization and interoperability across the EU.

National Access Points (NAPs) facilitate ITS services by making essential traffic and travel data available in each Member State. So, ITS service providers can combine their data with NAP information for harmonized ITS applications across Europe, ensuring consistent implementation regardless of data types and sources. To enhance NAP interoperability and align member states, the NAPCORE project, aiming to harmonize mobility data standards and improve data access and availability across Europe was started in 2021.

The NAP Reference Architecture (NRA) is central to NAPCORE's harmonization efforts. NAPCORE identified various NAP implementations within the EU, necessitating the update (NAPCORE, 2025) and (NAPCORE, 2022) of the FRAME reference architecture for NAPs based on Delegated Regulations as of 2018. The primary goal of NAPCORE is to update the NAP reference architecture (NAPCORE, 2024) to serve as a blueprint for new NAP implementations and to set requirements for existing NAPs, enabling common functionalities, seamless data exchange, trust, and interoperability by defining common elements at the architecture level (NAPCORE, 2023).

To improve understanding and descriptions of NAP interfaces, processes, and data formats, the NAPCORE project created several interoperability demonstrators to test real-world scenarios, such as cross-border and intermodal environments (Scrocca, Azzini, Bureš, Comerio, & Lubrich, 2022). They also explored NAP implementations across Europe to identify good practices. These findings are used to update the NAP reference architecture using the FRAME methodology (FRAME, 2021), ensuring a cohesive approach to ITS services across Europe.

This paper describes the use of FRAME to improve the NAP reference archi tecture within the NAPCORE project. The reference architecture provides users with a ready-made description of how NAP can be delivered in accordance with regulations and standards, enabling a high level of standardization and interoperability in EU Member States.

2. METHODOLOGY

The European ITS framework architecture, known as FRAME, is designed to be technology independent. This characteristic ensures that it does not rely on specific technologies, making it adaptable and durable, capable of incorporating future technological advancements. Consequently, the FRAME architecture focuses on a holistic definition of the functional view of the entire ITS domain.

In the FRAME methodology (FRAME, 2021), the implementation of ITS begins with capturing stakeholder aspirations. These aspirations, often articulated in natural language, are then mapped to a subset of User Needs from a comprehensive set of over 500 needs that encompass a wide range of ITS applications and services. These User Needs are used to select the necessary functions, from the FRAME Architecture, to perform the service. The selected functions, forming the systems Functional View, serve as a structural layer that can be modified by the system architect when needed. To fully describe the system, additional views such as the Motivation Layer, Physical View, Organizational View, Communication View and Security View are developed, each building upon the other. These additional views are constructed from scratch with the assistance of the FRAME methodology.

The strength of FRAME lies in its ability to relate functions to user needs to create a functional view. However, the NRA is a smaller system, requiring a more detailed description, then what is available in the FRAME Architecture. Additionally, the FRAME methodology, beyond building the functional view, is rather sparse and, since the last FRAME-NEXT development, incomplete, sometimes providing conflicting instructions or lacking advice on how to work with and describe important elements of reference architecture views.

In this paper, we explain how we utilized, adapted, and appended the existing FRAME methodology to develop the National Access Point Reference Architecture (NRA). We begin with a brief description of the reference architecture composed of different views, their building blocks, and their development using the FRAME methodology after its cleanup and review. We then describe our activities within the NAPCORE project to define the NRA, specifically the collecting of needed functionality from stakeholders and our contributions to harmonization and updating efforts by developing agreed-upon terminology definitions, component and interface definitions, minimal requirements for data description harmonization, and the definition of NAP types. Furthermore, we illustrate, using examples, key features of the developed NRA views and detail how we specifically created these views to facilitate the harmonization of the NAPs. Additionally, we discuss our approach to the FRAME methodology, the challenges we encountered, and their potential solutions.

This paper summarizes and describes the efforts of NAP experts and systems architects within a dedicated task of the NAPCORE project, which has been led and influenced by the authors of this paper.

3. MODELLING REFERENCE ARCHITECTURE IN FRAME

In this section, we provide a concise summary of the various views, their building blocks, and their development processes as an entry point to the detailed description of the created NAP reference architecture. According to the FRAME methodology (FRAME, 2021), the reference architecture consists of Motivational layer, Functional view, Organizational view, Physical view, Communications view, and Security view. The Reference Architecture is developed using a FRAME tool, the Enterprise Architect software with a custom toolbox.

3.1. Motivational Layer

Motivational Layer outlines the initial position of system development, the stakeholders involved, and the expected added values and business goals. It includes key elements such as the ITS Vision and the ITS Service description. This layer models the motivations, reasons for the necessity of the ITS Service, and the expectations of its successful implementation. The layer includes stakeholders, represented by actors, who have a vision realized through a mission. This mission, along with their expectations, defines the ITS Service, which in turn provides added value. The ITS Service operates within a domain and satisfies user needs and requirements.

