



Study in support of the creation of the common European mobility data space

Final webinar

14.3.2025

Agenda



Time	Topic	Presenter
10:00 – 10:05	Welcome and introduction	Johan Scholliers, VTT
10:05 – 10:15	Setting the scene	Dimitrios Gkatzoflias, DG MOVE
10:15 – 10:50	Analysis of the governance and technical dimension of the EMDS framework <i>Presentation & Q&A</i>	Alessandro Zamboni, Wavestone
10:50 – 10:55	Break	
10:55 – 11:20	Specifications and recommendations for the creation of an interlinking layer <i>Presentation & Q&A</i>	Janne Lahti, VTT
11:20 – 11:40	Specifications and recommendations for potential participants to interlink and exchange metadata through the EMDS framework <i>Presentation & Q&A</i>	Immo Heino, VTT
11:40 – 11:55	Generic Q&A	
11:55 – 12:00	Closing remarks	Dimitrios Gkatzoflias, DG MOVE

Overview of the EMDS Study

The ***Study in support of the creation of the common EMDS*** has been carried out by VTT, Ricardo and Wavestone on behalf of the European Commission's Directorate for Mobility and Transport (DG MOVE)

Objectives

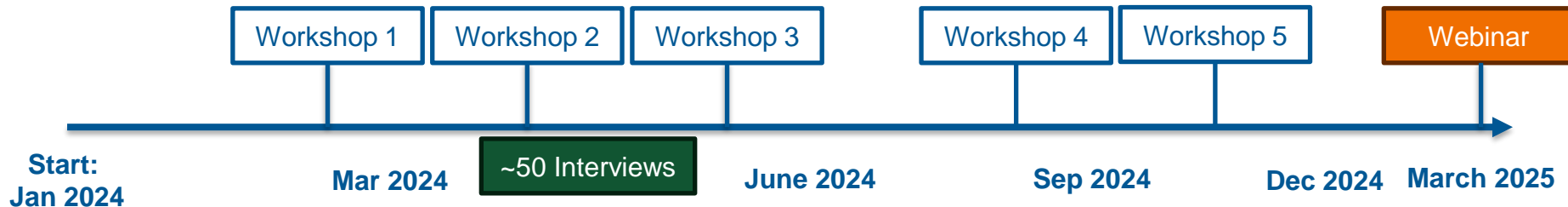
1. Support the definition of the **technical and governance dimension of the common EMDS framework**, building on the analysis of the recommendations of the PrepDSpace4Mobility project and other initiatives.
2. Assist the development of **specifications and recommendations for an interlinking layer**, with the goal to interlink and facilitate the discovery and access of data from existing and future transport data ecosystems and initiatives.
3. Provide **specifications and recommendations** to allow existing and future mobility and transport ecosystems **interlinking and exchanging metadata through the common EMDS framework**.

Stakeholder interaction during the study

Five workshops:

1. **Governance and technical dimension** of the common EMDS, 23.2.2024
2. Preliminary results of the analysis of the options for **governance and technical dimension**, and of the **interlinking layer desk study**, 16.4.2024
3. Initial specifications for the **interlinking layer and metadata exchange** for the common EMDS ecosystem, 29.5.2024
4. Draft specifications and recommendations for the **interlinking layer and metadata**, 10.9.2024
5. Options review for the **technical and governance dimensions** of the EMDS framework, 11.10.2024

Two sets of interviews



Study in support of the creation of the common European mobility data space (EMDS)

Task 1: Analysis of the technical and governance dimension of the EMDS framework



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Contents

1. Methodology of Task 1
2. Governance scenarios of the common EMDS
3. Comparative analysis of governance scenarios
4. Conclusions & Recommendations
5. Q&A

Disclaimer

The information and views set out in this presentation are those of the author(s) and do not necessarily reflect the official opinion of the Commission. The Commission does not guarantee the accuracy of the data included in this study. Neither the Commission nor any person acting on the Commission's behalf may be held responsible for the use which may be made of the information contained therein.

Goals and methodology of the task

■ Goals of Task 1:

- Assess the governance dimension of the common EMDS framework
- Provide recommendations on a potential governance structure and its implementation needs.

■ Methodology adopted:

- Extensive review of relevant documents and initiatives.
- Definition of multiple governance scenarios for the EDMS framework.
- For each scenario, the following aspects have been analysed: (i) main prerequisites; (ii) governance structure; (iii) funding model and resources; (iv) regulatory framework and enforcement mechanism; (v) participation and cooperation mechanism.
- Conduction of a comparative analysis of the various scenarios, highlighting strengths and weaknesses of each scenario.
- Provision of targeted recommendations, outlining the preferred solutions.

Introduction to the scenarios

- PrepDSpace4mobility identified 5 scenarios of potentially suitable organization structures for the common EMDS:

Initial name	New name
European Commission-driven initiative or organisation	EU Entity
Member State-driven EDIC as the backbone	Member State-driven consortium such as an EDIC
European association of mobility data spaces	European association of mobility data spaces
European-level governance or certification framework	EU Regulatory Framework
Expert working group for interoperability guidelines	Expert group

- These were presented in the 1st workshop and 2nd workshop and analysed in interviews during the first phase of the study.
- The final governance approach may involve a combination of scenarios to address different aspects effectively.

Potential scenarios for the governance model (cont'd)

■ Scenario 1 – EU Entity

An initiative or organisation established by the EU (similar to initiatives such as the EIT Urban Mobility, and the European Battery Alliance) would manage the data space, with a mixed funding model (primarily funded by the EU alongside contributions from private sector and Member States) and stakeholder involvement in supervisory or advisory capacities.

■ Scenario 2 – Member State-driven consortium such as a European Digital Infrastructure Consortium (EDIC)

Member States would lead through a consortium such as an EDIC, funded primarily by contributions from participating Member States and potentially supplemented by EU and national grants. Once established, this consortium could operate as a legal entity, facilitating the deployment of cross-border infrastructure, use cases and joint services.

Potential scenarios for the governance model (cont'd)

■ Scenario 3 – European association of mobility data spaces

A European association (e.g., AISBL) or a decentralised network of mobility data spaces would set frameworks, requirements, and guidelines, managing interoperability among existing data spaces. Temporary funding would expedite harmonisation and interconnection.

■ Scenario 4 – EU Regulatory Framework

This scenario envisions a regulatory framework focused on enforcement and compliance, without the need to establish a new legal entity. In this respect, the European Commission acts as the overarching governing body responsible for setting policies, regulations and certifications.

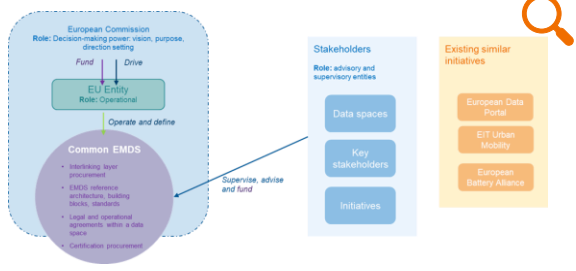
■ Scenario 5 – Expert group

A group of specialists from various fields (e.g., industry, public sector, academia) would advise and provide guidelines on best practices and policies to ensure that the EMDS and relevant mobility and transport data ecosystems operate effectively in alignment with EU requirements.

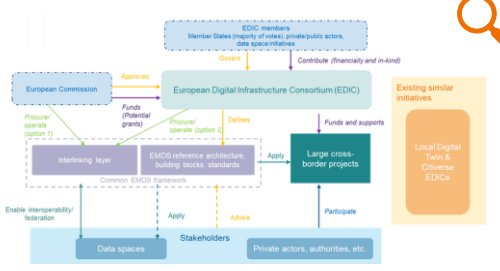
Potential scenarios for the governance model

A deep analysis of each scenario outlining the stakeholders and their interactions was performed, details can be found in the Final Report.

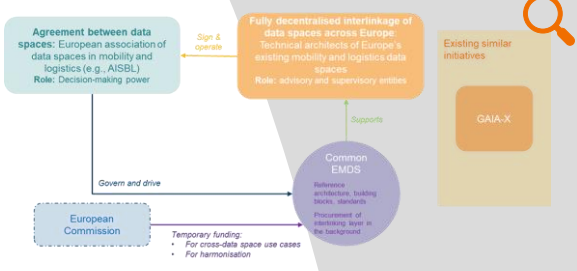
1) EU Entity



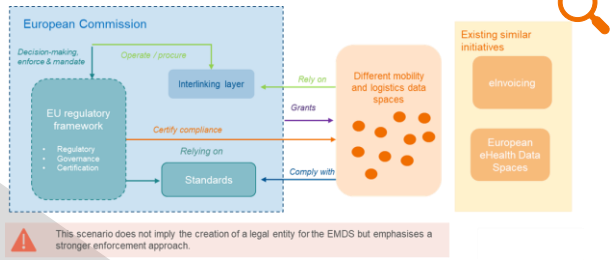
2) Member State-driven consortium such as an EDIC



