

EU EIP SA46

Metadata Guideline

Monitoring and Harmonisation of National Access Points in Europe



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Document Information

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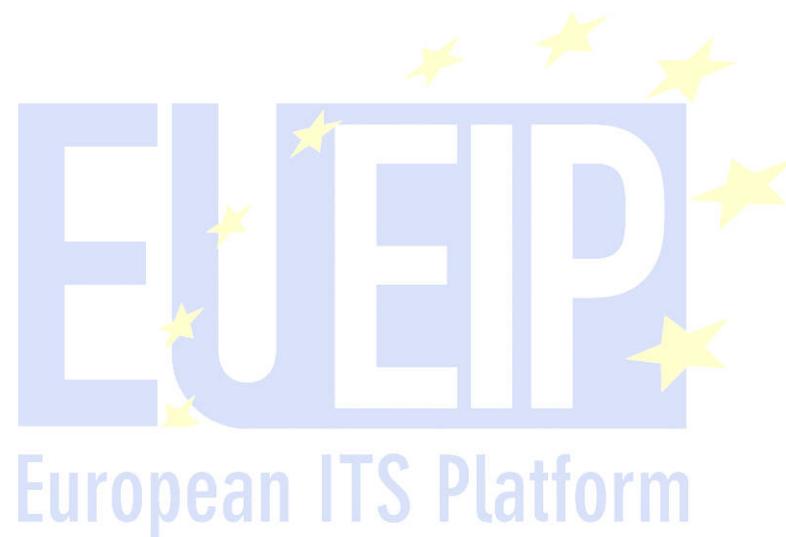
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1. Introduction

1.1. Purpose

This document has been drafted by the EU EIP SA4.6 group to support the development and utilisation of National Access Points (NAPs) as set out in the Commission delegated regulations of the ITS Directive, where an access point is specified.

In particular, the document gives guidance how to apply Metadata in existing and future NAPs.

The intended audience is organisations responsible for NAPs as well as NAP users with interest in Metadata usage within NAPs.

1.2. Context and definitions

Within EU EIP, sub-activity 4.6 is intended to monitor the on-going implementation of NAPs, to learn from each other and to harmonise NAP services across Europe. One task here is to give recommendations for harmonisation of NAP approaches with respect to Metadata.

Metadata describe the administration, organisation, and content of a dataset and of a data service. Metadata datasets are therefore crucial elements to make NAPs accessible and searchable. The most visible Metadata representation are the dataset descriptions in NAP portals, see the example from the Mobility Data Marketplace (MDM, German NAP) below.

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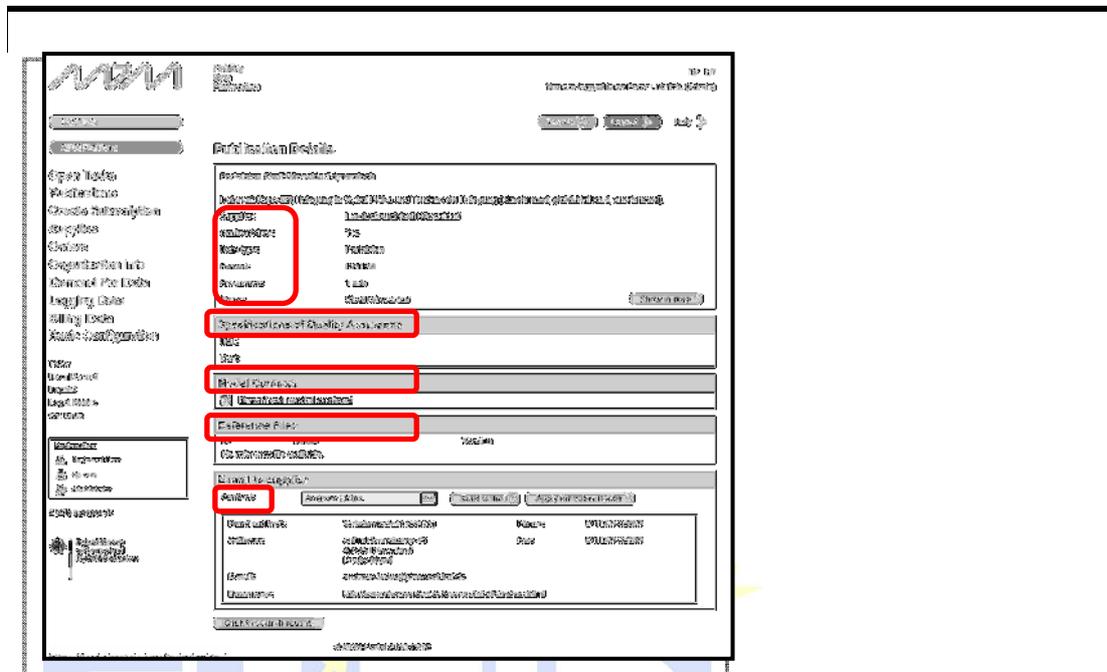