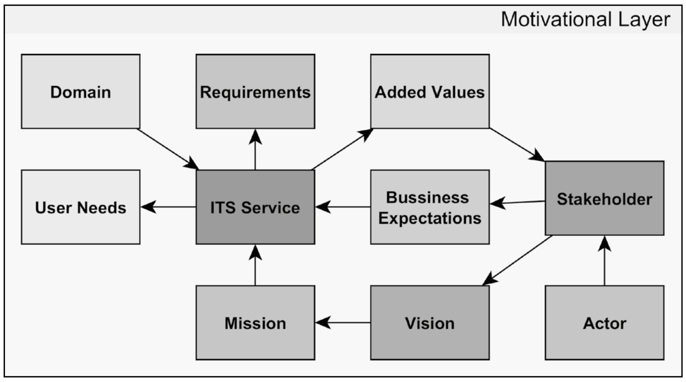

Fig. 1. Components of FRAME motivation layer

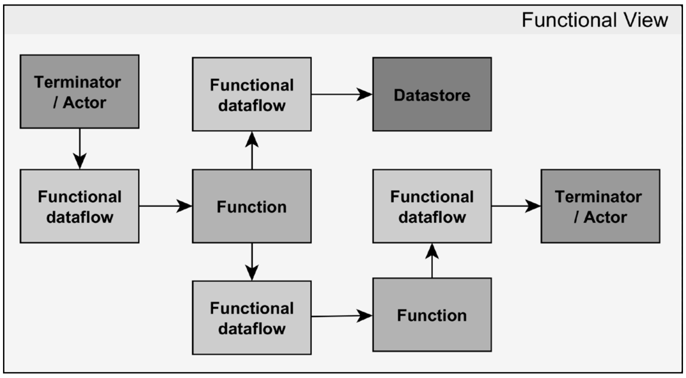

Fig. 2. Components of FRAME functional view

3.2. Functional View

Functional View focuses on the functional aspects of a system. It defines the architectural elements that deliver the system's functionality, including key functional elements, their responsibilities and their interactions. This view is often the cornerstone of most architecture descriptions and is usually the first part stakeholders read. The Functional View contains a chain of functions connected via functional dataflows, with terminators at both ends. This chain represents a data processing sequence in the designed system. Datastores represent the ability of a function to store and retrieve data, modelling real databases. Creating the Functional View involves using identified user needs, representing stakeholder aspirations, to define the necessary functionality for providing services.

3.3. Organizational View

Organizational View provides information about actors, their roles and responsibilities, and the relationships between these roles, whether lawful or contractual. It also includes data on capabilities, actor definitions, desired business results, and business processes for the ITS deployment related to the subset ITS architecture derived from FRAME Architecture. Additionally, it depicts desired business results and processes for the ITS deployment, such as ownership, planning, maintenance, deployment, implementation, and tendering. The

Organizational View consists of ITS actors performing one or more roles, agreements between these roles, and their relationships to components (sub-systems) and modules.

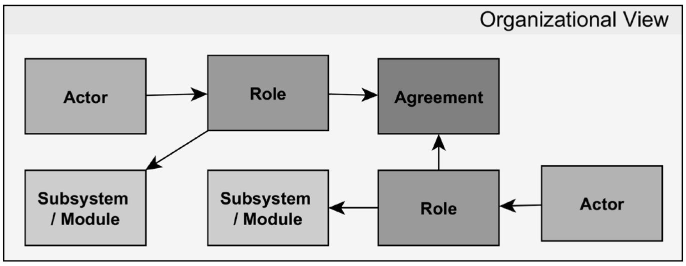

Fig. 3. Components of FRAME Organizational view

3.4. Physical View

Physical View presents the system from a system engineer's perspective, focusing on the topology of software components at the physical layer and their physical connections. It aims to satisfy logical architecture elements and system requirements. Physical View also includes the exchange of information between systems, corresponding to an interface specification that defines a protocol and a data model. It is always based on a specific Functional View, which must pass logical consistency checks before use.

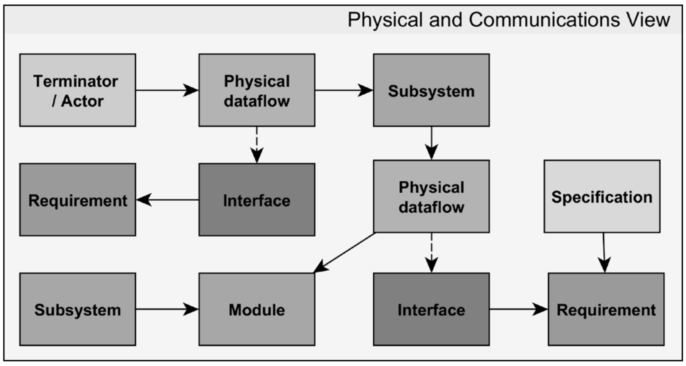

Fig. 4. Components of FRAME Physical and Communications view

3.5. Communications View

Communications View focuses on the interaction and data exchange between different components (subsystems and/or modules) of the system. It outlines the communication protocols, data formats, and interfaces used for data transmission between system elements. This view is crucial for understanding how information flows within the system, how components interact, and how external systems interface with it. It aids in designing efficient communication strategies, ensuring seamless data exchange, and improving the system's overall performance and reliability.

3.6. Safety and Security View

The Safety and Security View addresses two key aspects: safety and security. Safety refers to freedom from hazards that can cause physical harm, while security pertains to protection from threat agents and abuse, whether actual or perceived. This abuse includes, but is not limited to, unauthorized disclosure (loss of confidentiality), unauthorized modification (loss of integrity), and unauthorized deprivation of access to the asset (loss of availability).