3) European association of mobility data spaces

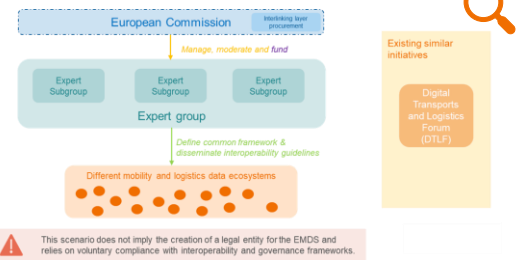


4) EU Regulatory Framework



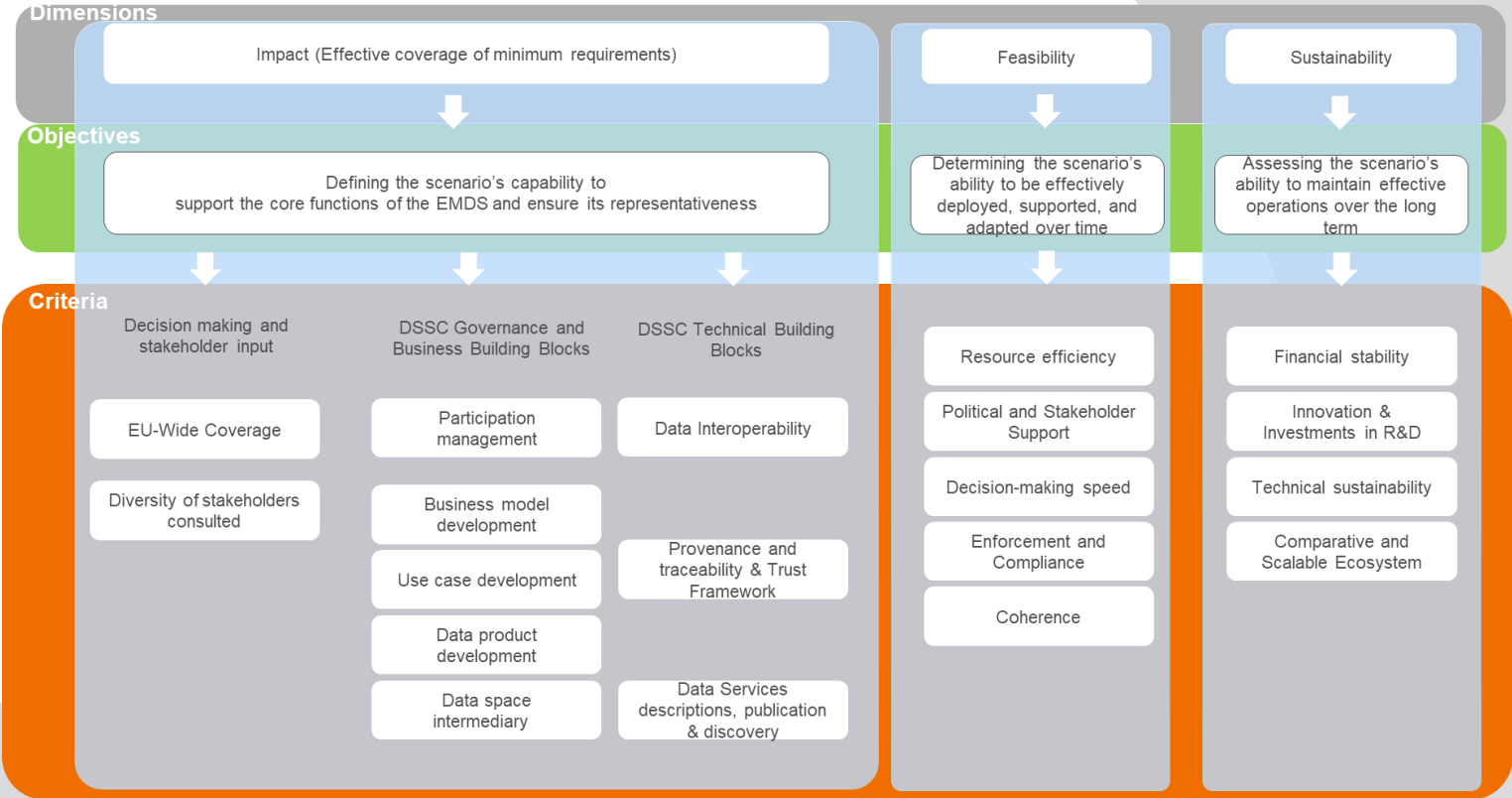
This scenario does not imply the creation of a legal entity for the EMDS but emphasises a stronger enforcement approach.

5) Expert group



This scenario does not imply the creation of a legal entity for the EMDS and relies on voluntary compliance with interoperability and governance frameworks.

Comparative Analysis Criteria



Results

The following tables depict the results for all the three dimensions (not to be discussed in detail in this session).

1 = better capability than most scenarios

-1 = worse capability than other scenarios

0 = average capability similar to other scenarios

Impact dimension

Criterion	Scenario 1 EU-Entity	Scenario 2 MS Driven EDIC	Scenario 3 Association of MDSs	Scenario 4 EU-level Regulatory Framework	Scenario 5 Expert group
1 EU-Wide Coverage	1	0	-1	1	0
2 Diversity of stakeholders consulted	1	1	-1	1	0
3 Participation management	1	1	1	0	-1
4 Business model development	0	1	0	0	0
5 Use case development	1	1	0	-1	0
6 Data product development	1	0	-1	1	0
7 Data space intermediary	0	0	-1	1	0
8 Technical Building Blocks for Data Interoperability	0	0	-1	1	0
9 Technical Building Blocks for Provenance, traceability & Trust Framework	1	1	0	0	0
10 Technical Building Blocks for Data service descriptions publication and discovery	0	0	1	0	-1
Total score:	6	5	-3	4	-2

Feasibility dimension

Criterion	Scenario 1 EU Entity	Scenario 2 MS Driven EDIC	Scenario 3 Association of MDSs	Scenario 4 EU Regulatory Framework	Scenario 5 Expert group
1 Resource intensity	-1	-1	-1	0	1
2 Time needed to form the governance body	-1	0	0	1	0
3 Political and stakeholder support	0	1	-1	0	0
4 Decision-making speed	1	0	0	-1	-1
5 Enforcement and Compliance	0	0	-1	1	-1
6 Coherence	0	0	0	1	0
Total score:	-1	0	-3	2	-1

Sustainability dimension

Criterion	Scenario 1 EU-Entity	Scenario 2 MS Driven EDIC	Scenario 3 Association of MDSs	Scenario 4 EU-level Regulatory Framework	Scenario 5 Expert group
1 Financial stability	0	0	-1	1	0
2 Innovation & Investments in R&D	0	0	1	0	0
3 Technical sustainability	0	0	0	-1	0
4 Collaborative and scalable ecosystem	0	1	0	0	0
Total score:	0	1	0	0	0

Overall comparison^{1,2}

	Dimension	Scenario 1 EU-Entity	Scenario 2 MS Driven EDIC	Scenario 3 Association of MDSs	Scenario 4 EU-level Regulatory Framework	Scenario 5 Expert group
1	Impact (Effective coverage of minimum requirements)	6	5	-3	4	-2
2	Feasibility	-1	0	-3	2	-1
3	Sustainability	0	1	0	0	0
Total score:		5	6	-6	6	-3

¹ The consortium provided also a SWOT analysis for each scenario.

² The consortium recommended to exclude Scenario 3 for further analysis.

Task 1 – Main findings

- The main finding was that **a single scenario alone would not be able to efficiently cover** all the needs of the EMDS framework.
- For example, while **Scenarios 1 and 2** would be fit for implementing projects, they would not be able to define rules at an EU-level without the necessary EU regulatory framework (**Scenario 4**).
- And vice versa, **Scenario 4** could define the rules and **Scenario 5** could provide guidance, but neither would be able to carry out the implementation in practice.
- Furthermore, **Scenarios 1 and 2** would require specific EU legal acts to define the mandate and activities of these scenarios.
- Therefore, **combining the scenarios could cover better the aspects of rule setting, guidance and implementation.**

Task 1 – Main strengths for each scenario

	Scenario 1 - EU Entity /Scenario 2 - MS-driven (e.g. EDIC)	Scenario 4 - EU Regulatory Framework	Scenario 5 - Expert group
Main strength	“Supporting implementation”	“Defining the roles and rules”	“Providing guidance and advice”
Role in the governance structure	Support the implementation of EU-wide projects and actions through the deployment of common infrastructure, services and interoperability frameworks	Ensure standardisation, interoperability, and compliance across Member States through a regulatory framework adopted by the EU	Provide advisory support to the European Commission for the EMDS by providing opinions, recommendations, reports, based on best practices, and industry standards

Proposed staged hybrid governance model

A staged hybrid governance model is proposed to illustrate the recommendations and their interdependence in a more concrete and accessible way.

- This would **avoid redundancy between the scenarios**, enabling the model to effectively capitalize on their respective advantages, and establish a more robust and adaptable governance framework.
- The governance of the EMDS could be envisioned through **distinct stages**, aligned with the **DSSC Blueprint 'Evolution of Data Space Initiatives.'**
- **Each stage corresponds to different scenarios** rather than forming a sequential progression, with each stage addressing key aspects of development and operation across multiple scenarios.

The following slides provide details about the three stages.

Stage 1 – Alignment and foundation building (EMDS framework development)

This stage focuses on fostering dialogue in the mobility and logistics data ecosystem to develop practical, and informed recommendations, while ensuring alignment and synergy with other expert groups (e.g. DTLF, STF, EGUM) and initiatives (e.g. deployEMDS, DSCC).