Figure 1: Metadata as part of the data set description in a NAP portal

Metadata represent a recurring element of Delegated Regulations of the ITS Directive. Metadata have been mentioned so far for Priority Action b (Delegated Regulation EC 2015/962) and for Priority Action a (Delegated Regulation EC 2017/1926). It is recommended that Metadata should also have the same relevance for all other Delegated Regulations.

There is a need to harmonise Metadata descriptions and structures for the following reasons:

- to help to make data available and searchable for pan-European service providers,
- to ensure Metadata to be machine-readable in a later stage, and
- to ensure a common understanding of the listed data content.

In the context of EU EIP sub-activity 4.6, harmonisation approaches are being discussed in the field of Metadata. In particular, recommendations are being elaborated in terms of how to implement Metadata in existing and upcoming NAPs across Europe.

The activities of EU EIP sub-activity 4.6 are based on:

- Results from the former projects EIP and EIP+, in particular the “Coordinated Metadata Catalogue” as a proposal for a harmonised set of Metadata

- Evaluation of Metadata approaches in the Member States so far
- Identification of needs and requirements in order to further develop a recommended, harmonised Metadata approach across Europe

These are the findings from the first analyses:

- In general, the individual approaches in establishing Metadata structures vary to a certain extent. The Metadata approach seems to depend particularly on the status of the NAP implementation and the general Open Data frameworks of the individual MS.
- The Coordinated Metadata Catalogue is known to all NAP operators that have been interviewed. However, only in a few cases the Coordinated Metadata Catalogue has been fully implemented in a NAP. In many cases, the DCAT-AT standard (as an Open Data standard) has been used for interoperability and compatibility reasons. This is particularly the case when transport-related data are implemented in Open Portals, which bundle all data from any public agency. (Only few countries have established specific transport-related portals with adopted Metadata structures.)
- A need for European harmonisation of Metadata descriptions and structures has been identified by all MS which have been interviewed. However, no clear preference for an existing Metadata standard that should be used as a base for the harmonisation effort could be identified.

An important milestone towards a further harmonisation of Metadata across the European NAPs has been a workshop on Metadata, organised by EU EIP Activity 4.6 in Frankfurt/Germany on 8th June 2017. This workshop aimed to enable stakeholders share their views and to establish a common understanding for the upcoming activities of EU EIP Activity 4.6,

As an outcome of this workshop, it has become evident that a complete Metadata harmonisation across all NAPs would be quite challenging, as individual NAP environments are quite varied regarding system architectures, functionalities and IT / Open Data frameworks. Therefore, some balance has to be found between the harmonisation needs on the one hand, and the consideration of the individual NAP environments in the other hand.

It has been agreed that EU EIP sub-activity 4.6 will provide further guidance for Metadata harmonisation among European NAPs. This guidance refers to two layers:

- The **technical guidance** refers to specific Metadata standards. In particular, the “Coordinated Metadata Catalogue” (being a result of previous EIP activities) is further assessed regarding its usability. Together with the authors of the

Catalogue, it is also discussed how the catalogue may be revised in order to meet future requirements. Other standards such as DCAT-AP will be compared towards the Catalogue.

- In addition, **strategic guidance** is given in form of a “Metadata Guideline”. This guideline depicts and discusses alternative Metadata approaches for individual NAP environments, taking into account higher-level considerations for NAP implementations.

This report contains a draft of such a Metadata Guideline. It has been elaborated by sub-activity 4.6 partners, with support by further stakeholders.