4. NAP REFERENCE ARCHITECTURE INITIATION

To develop the National Access Point Reference Architecture (NRA), we began by gathering relevant sources on ITS architecture and NAPs from NAP operators, NAPCORE working groups such as NAP links and data availability (NAPCORE, 2025), NAP types and level of service assessment (NAPCORE, 2022) and requirements on standards (NAPCORE, 2023), and the FRAME-NEXT project documents such as description of FRAME evolution (Becker, 2021), FRAME artefacts (FRAME, 2019) methodology introduction and initial FRAME NRA version (FRAME, 2021). To leverage the European approach to architecture and modelling we selected FRAME methodology, despite potential legacy challenges.

This work included specification of all actors and their responsibilities, main functionalities, technological components, and interactions, considering different NAP types and maturity levels, and identifying minimum components for a common basis.

In addition to gradual creation of the NRA large effort of the NAPCORE Architecture task, in cooperation with other project tasks, was focused on harmonization of terminology (e.g., NAP types), commenting data type definitions, component and interface definitions, and minimal data description requirements.

4.1. Functionalities for the NRA

The following functions represent an input to update the functionality of the NRA from NAPCORE analysis. In each functionality topic, a minimum was identified from the possible choices.

4.1.1. Functionalities for NAP operation and management

- User Support: there is a need for broad support, e.g. FAQ, Questions & Answers, issue reporting, for several types of NAP users in different forms.
- Metadata storage: the storage of meta-data and data are strongly related to the functionalities of the NAP. It is a crucial part of any NAP. Minimum requirement is to store metadata.
- Content provider management: content provider fills in information about the dataset / service and itself via NAP.
- Content consumer management: in general, NAP does not need to know the content consumer, but it makes sense in some use cases (real data consumption via NAP, statistics, newsletter etc.).
- Provide (User) Interface: information at NAP can be accessed by user or by machine, furthermore information could be entered to the NAP by user, via GUI (Graphical User Interface), or by machine, e.g., APIs (Application Programming Interfaces).

4.1.2. Functionalities for metadata, data, and service

- Metadata structure and content: metadata are essential to find relevant data and assess its usefulness before using it. There are several sets of specifications for structuring metadata, e.g., mobilityDCAT-AP developed within NAPCORE project.
- Metadata quality checks: metadata is essential to find and evaluate data before using it. Therefore, Metadata should be complete and provided with high quality. If a standardized format for description is used, basic quality check can be done automatically.
- Metadata provision to user: metadata accessibility and searchability is a crucial part of the usability of the NAP.
- Static data provision to user: providing static data via NAP as links is minimum functionality.
- Dynamic data provision to user: Providing dynamic data via NAP as links is minimum functionality.
- Provide data interface between producer and subscriber: there are several possibilities how a NAP could be involved in data exchange between a publisher and a data user. Minimum functionality is not to be involved.
- Metadata processing (at input): automatic metadata processing at input is useful for enhancing visibility of data and speeding their delivery to the user.

- Static traffic and travel data processing (at input): usually, NAPs do not need to process static data. Minimum functionality is just to link them.
- Dynamic traffic and travel data processing (at input): usually, NAPs do not need to process dynamic data. Minimum functionality is just to link them.
- Data Processing: the processing (e.g., data aggregation, data merge) of the raw input data is very unlikely for the NAP. Minimum functionality is just to link them.

4.2. Terminology harmonization

Interoperability begins with consistent terminology, which enhances understanding and agreement among system actors. Therefore, the NAP Architecture must first define what a NAP is and its types. We analysed the following sources:

- Delegated regulations (DRs) and the ITS Directive review to understand the definition of NAP according to DRs.
- Different NAP implementations, including functionality and the names assigned by operators.
- Information from NAPCORE working groups (WGs).

Information on what constitutes a NAP is scattered across various legal documents. These documents specify that "*data shall be provided/accessible via/through NAP*", without clarifying if data needs to be hosted. They also state that "*metadata shall be provided to NAP so it can offer discovery services to users*", implying that metadata alone is sufficient. Additionally, phrases "*NAP regroups the individual access points of service providers/data owners*" and "*organize the access to and reuse of transport-related data*" from the analysed legal documents were later used to form a definition of NAP in Directive 2023/2661, which amends the ITS Directive 2010/40/EU. However, a clear definition of NAP is missing, as evidenced by the statement that "*NAP can be in the form of a repository or database/data warehouse*", which is confusing due to incorrect terminology.

The lack of consistent terminology created confusion, as member states implemented their NAPs in various ways and selected their own preferred labels to identify them. Sometimes, different labels were used for the same type of implementation in different member states.

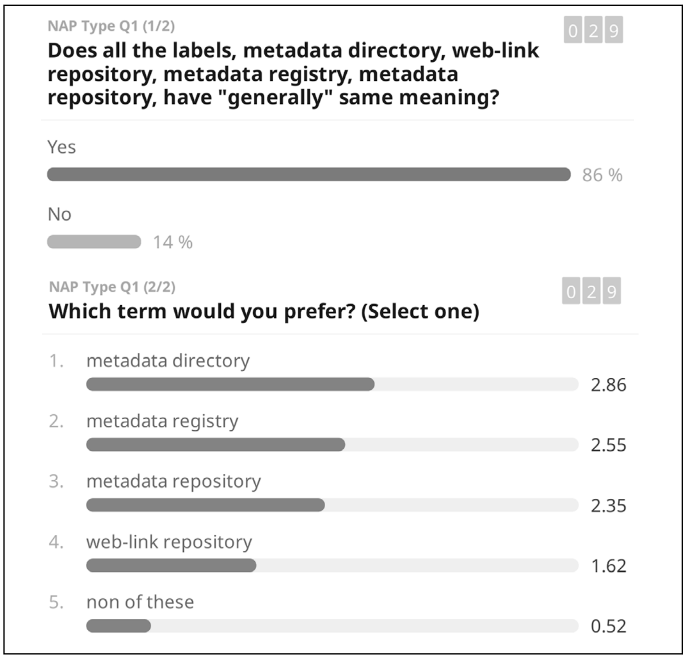

Fig. 5. NAP Operators' response to "NAP type" question from NAP operator workshop in 2023