- It involves the establishment of a new **Commission expert group or a new subgroup in an existing one (Scenario 5)**, composed of specialists with technical expertise.
- The framework would be built on **existing regulatory requirements (Scenario 4)** and the Expert Group with the Commission could look at possible recommendations on revising existing legislation.
- The objectives of the EMDS could be streamlined across different existing expert groups to support this process. At this stage, **Scenario 1 or 2 would be progressively prepared.**

Stage 2 - Implementation and operationalisation (EMDS framework implementation)

This stage should focus on the operationalisation of the EMDS, supporting the practical implementation of the EMDS framework by mobility, transport and data spaces actors.

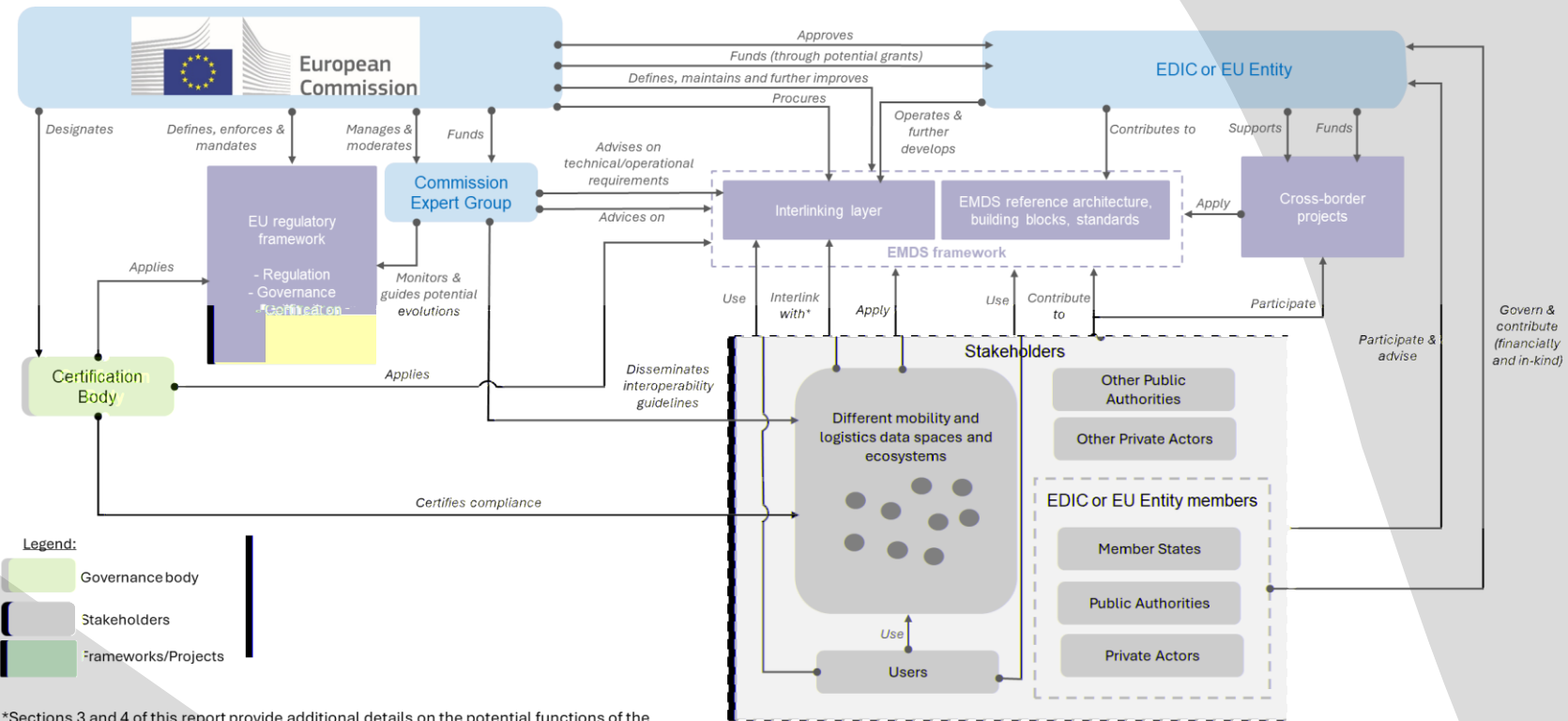
- **Implementation of either Scenario 1 or Scenario 2.** Both scenarios involve central coordination – either through an EU entity (Scenario 1) or an MS-driven entity (e.g. EDIC) (Scenario 2) – to facilitate the establishment of essential elements such as the reference architecture and building blocks.
- The related **EU regulatory framework (Scenario 4)** should be reviewed by the Commission with the support of the Expert Group (Scenario 5) or be complemented where and if necessary.

Stage 3 – Scaling up and value creation (Widespread adoption of the EMDS framework)

This stage should focus on unlocking the full potential of the EMDS framework by ensuring its widespread adoption, creating value for stakeholders, and scaling its impact across Member States.

- Depending on regulatory needs, **the revision of existing legislation and/or the adoption of dedicated new legislation may take place** to ensure effective harmonisation and coordination at EU-level (**scenario 4**).
- **Scenario 2 (or Scenario 1) could support this** by helping mobility and transport data ecosystems apply the EMDS framework, certifying compliant ecosystems, and maintaining the common core infrastructure, driving innovation and collaboration.

Proposed structure of the hybrid governance model for the EMDS framework



*Sections 3 and 4 of this report provide additional details on the potential functions of the interlinking layer.

Recommendations

- **Recommendation #1.1** – The strengths of each of the Scenarios 2, 4 and 5 should be leveraged. These strengths should be combined in a hybrid governance model.
- **Recommendation #1.2** – A new expert group or a new sub-group in an existing one (Scenario 5) should be established with a specific mandate to support the development of the EMDS framework.
- **Recommendation #1.3** – Scenario 2, which involves the establishment of an EDIC, should be leveraged for the implementation of the EMDS framework, if it meets certain conditions (e.g. EU-wide representation, private sector inclusion).
- **Recommendation #1.4** – Scenario 1, which envisions an EU Entity, should be considered as a contingency in the event that Scenario 2 faces delays or challenges.
- **Recommendation #1.5** – The existing EU regulatory framework, including EU-level cross-sectoral and sector-specific legislation, should serve as the foundation for the EMDS.

Recommendations (cont'd)

- **Recommendation #1.6** – Future regulatory efforts should address any gaps or overlaps in existing legislation, ensuring the EMDS operates within a comprehensive, and legally sound environment.
- **Recommendation #1.7** – A certification framework should be established for sectoral data spaces to support the EMDS framework.
- **Recommendation #1.8** – To ensure the long-term sustainability of the hybrid governance scenario, a multi-faceted funding model should be established, drawing from diverse sources to create a balanced and flexible financial structure.
- **Recommendation #1.9** – Ensuring alignment and coordination between the EMDS and other European data exchange initiatives would be essential to create a unified and efficient framework for data sharing across multiple sectors within the EU.



Q&A

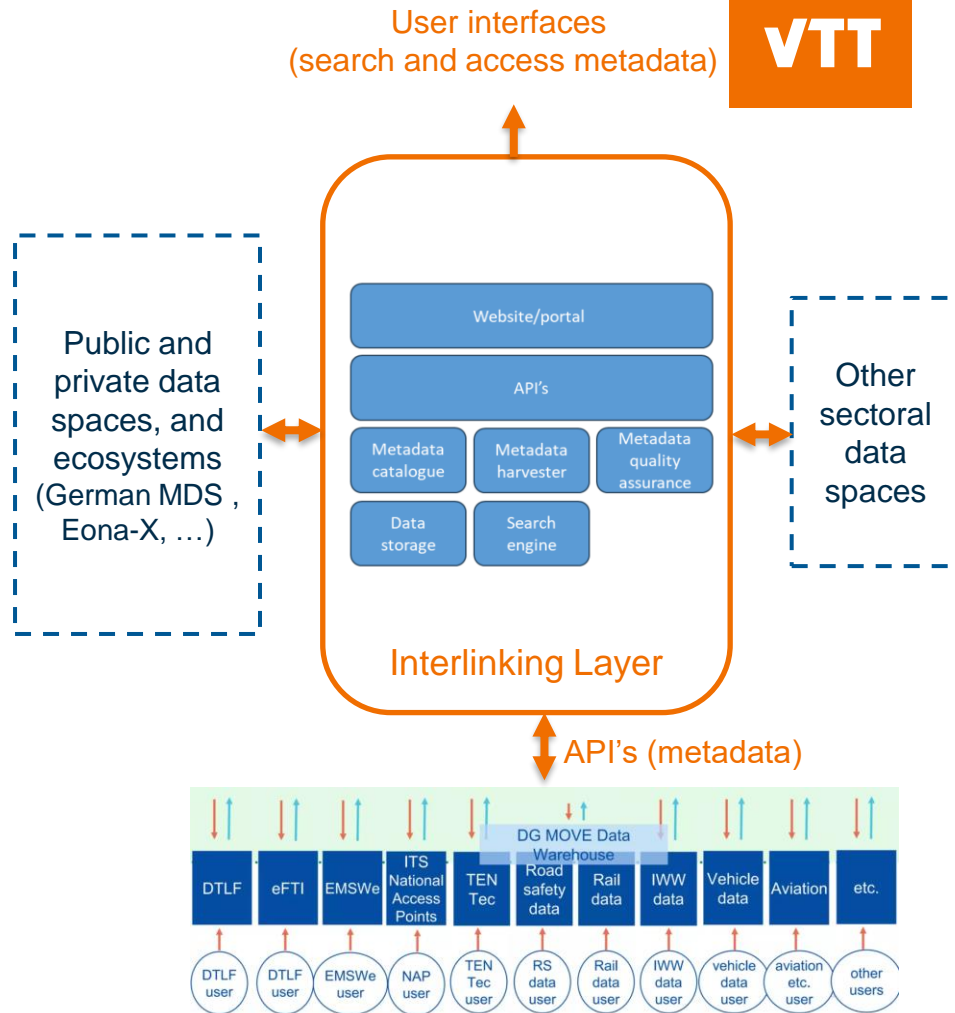
Task2: Specifications and recommendations for the creation of an interlinking layer



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Initial requirements for the functionalities of the Interlinking Layer

- Enabling the **publication** and **display** of data sources and their **terms of use**, through the **exchange of metadata**.
 - Metadata should be exchangeable in machine-readable format to allow further processing from other systems and applications.
- A user interface** should allow users to easily understand:
 - which mobility and transport data is available and from which domain,
 - where and how to access the data (access conditions),
 - who the contact persons are,
 - (where relevant) which legislation underpins the availability and accessibility to the data sources.