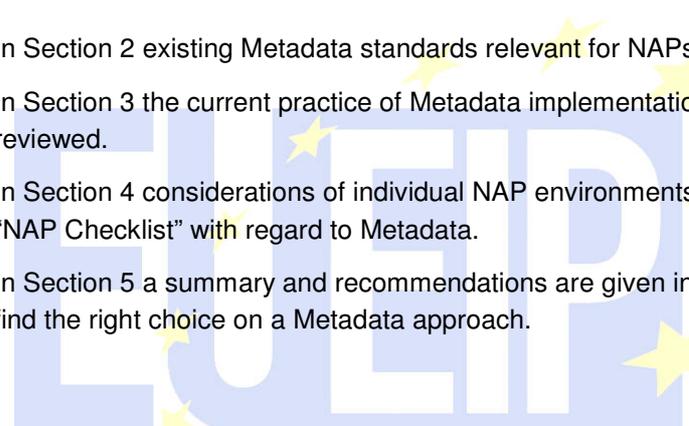
1.3. Document organisation

In Section 2 existing Metadata standards relevant for NAPs are summarized.

In Section 3 the current practice of Metadata implementation in individual NAPs is reviewed.

In Section 4 considerations of individual NAP environments are discussed in form of a “NAP Checklist” with regard to Metadata.

In Section 5 a summary and recommendations are given in order to help NAP operators find the right choice on a Metadata approach.



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2. Overview of Metadata Standards and Initiatives

Various Metadata standards have been developed, each describing the technical syntax and the semantics of Metadata, i.e. the choice, structure and the meaning of individual Metadata elements. However, some of these standards have been developed for specific use cases. Metadata standards relevant for NAPs are summarized below.

2.1. „Coordinated Metadata Catalogue“

Within the earlier work in EIP and EIP+, a proposal of a harmonised set of metadata applicable for the priority actions b, c and e has been developed. The result was a joint effort of Austria, Germany and the Netherlands, called the “Coordinated Metadata Catalogue¹”, where a ‘minimum set of metadata’ was proposed. This first harmonisation effort relates to agreements on:

- clear labelling, definitions, enumerations and remarks concerning mandatory fields,
- a context to structure the metadata by building groups, and
- a commonly used “master” language (English).

However, it was stated that there may be additionally “national” fields, which are not used across all MS.

The focus here was to define what information about the data at the NAP is necessary and appropriate to describe the data and to make it findable for a search function. In this effort, definitions (Metadata descriptions, Metadata structure, etc.) from existing Metadata sets (e.g. Inspire, DCAT-AP) were re-used to avoid incompatibilities. In particular, the following definitions and recommendations were made:

- Definition of data elements which are necessary to describe a dataset in a minimal but adequately way
- Definition of wordings and semantics
- Definition of predefined categorisation
- Definition of data field name
- Definition of data value type
- Recommendations of data field length

¹ https://www.its-platform.eu/filedepot_download/1701/5355

The following table show an overview of the described Metadata elements.

Category	Data field	Data type	Mandatory
Metadata information	date of metadata	<i>DateTime</i>	<i>yes</i>
	metadata language	<i>predefined</i>	<i>yes</i>
	contact point for metadata (name, company, address, email, website, phone)	<i>specific text</i>	<i>yes</i>
Content information	name of publication	<i>free text</i>	<i>yes</i>
	description of publication	<i>free text</i>	<i>yes</i>
	dataset type category	<i>predefined</i>	<i>yes</i>
	dataset detailed type	<i>predefined</i>	<i>yes for self-validation</i>
	dataset language	<i>predefined</i>	<i>yes</i>
Temporal information	start date of publication	<i>date</i>	<i>yes</i>
	end date of publication	<i>date</i>	<i>no</i>
Geographical coverage	area covered by publication	<i>predefined</i>	<i>yes</i>
	network coverage	<i>predefined</i>	<i>yes</i>
Responsibilities / Contact information	Publisher (name, company, address, email, website, phone)	<i>specific text</i>	<i>yes</i>
	data owner (name, company, address, email, website, phone)	<i>specific text</i>	<i>no</i>
Conditions for use	contract or license	<i>predefined</i>	<i>yes</i>
	conditions for use	<i>URL</i>	<i>yes if con/lic is used</i>
Access information	structure of dataset	<i>predefined</i>	<i>yes</i>
	Access interface	<i>predefined</i>	<i>yes</i>
	communication method	<i>predefined</i>	<i>yes</i>
	access URL	<i>URL</i>	<i>yes</i>
Quality information	update frequency	<i>predefined</i>	<i>yes</i>
	quality indicator	<i>URL + free text</i>	<i>yes</i>
	National body validation date	<i>Date</i>	<i>no</i>

Table 1: Overview on Metadata elements from the Coordinated Metadata Catalogue

Austria and the Netherlands have both implemented this set of metadata within their NAP in 2015/2016. First experiences of the application of this Catalogue have proved its suitability. This means that both countries have stated that the Catalogue works fine for their running NAPs so far. Only minor, non-critical remarks on some of the Metadata elements were identified.