Our analysis identified 13 different NAP labels, such as data directory, data registry, data platform, data warehouse, link registry, repository, database, used in legislative documents, often conflicting and creating confusion. To address this, we categorized the labels by their core functionality into "metadata portals" and "data portals" and aimed to select one term from each category based on feedback from NAP operators during the runtime of the project NAPCORE.

The two selected candidates were metadata directory and data platform. We developed detailed definitions and descriptions of key features to eliminate potential ambiguity. Generally, the metadata directory provides storage and provision of metadata records of data, services, and providers, search/discovery functionality, and data provider authentication. The data platform includes these functionalities and adds storage and provision of data and services, as well as data user authentication. Depending on the core functionalities we were able to create minimum reference architecture.

5. NAP REFERENCE ARCHITECTURE

The development of the National Access Point (NAP) reference architecture is based on the revision and update of the FRAME NRA (FRAME, 2019), (FRAME, 2021), incorporating findings from the NAPCORE project (NAPCORE, 2022), (NAPCORE, 2024). During the NAPCORE project, we extended the FRAME NRA to cover the minimum functionality of two identified NAP types and to align it with the latest developments. This led to the creation of two reference architectures (presented as views) within the FRAME tool: one for the Metadata Directory and another for the Data Platform. Key parts of these developed views are described in the following subchapters. It is to be noted that developed NRA have been, piecewise used in development of a new functionality of German NAP, however it still lacks larger user base and wide adaptation, that would in turn provide essential feedback. While containing a lot of very useful and expert knowledge it remains largely theoretical exercise.

5.1. NRA Motivational Layer

The NRA Motivational Layer models the motivations, necessity, and expectations for the successful deployment and implementation of NAPs. We described the ITS Service, based on the vision and mission of the key stakeholder the European Commission, as: *"The National Access Point(s) provide non-discriminatory central access to data listed in Delegated Regulations"*, with key requirements such as:

- Language independence (English + local language)
- Discovery of metadata and data samples without user registration
- Data exchange based on standards
- Support for EU-wide interoperable ITS services for travellers
- Availability of data at standard interfaces and in machine-readable formats
- Extendable data content to all ITS-directive domains
- Respect for data owner rights while supporting data exchange

These requirements summarize the NAP as an easy-to-use central point of exchange for traffic-related data between providers and consumers. To achieve this, the NAP must have clearly defined operational domain, setting boundaries across various parameters (Transport Network, ITS Service, ITS Service Type, Level of Detail, Perspective, Focus).

The NAP environment involves other stakeholders, including Member States, Competent, Content Providers, Content Consumers, and NAP Operators, contributing to the ITS service through their business expectations.

We created six expectations, one for each stakeholder, for example, *"The Content Consumer expects all mobility data or services accessible online at one place (NAP), uniformly described, accessible to all, and with content aligned by recommended standards and/or relevant profiles."*.

The ITS service, when implemented, creates additional benefits (Added Values) for various stakeholders. We created 19 service added values affecting one or more of the six stakeholders. One such added value affecting Content Consumer is *"By fulfilling the obligations of the ITS Directive, the data and services shared via NAP are provided concerning a set of standards which makes it easier to integrate them into pan-European service. Better quality of ITS services for end users."*.