Phase 1

Mapping and selection of mobility data ecosystems and initiatives

Workshop 1

Phase 2

Current state analysis selected ecosystems

Stakeholder interviews

Requirements capture

Workshop 2

Phase 3

Requirements analysis

System architecture definition

Workshop 3

Phase 4

Required digital tools and components definitions

User interface aspects

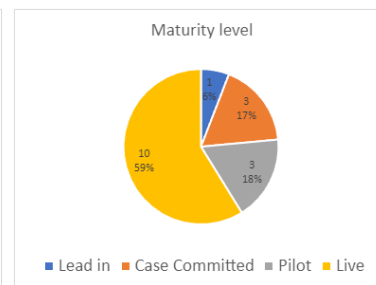
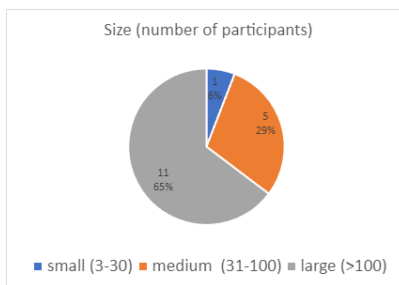
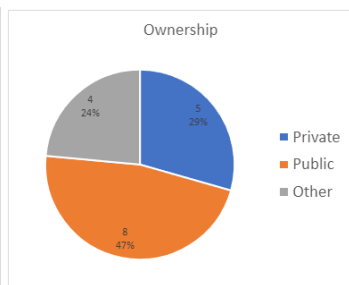
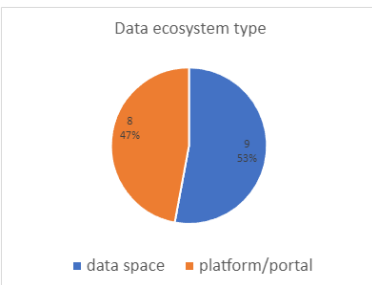
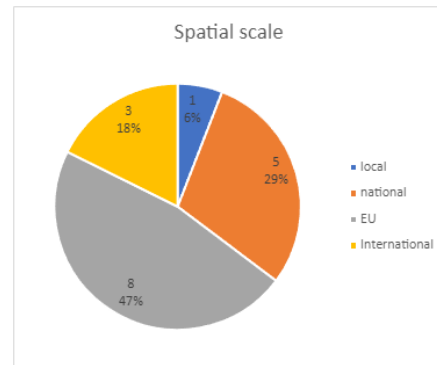
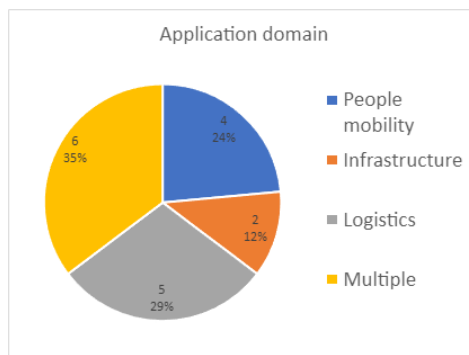
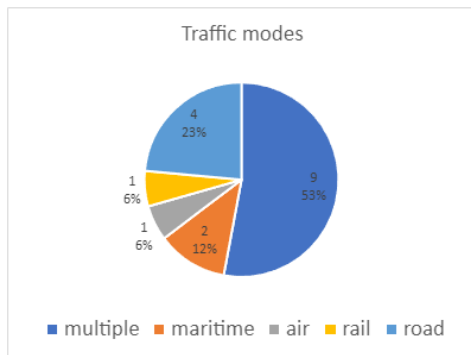
Long-term upkeep and management recommendations

Workshop 4

Result: Specifications and recommendations for the creation of an Interlinking Layer

Summary of ecosystems analysis (desk study)

Mobility Data Ecosystem mapping and selection



From: https://internationaldataspaces.org/wp-content/uploads/dlm_uploads/The-Data-Spaces-Radar-Version-3-1.pdf

1. EONA-X
2. Finnish National OpenTransport Service (NAP)
3. Traffic Data Ecosystem
4. The Finnish initiative on a data space for maritime transport
5. Open Data BCN
6. DataPorts
7. Mobility Data Space / Mobilithetk
8. FEDerATED
9. Fenix
10. EAFO
11. ERA (Knowledge Graph)
12. IATA Industry Open API Hub + ONE Record
13. Catena-X
14. Basic Data Infrastructure (NL)
15. TOMTOM
16. HERE
17. EU Data Portal

Requirement Capture and Analysis

Requirements capture and analysis process

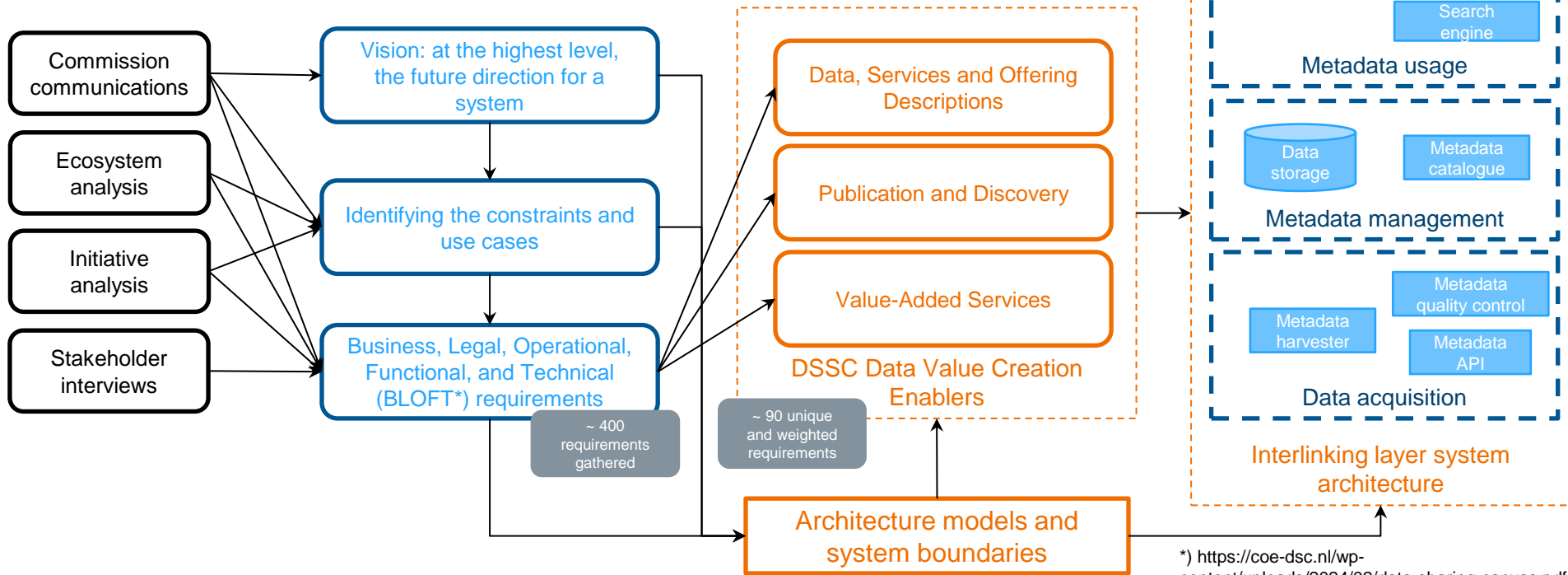


Requirement sources

Requirement classifications

Requirement grouping (DSSC Technical Building Blocks)

Architectural functional components



Interlinking layer system boundaries

■ Core functionalities:

1. Enable data providers to **publish data product descriptions**, i.e., make them visible to all (or a subset of) participants of data spaces connected by the Interlinking layer
2. **Manage** the published data **product descriptions** in accordance with their lifecycle (publish, update, remove, restrict access)
3. **Enable** data recipient to:
 - **search** among these **descriptions** (from all the connected data spaces),
 - view them in order to determine whether the characteristics, and terms and conditions fit their needs and requirements, and
 - proceed to request access to these offerings (actual transaction is between provider and recipient).
4. **Enable search/browse data spaces** (data ecosystem type, capabilities, participants) connected by the EMDS

Aligned with DSSC Publication and Discovery, and Data, services and offerings descriptions building blocks

■ Possible / next phase functionalities:

- Connection to **other sectoral data spaces**, such as Energy or Tourism
- **Harmonised trust** between interlinked data spaces
 - Unified ID management (eIDAS)
 - Data space protocol connectivity

The metadata description of data products contains information related to the trust framework/model, which is used in the local data space of the data provider

■ Out-of-scope:

- **Contract negotiation, data exchange** -> should be done in local data space level
- **Metadata transformation/mapping** to correct format (responsibility of local data providers)
- **Vocabulary** hubs
- **Application** sharing

General recommendations



Recommendation #2.1

The interlinking layer should offer a single point of access to find data ecosystems, participants and offerings.