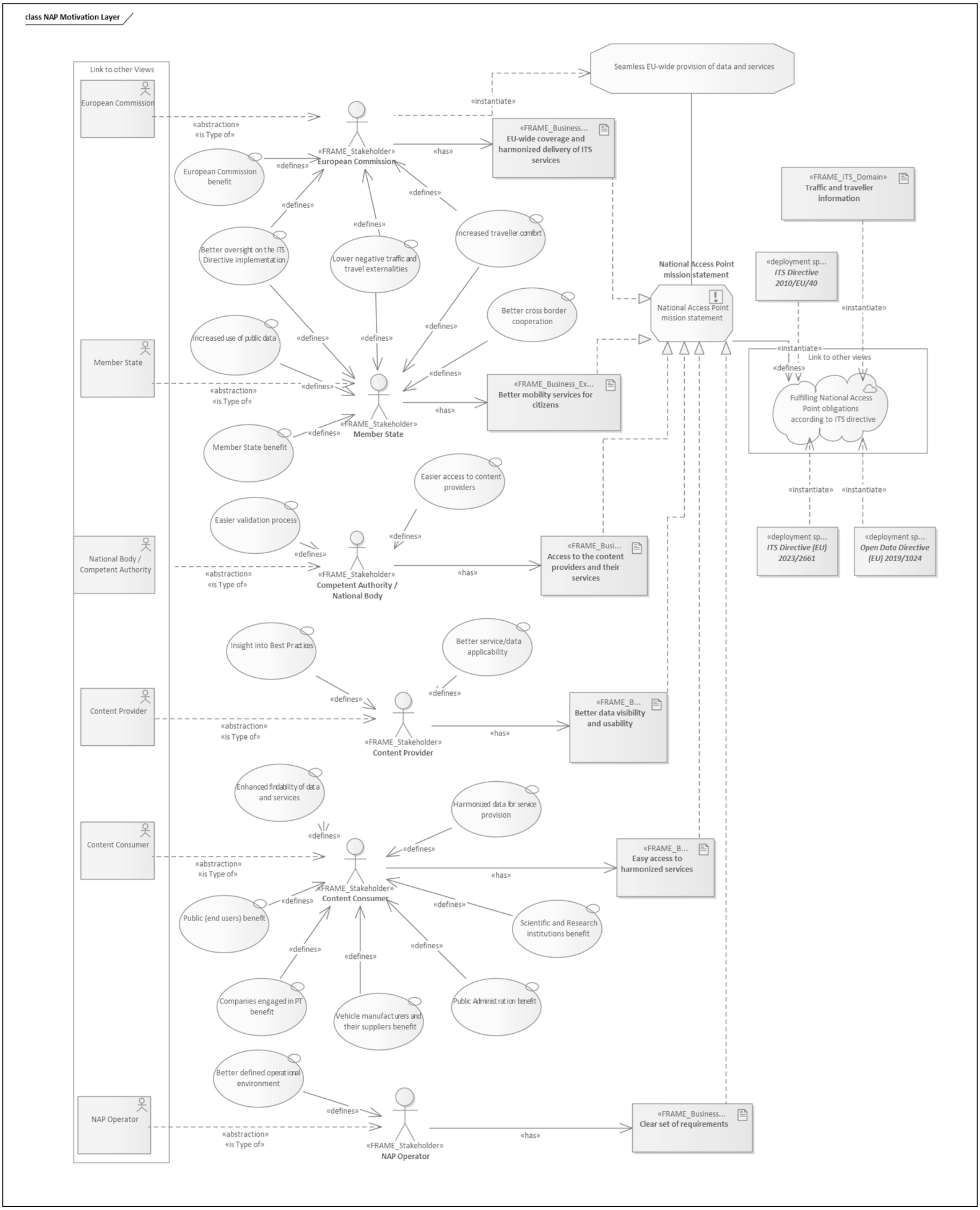

Fig 6. NRA Motivational view of the data platform / metadata directory

5.2. NRA Functional View

According to the NAP typology, we created two functional views: one for metadata directories and another for data platforms

The metadata directory functionality is depicted in Fig. 7, illustrating NAP processes. NAP Content Providers can register at NAP, manage registration, and add personal and machine accounts, including their credentials, which are stored in the NAP Users data store via the Manage Registrations and Provide Authorization Service function. This function also provides authorization to end-users and machines uploading or retrieving NAP metadata or NAP data (for Data Platforms) indirectly via other NAP functions.

Management of metadata is ensured by several functions and the NAP Metadata store in the Metadata Management module. NAP Content Providers can request retrieval, creation, update, or deletion of metadata and check the basic consistency and completeness of the provided metadata. In case of successful authorization, and updating of information in the NAP Metadata store, a metadata quality check is executed, and the result of the operation is propagated back to its originator. For retrieving and searching for metadata of other providers, the entity accesses the system as a NAP Content Consumer.

Retrieval of metadata is ensured by several functions and the NAP Metadata store in the Metadata Management module. NAP Content Consumers or Metadata Requesting Systems send a search request to the Manage NAP Metadata Retrieval function, which provides a search engine for the metadata. The result of the search request is processed by Manage NAP metadata repository function and sent back to the requestee.

Each function, data flow, terminator, or data store is described in such detail to enable a system analyst to create instructions for its implementation without necessitating details of a particular deployment. E.g. the function, Provide User Support is defined as follows: *This Function shall be capable of providing the following facilities:*

1. The ability to receive and process support requests from any existing or potential NAP Content Provider or NAP Content Consumer.
2. The ability to respond to user support requests adequately at least in the form of first-level support.
3. The ability to consult other NAP roles for issues which cannot be responded to with their own knowledge.
4. The ability to manage issues and log the issue resolution for later use by NAP Users or by an Auditing entity