Recommendation #2.2

The interlinking layer should support a sustainable and stable technology platform, based on mature technologies, and able to support new data formats and standards.

Recommendation #2.3

The interlinking layer should complement and build on existing solutions, such as NAPCORE, and seek compromise between supporting existing legacy data ecosystems and upcoming data spaces.

Recommendation #2.4

In the first phase, the interlinking layer should provide only access to metadata and not the actual data. The metadata should facilitate the discovery and indicate how to access the actual data.

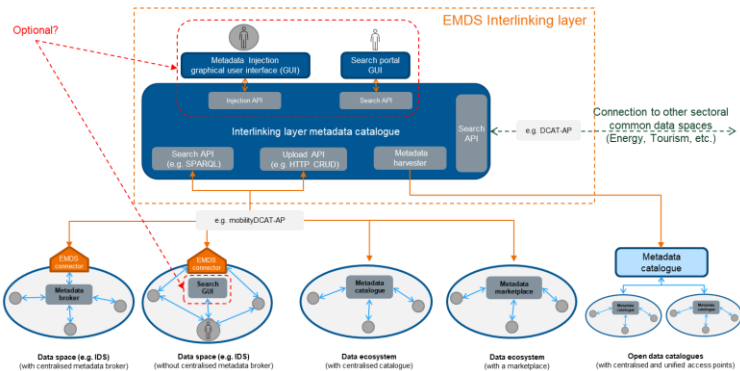
Recommendation #2.5

The interlinking layer should provide a low threshold for the integration of participant data ecosystems.

Interlinking layer architecture options

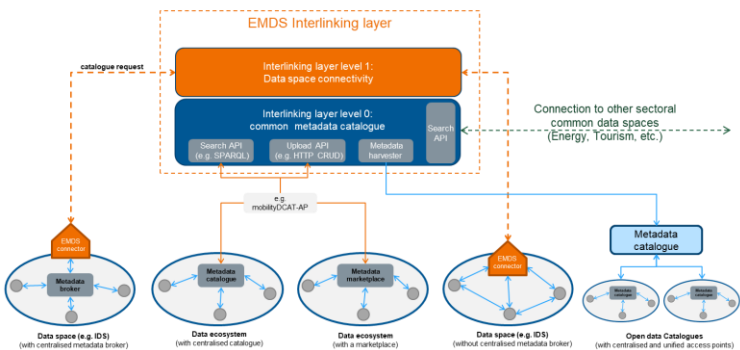


- Data space participant
- ➡ Metadata flow (EMDS format)
- ↔ Metadata flow (data space specific format)
- ⬅ Data space protocol connection



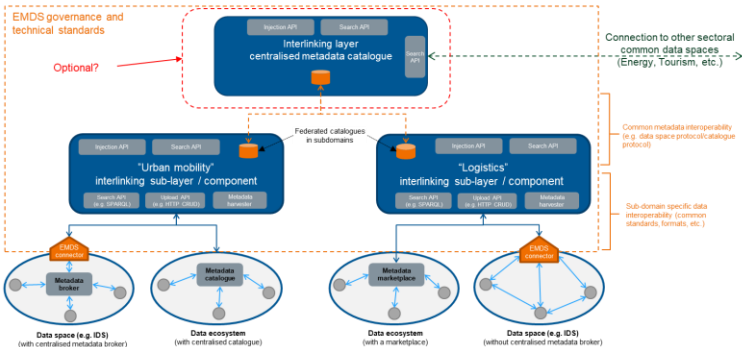
Centralised scenario, Version A

- Data space participant
- ➡ Metadata flow (EMDS format)
- ↔ Metadata flow (data space specific format)
- ⬅ Data space protocol connection



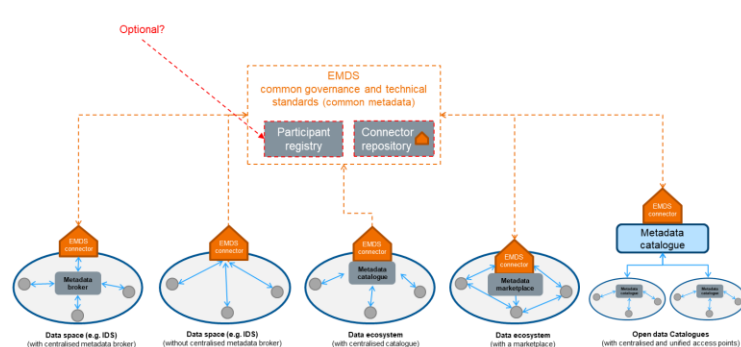
Centralised scenario, Version B

- Data space participant
- ➡ Metadata flow (EMDS format)
- ↔ Metadata flow (data space specific format)
- ⬅ Data space protocol connection
- ⬅ Sub-domain specific metadata flow



Federated scenario

- Data space participant
- ➡ Metadata flow (EMDS format)
- ↔ Metadata flow (data space specific format)
- ⬅ Data space protocol connection
- ⬅ Sub-domain specific metadata flow

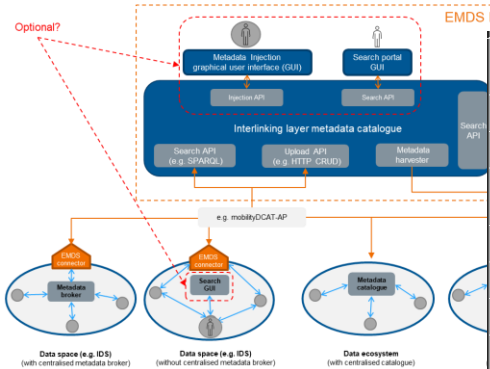


Decentralised scenario

Interlinking layer architecture options

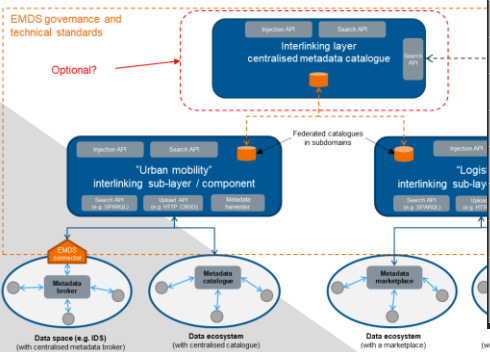


● Data space participant
↔ Metadata flow (EMDS format)
↔ Metadata flow (data space specific format)
↔ Data space protocol connection



Option 1: Centralised scenario A

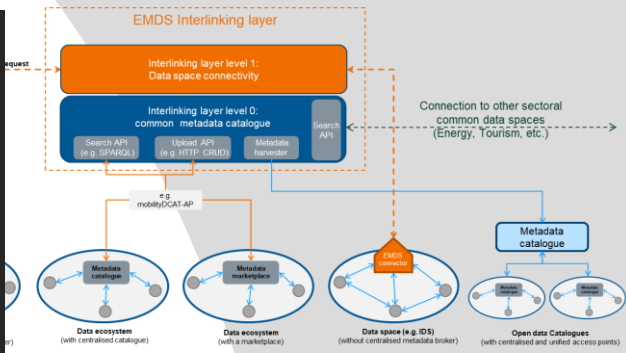
● Data space participant
↔ Metadata flow (EMDS format)
↔ Metadata flow (data space specific format)
↔ Data space protocol connection
↔ Subdomain specific metadata flow



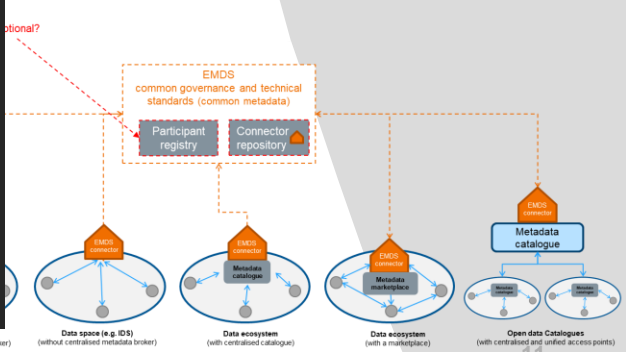
Option 3: Federated scenario

	Metric	Option 1	Option 2	Option 3	Option 4
1	Implements core requirements	1	1	1	-1
2	Compliance to data space frameworks	0	1	0	1
3	Support for domain specific data models	0	0	1	-1
4	Implementation complexity	1	-1	-1	0
5	Flexibility and modularity	0	1	0	1
6	Maintainability	1	0	0	-1
7	Performance	1	0	0	-1
8	Complexity for governance	1	0	-1	0
9	Metadata life cycle	0	0	0	1
10	Metadata quality support	1	0	0	-1
11	Authentication and access control	0	1	0	1
12	Reliability	0	-1	0	1
13	Data sovereignty	0	1	0	1
14	Security and Trust	0	1	0	1
15	Compatibility/adaptability	0	1	0	-1
16	Equity / Level playing field	1	0	0	-1
17	Scalability	1	0	0	1
18	Interoperability	0	1	0	-1
Total score:		8	6	0	0

● Data space participant
↔ Metadata flow (EMDS format)
↔ Metadata flow (data space specific format)
↔ Data space protocol connection



Option 2: Centralised scenario B

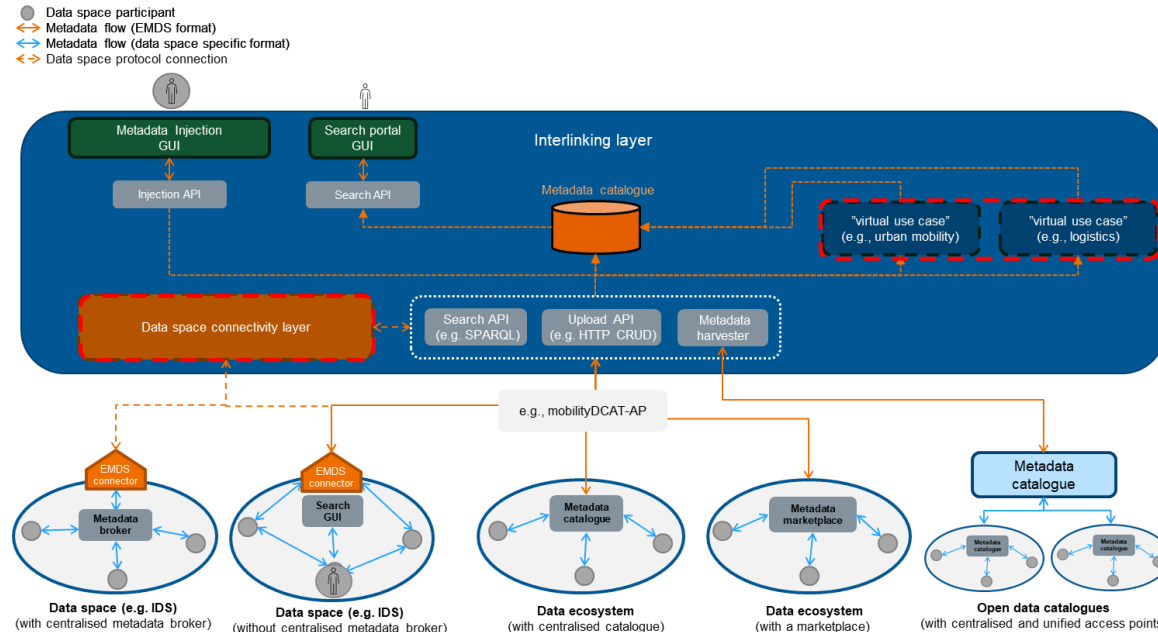


Option 4: Decentralised scenario

Recommendations for the interlinking layer architecture model

Recommendation #2.6

A hybrid model is proposed for the interlinking layer architecture, combining the “Centralised scenario, version A” with aspects of “Centralised scenario, version B” and the “Federated scenario”.



Recommendation #2.12

The interlinking layer should enable a phased development cycle, starting from an MVP corresponding to “*Centralised scenario, version A*” and gradually evolving towards the recommended hybrid architecture

MVP (version 1.0) functionalities:

1. Enable data providers to publish data product descriptions
2. Manage the published data product descriptions in accordance with their lifecycle
3. Enable data recipient to search among these descriptions (from all the connected data spaces)
4. Enable search/browse data spaces (data ecosystem type, capabilities, participants) connected by the EMDS



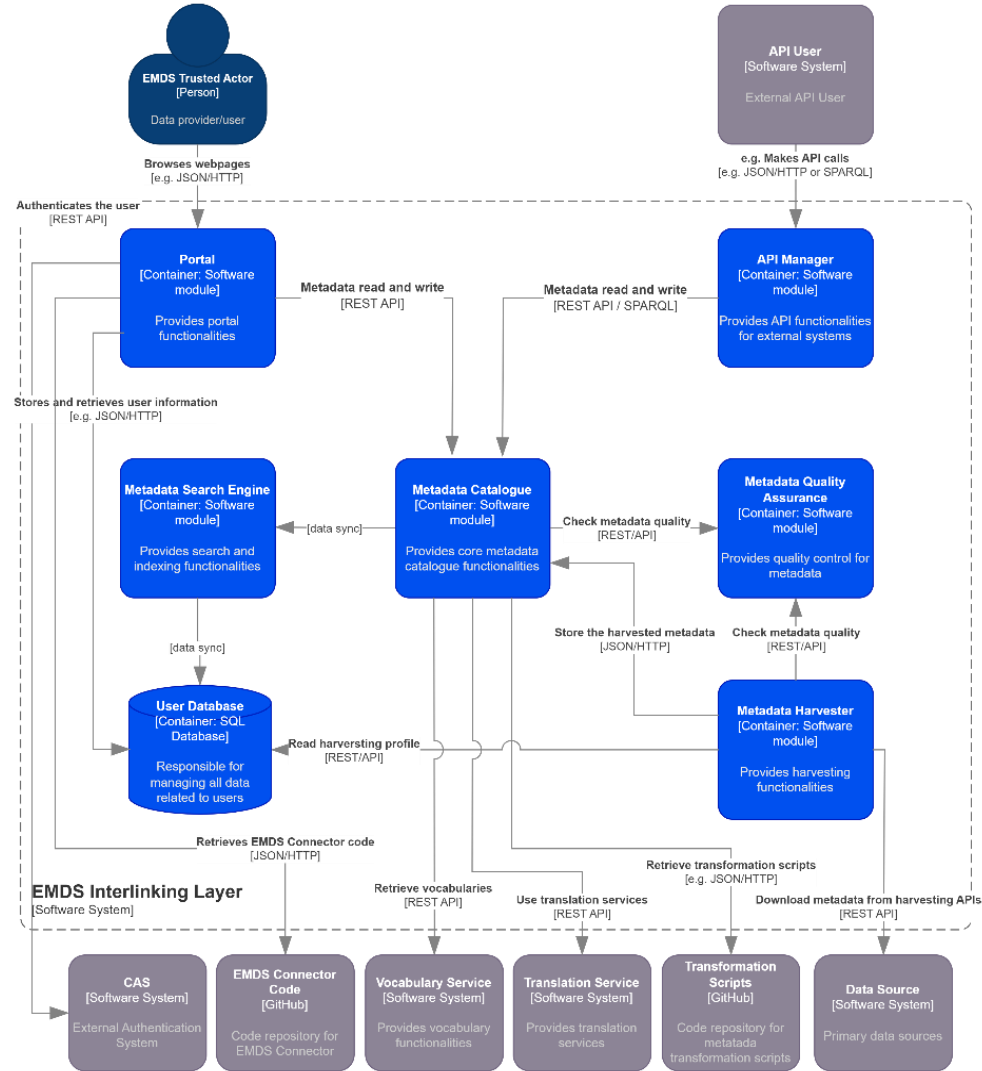
Version 2.0 -> functionalities:

- Connection to other sectoral data spaces, such as Energy or Tourism
- Harmonised trust between interlinked data spaces
 - Unified ID management with compliant data spaces
 - Data space protocol connectivity

Interlinking Layer MVP Technical Specification

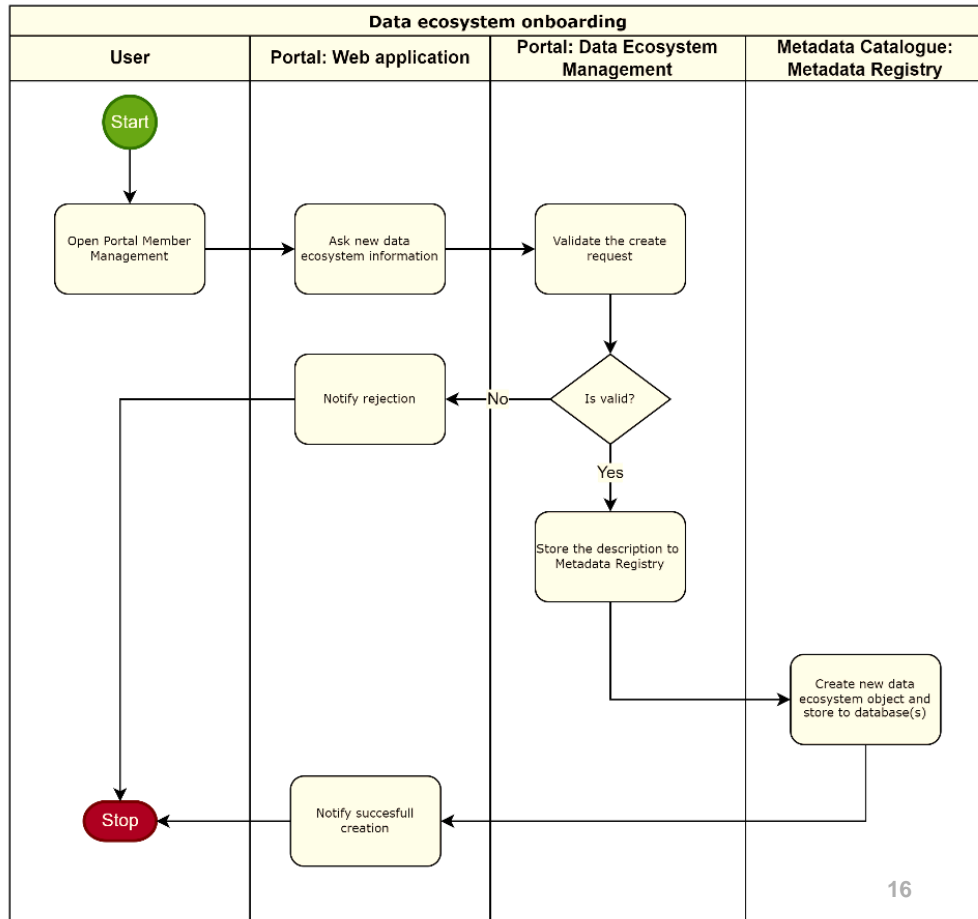
Interlinking Layer Technical Specification