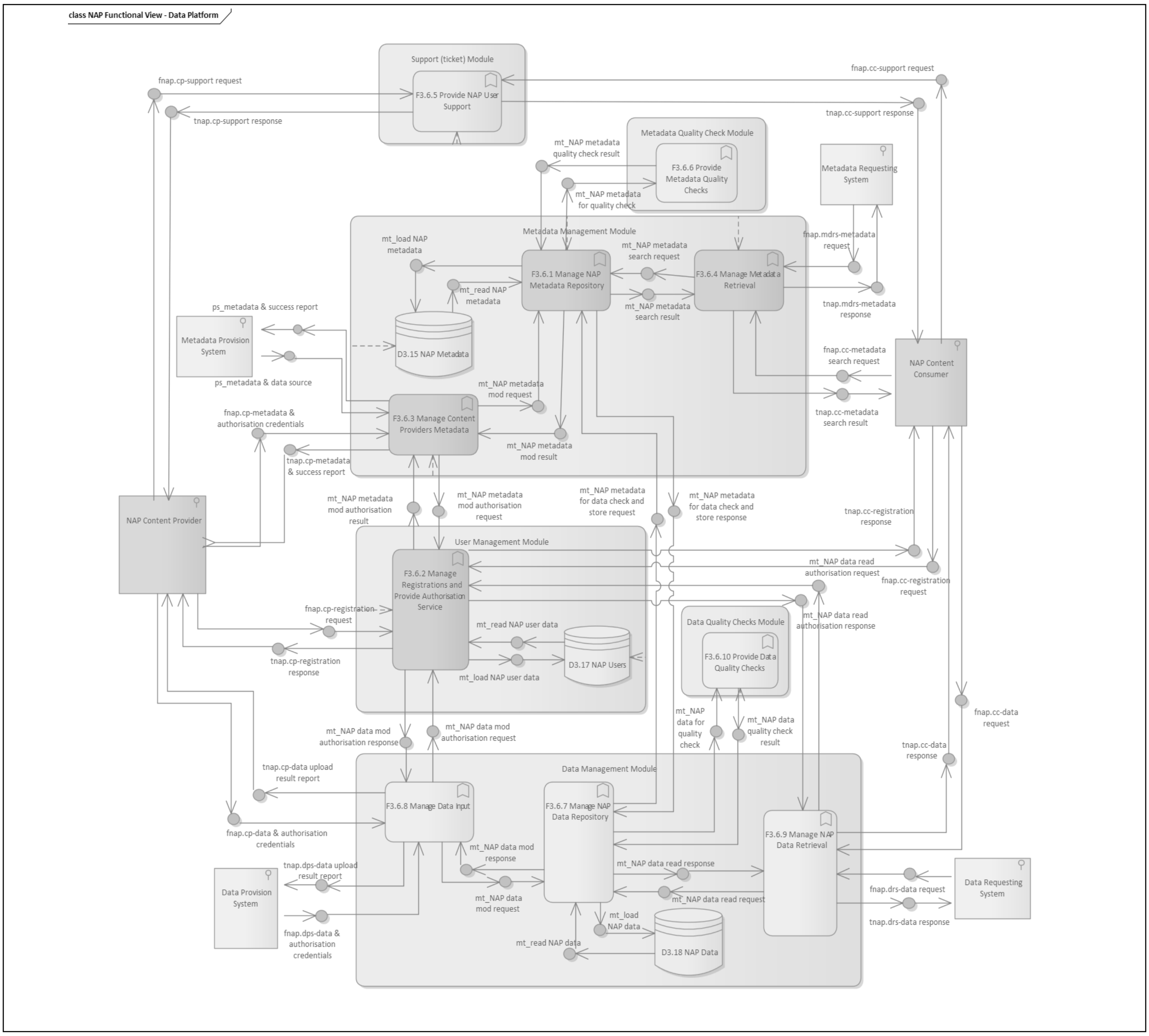

Fig 7. NRA Functional view of the data platform NAP

5.3. NRA Physical View

The physical view of the NRA describes the arrangement of sub-systems modules, and their connections built upon functionality described earlier.

The physical view of the Metadata directory comprises one subsystem and four modules: Support, Metadata Management, Quality Checks and User Management. The Data Platform physical view differs from Metadata directory physical view by including Data Management module with its physical data flows. Description of the objects in the physical view is derived from the previous views; the intention is just to highlight where interfaces are to be located.

5.4. NRA Organizational View

The NAP organizational structure comprises six actors, related to identified stakeholders. Definition of different actors, helped to identify main responsibility and typical representation of the actor, e.g. for NAP Operator *"Any public or private organization responsible for collecting and publishing information about content generated by Content Providers (metadata) under the Delegated Regulations obligations, to any interested party (Content Consumers) without prejudice.*

The NAP (National Access Point) Actor represents and fulfils the interests of the NAP (National Access Point) Stakeholder.

Represented by: Usually, a department of the MS relevant Ministry (responsible for Transport matters), a state-owned organization, or a research organization. Usually, based on the explicit stating of the entity in the national law."

The actors interact with the system, via Agreements, in seven roles, each actor in one role but the NAP Operator represented in two roles, as the operator of the NAP and as the technical IT infrastructure supplier. Roles clarifies key issue that the role resolves and its main task and responsibilities. For example, key issue of the NAP Operator being *"Publish metadata (and in certain cases data) at the NAP. Provide self-declaration and assistance in case of compliance assessment. Provide data in the prescribed format and with the desired level of quality."*.

Most important and most useful aspect of the organizational view are agreements between the roles. Each agreement specifies parties involved, its objective, form, the obligations of the parties to each other and referenced laws and citations from the law. For example, agreement Member State (MS) and National Body / Competent Authority (NB/CA) is defined as follows: "*Objective: Setting up the framework and responsibilities of the NB/CA operation.*

Form: National law implementing the ITS Directive and direct execution of EU Regulations and Delegated Acts or a contract for nonessential parts of the NB/CA duty.
Obligations of MS to NB/CA: none
Obligations of NB/CA to MS:
(1) To identify relevant stakeholders Content Providers that are obliged to make data accessible via NAP.
(2) To periodically and randomly assess the compliance of the Content Providers with the Law.
(3) To provide information about the performed compliance assessment to the MS and to NAP Operator.
(4) To cooperate with NAP Operator on the ITS directive implementation."