- Specifications developed using C4 approach
- Containers:
 1. Portal
 2. API Manager
 3. Metadata catalogue
 4. Metadata search engine
 5. Metadata quality assurance
 6. Metadata harvester
 7. User database



Interlinking Layer Functionalities

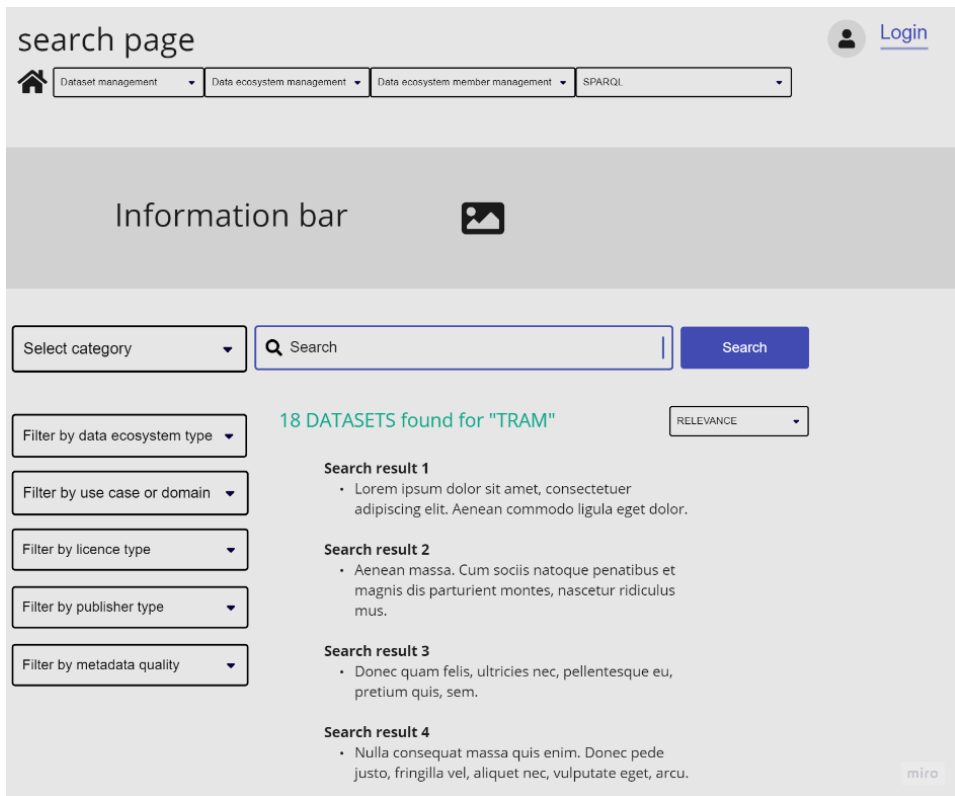
- User scenarios with swimlane diagrams
- 1. User management
- 2. Data ecosystem management
- 3. Interlinking layer member management
- 4. Harvesting management
- 5. Dataset description management
- 6. Dataset description discovery/search



User interface and API specifications and recommendations



- Structure of the Interlinking Layer portal and description of the UI features
- API specifications
 - Metadata harvesting API
 - Metadata management API
 - Metadata search API



Interlinking Layer life-cycle management

- Topics addressed in the report:
 - Technology foresight and technology stack analysis
 - SWOT analysis of key technologies
 - Cost optimisation
 - Scalability
 - Software development process
 - Data governance
 - Measurement of success of the EMDS Interlinking Layer (KPIs)

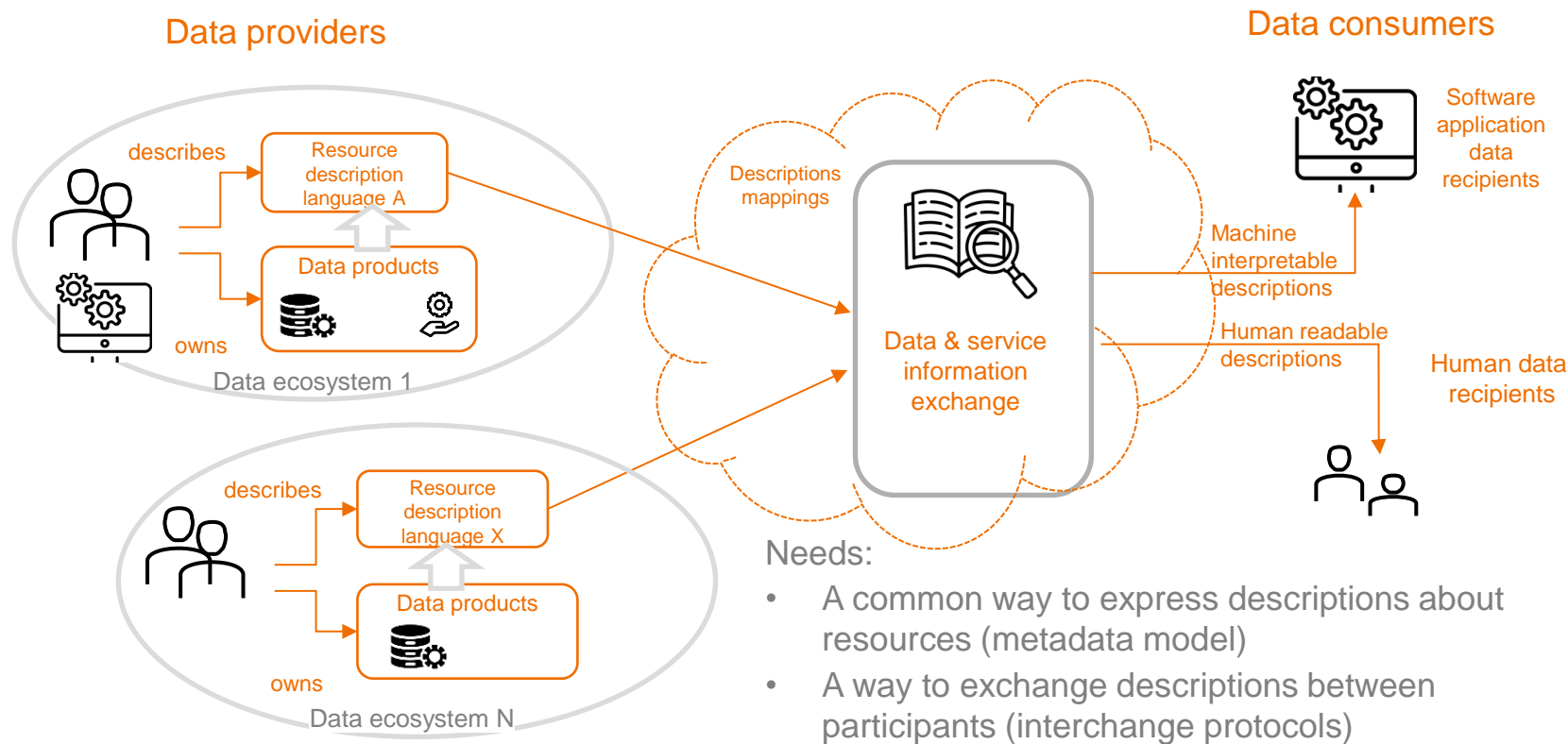
Questions/Comments?

Task3: Specifications and recommendations for potential participants to interlink and exchange metadata through the EMDS framework

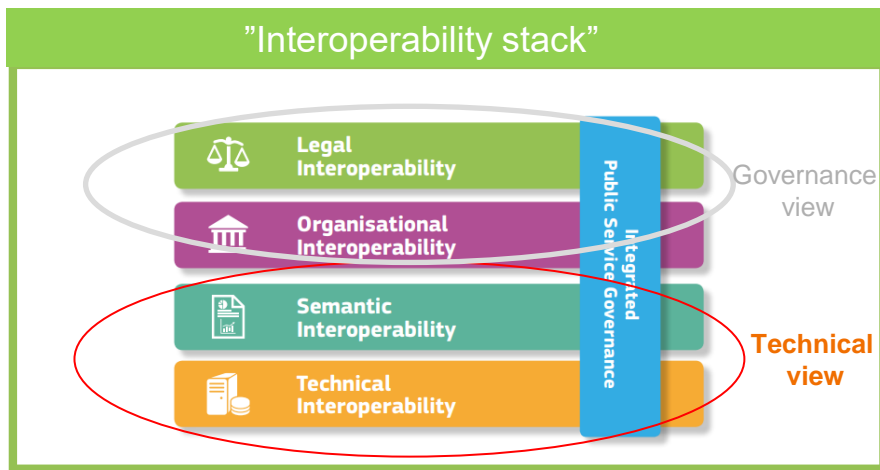


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The challenge of resource discoverability in the EMDS



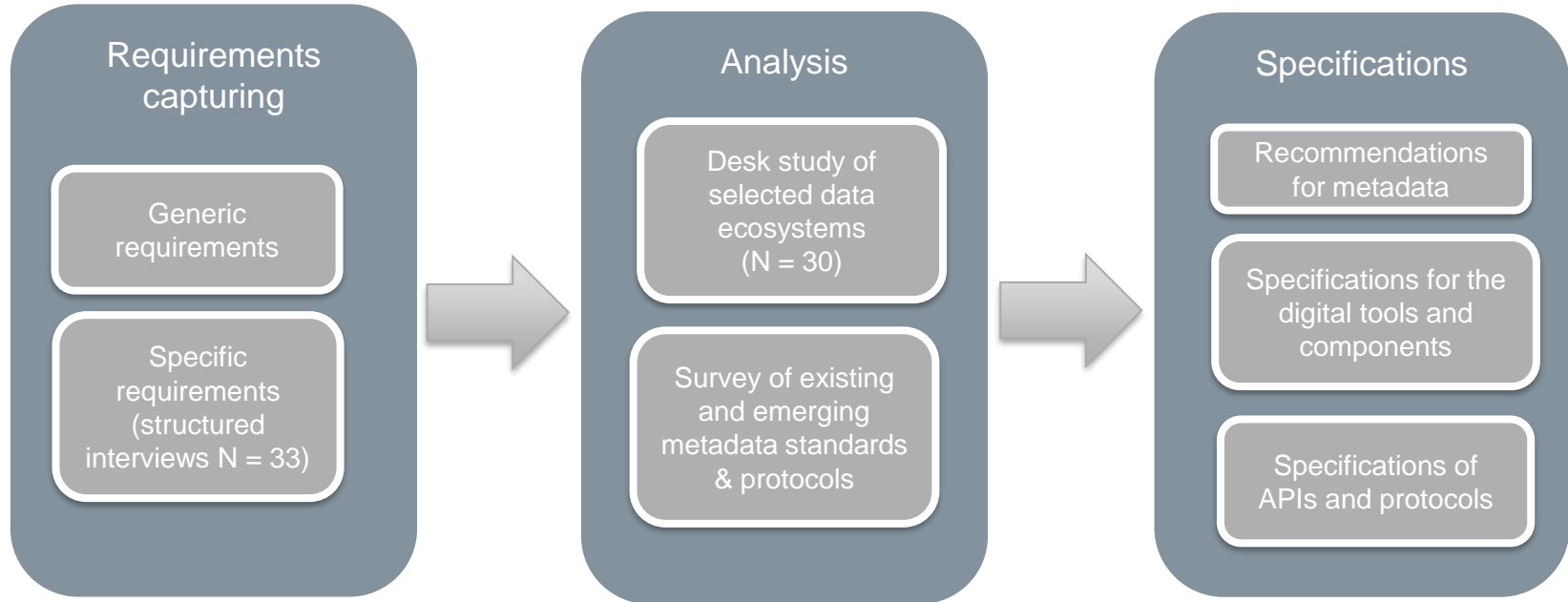
Guiding principle - European Interoperability Framework (EIF)



- To achieve semantic interoperability:
 - “**Management of metadata**, master data and reference data should be prioritised. **Support the establishment of sector-specific and cross-sectoral communities** that aim to create open information specifications..”
- Aiding technical interoperability,
 - “**Use open specifications**, where available, to ensure technical interoperability”.

Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource.

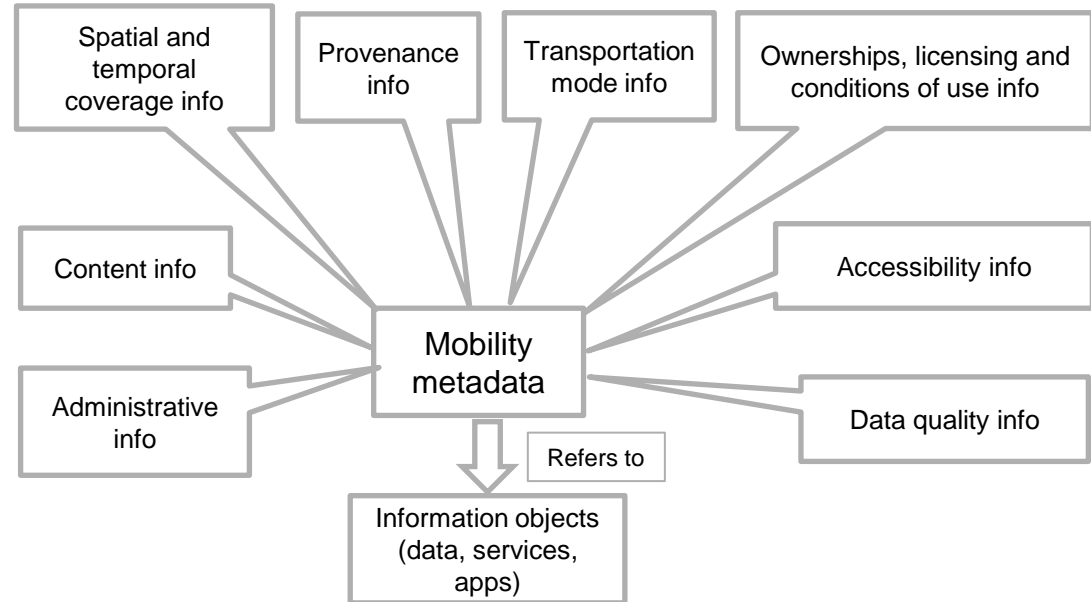
Process and used methodology



Mobility metadata model generic requirements

Desirable properties for a metadata model:

- Openness
- Expressiveness
- Formal (well defined)
- Expandability (flexibility)
- Support (backing community)
- Tools
- Migration paths (mappings)



Requirements capture results (specific requirements)

... **one** single **metadata model**

... should use **mobilityDCAP-AP**

... ability to keep **history of changes** in
metadata

... should provide **data quality
information**

... should use of **unified location
referencing system** (align with OGC
Open Geospatial Consortium)

... model based on
semantic web technologies

.. very clearly provide the
ownership of data

... should have a harmonised
license model information

... support for **policies
negotiation** based on ODRL

Key observations from analysis

- A **lack of metadata documentation** and related APIs in the mobility sector is common.
- Metadata **models in current ecosystems are fragmented** and generally tied to the internal metadata models of implementation platforms.
- **Metadata standards are highly interlinked and re-utilising existing WC3 RDF based standards/vocabularies** (cross dependencies).
- **Data quality and terms and condition information are weakly acknowledged in current metadata models.**

Recommendation #3.1

mobilityDCAT-AP is suggested as the foundation for the common metadata model for the EMDS. Its use for advanced logistics use cases requires further analysis.

- mobilityDCAT-AP was developed based on requirements for National Access Points (NAPs) to provide access to wide range of **static and dynamic** traffic datasets. It is a mobility-related extension of the DCAT application profile (DCAT-AP) which is the standard for data portals in Europe.
- The metadata model could be based on **mobilityDCAT-AP upgrades**, and more specific metadata models for “virtual use cases” could be reached by defining subdomain specific controlled vocabularies and/or extensions.
- The **specification of the metamodel** should be taken care of by a working group, consisting of all relevant stakeholders, including potential users, software developers, policy makers and regulators.

Benefits and shortages of mobilityDCAT-AP

Benefits

- **Common** mobility specific data model
- **Extensible** (RDF, linked data principles) responding to future needs
- **Serialising** formats defined for data exchange
- Enables **efficient queries** (SPARQL)
- Metadata **validation** (SHACL and ShEx)
- Storage systems **availability** (CKAN + plugins, Triple-store DBMS etc.)
- DCAT **development libraries** for several programming languages incl. Java, Python, .NET

Shortages

- Plenty of **recommended and optional properties**
 - It is not strictly mandatory for a receiver to handle optional (MAY) nor recommended (SHOULD) properties
- Descriptions for **usage terms and conditions** is not formalized
 - Not easily machine processible
 - Possible solution: **use ODRL to define vocabulary** for terms of use conditions of data products

Recommendations for metadata



Recommendation #3.2

ODRL is recommended for refining commercial data information.

Recommendation #3.3

Trust framework and identity management system information should be included in metadata.

Recommendation #3.4

JSON-LD is suggested as the encoding format.

Recommendation #3.5

OAI-PMH is recommended as the data harvesting protocol for legacy systems.



Q&A

Final report

- Will be published at the EMDS webpage of DG MOVE's website:
- https://transport.ec.europa.eu/transport-themes/smart-mobility/creating-common-european-mobility-data-space_en