5.5. NRA Communications View

There are six interfaces for six external physical dataflows in the metadata directory NAP type. Each interface contains an analysis of the physical data flows to identify the characteris-

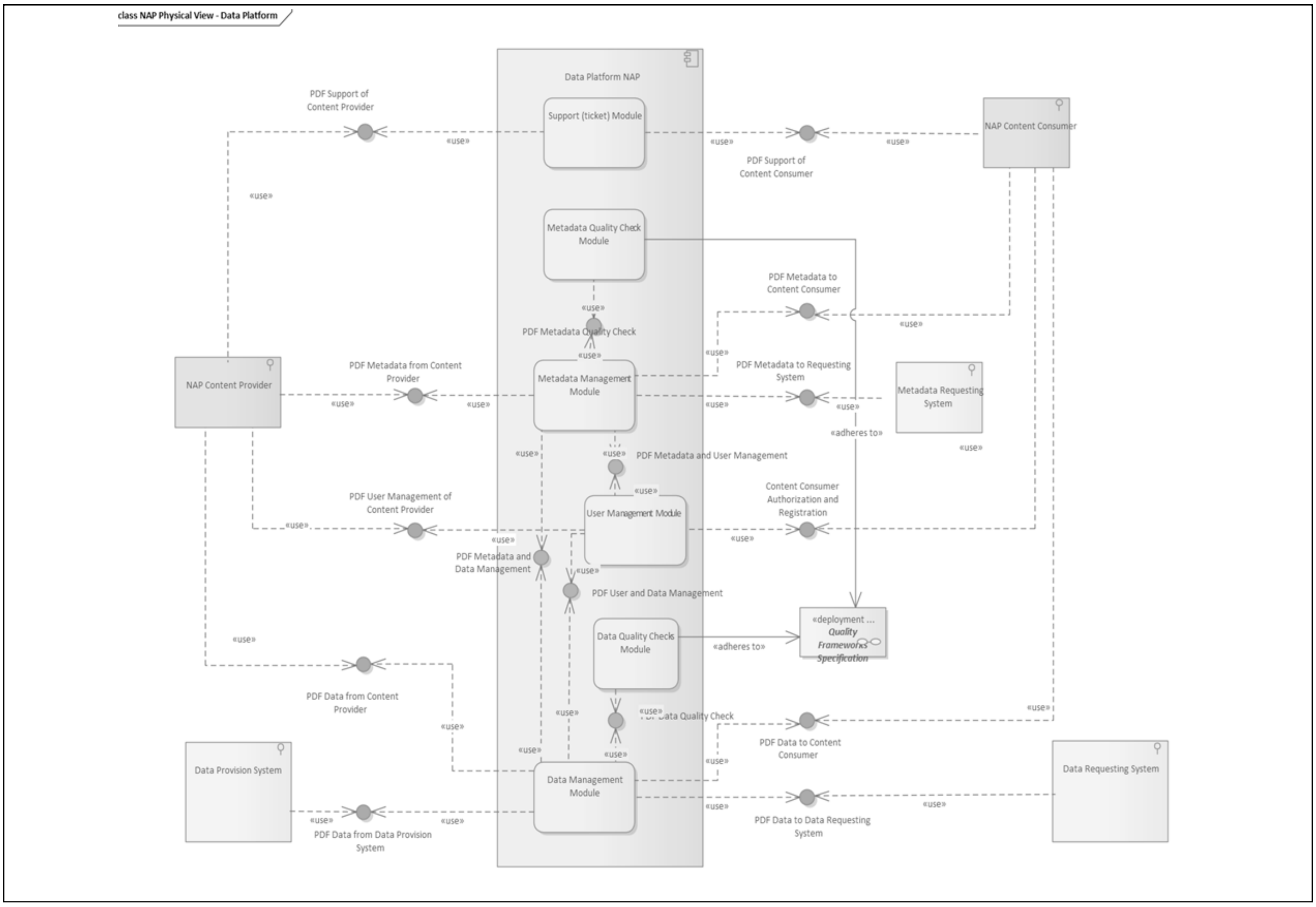

Fig 8. NRA Physical view of the data platform NAP

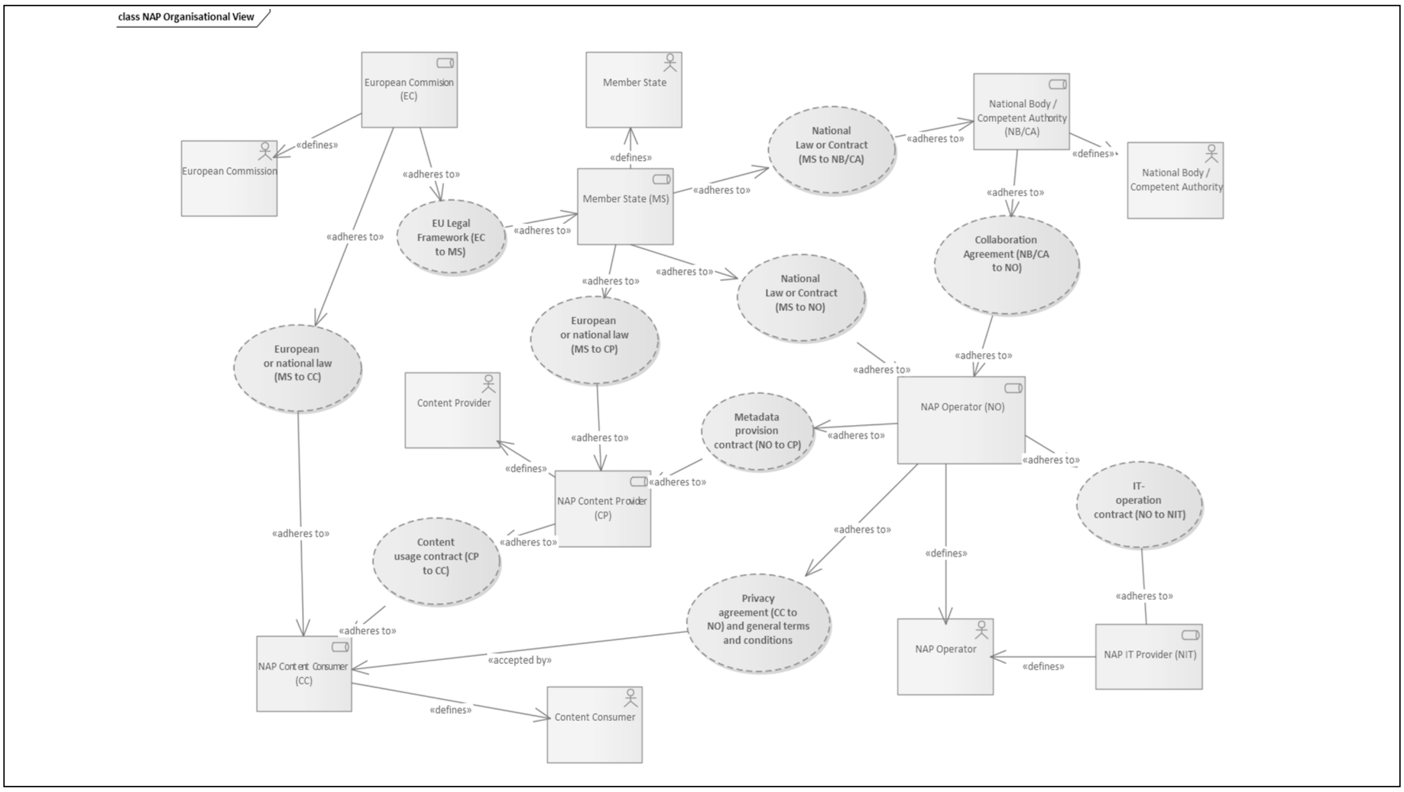

Fig 9. NRA Organizational view of the data platform / metadata directory

tics of the physical links that will carry the data, e.g. the types of data to be transferred, the physical mode of data transfer, any security requirements and the data transfer capacity required. Each interface is linked to one or more relevant data or protocol standards, requirements.

5.6. NRA Safety and Security View

The security requirements for the (meta)data upload / retrieval, user registration and interactions are partly common across all EU countries such as metadata integrity and partly specific to Member State such as data storing and retrieval processes. In some Member States, data is available with only basic security while in others access via user credentials is required. The implementation of security mechanisms is also dependent on the physical entities involved and the systems the Member States use for receiving, processing, and distributing (meta)data.

6. CHALLENGES AND LESSONS LEARNED

Updating the NAP reference architecture within the NAPCORE project presented significant challenges beyond the actual content of the architecture. One of the initial challenges was aligning terminology for NAP implementations, specifically the two types: Metadata Directory and Data Platform, many different labels used by NAP operators highlighted the importance of having common terminology.

Having two NAP types, however, created a challenge in addressing their similarities and differences within the architecture model. The decision to model the Data Platform on top of the Metadata Directory simplified the number of diverse artifacts but caused issues when describing functionalities that crossed type boundaries, adding complexity to the model.

Updating individual views was challenging because the FRAME methodology did not provide detailed guidance for creating reference architecture. The FRAME metamodel of the Motivation Layer lacked interactions between expectations and services, services and added values, and stakeholders. The methodology for the Organizational View did not precisely cover the expected content of actors, roles and agreements objects. The Physical View required alignment with already published and used terminology. In the Communications View, the interface and specification objects lacked precise explanations. We overcame these challenges by updating and detailing the methodology, adapting the FRAME model, updating the tool, and providing additional explanations and guidance, such as for the creation of specifications and interfaces.

Some of the challenges, for example, looking forward is the model governance and maintenance, and the process for updating the core FRAME functionality based on NAPCORE developments are yet to be determined.

7. CONCLUSIONS

This paper outlines the process of creating a harmonized National Access Point Reference Architecture (NRA) and updating the FRAME methodology used for its development. While not detailing every aspect of the NRA, it highlights the key building elements of different views, briefly notes their content, and describes the challenges and lessons learned during the NAPCORE project.

It is important to note that architecture is a living document, subject to updates based on strategic, political, legal, and technical developments. Future results and further harmonizations from post-project NAPCORE developments will be continuously integrated into the NAP reference architecture. Practical experience with the FRAME methodology will lead to updates of the core FRAME, following the developed maintenance procedure.

The developed NRA can be applied to create a harmonized NAP from scratch by implementing the necessary functional and organizational elements using the architecture. It can also harmonize existing NAPs by updating their functionalities and processes in line with the developed NRA or establish a basis for comparing NAPs by breaking down complex functionalities and processes.

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