However, it was also stated that both countries are working on an expansion of the data provisions in their NAPs, in order to cover other Priority Actions of the ITS Directive:

- The Netherlands have already implemented data types in its NAP for Priority Action C and E. An expansion for Priority Action B is planned for December 2017. An expansion for Priority Action A is planned for the near future.
- Austria has already implemented data types in its NAP for Priority Action B, C and E. An expansion for Priority Action A is planned for the near future.

It is expected that the Catalogue has to be verified again, once other data types are implemented. Especially for Priority Action A, where Multi-Modal Travel Information Services (MMTIS) include data types that are very different from the data types so far, the Metadata approach may to be revised.

In summary, adaptation needs to the current Catalogue have not been identified as of today. However, future adoptions may be considered for the further development of individual NAPs. As EU EIP Sub-Activity 4.6 is continuously monitoring the individual NAP developments, potential new requirements for the Catalogue will be identified and discussed.

2.2. DCAT, DCAT-AP and CKAN

DCAT² is a RDF vocabulary designed to facilitate interoperability between data catalogs published on the Web. DCAT is managed by the World Wide Web Consortium (WC3) and is a W3C recommendation.

DCAT-AP³ (DCAT Application Profile for data portals in Europe) is an European profile of DCAT. As the vision behind DCAT-AP, the European Commission states that the availability of the information in a machine-readable format as well as commonly agreed metadata could facilitate data cross-reference and interoperability and therefore considerably enhance its value for reuse. Much of the public sector information that would

² <https://www.w3.org/TR/vocab-dcat/>

³ <https://joinup.ec.europa.eu/solution/dcat-application-profile-data-portals-europe>

benefit from interoperability is published as datasets in data portals. Therefore, an agreement on a common format for data exchange would support the sharing, discovery and re-use of this data.

DCAT-AP has the following benefits:

- definitions on metadata,
- definitions of common vocabulary,
- a defined exchange format in RDF and XML,
- possibility of machine-to-machine exchange and sharing, and
- extendibility.

DCAT-AP classifies/groups data into 13 different themes/categories. For this domain, there is a Transport (code = TRAN) category defined.

DCAT-AP and its defined exchange format allow sharing Metadata in a standardised way. This is current state-of-the-art in the Open Data domain, where national Open Data portals make their Metadata available on the European Open Data portal. For example, Swedish local governments publish their Metadata in DCAT-AP which is then harvested by the national Open Data portal (öppnadata.se). The national Open Data portal is then harvested by the European data portal.

The following picture illustrates the flow.



Figure 2: Flow of Metadata between data portals in Sweden (Riksarkivet = Swedish National Archives).

The shown flow of Metadata is made possible by agreed definitions of Metadata and an exchange format with DCAT-AP. In addition, a nation-specific document has been prepared in Sweden (“Swedish Recommendations for DCAT-AP 1.1”), which further recommends which fields and Metadata vocabulary are to be used.

CKAN⁴ is an open source software, overseen and managed by the CKAN Association. It states to be the world's leading open source data portal platform.

CKAN can be used as a web portal for Metadata, hosting links to services and data. It can also provide a data storage and host data.

CKAN provides an internal model to store Metadata about its records. Users are allowed to browse and search this Metadata on a web interface. It also offers an API that allows third-party applications and services to be built around it.

There is a plug-in for DCAT, having a profile for DCAT-AP 1.1. There is also another extension called scheming that lets you define your own Metadata catalogue in a JSON configuration file.

CKAN is currently used in many Open Data portals in Europe. For Open Data environments, DCAT/CKAN solutions are therefore considered as a quasi-standard.

2.3. CSW 2.0

For geo data, the Catalogue Service for the Web (CSW 2.0) is often applied. This standard, developed by the Open Geospatial Consortium (OGC)⁵, specifies the online publication of geo-referenced data and services. Metadata have been defined in CSW 2.0 based on the ISO 19115 standard.

CSW 2.0 is especially applied for data portals in accordance with the INSPIRE directive.

However, this standard is so far not commonly used in the NAP context, as NAPs are currently not focused on geo data.

⁴ <https://ckan.org>

⁵ <http://www.opengeospatial.org/standards/cat>

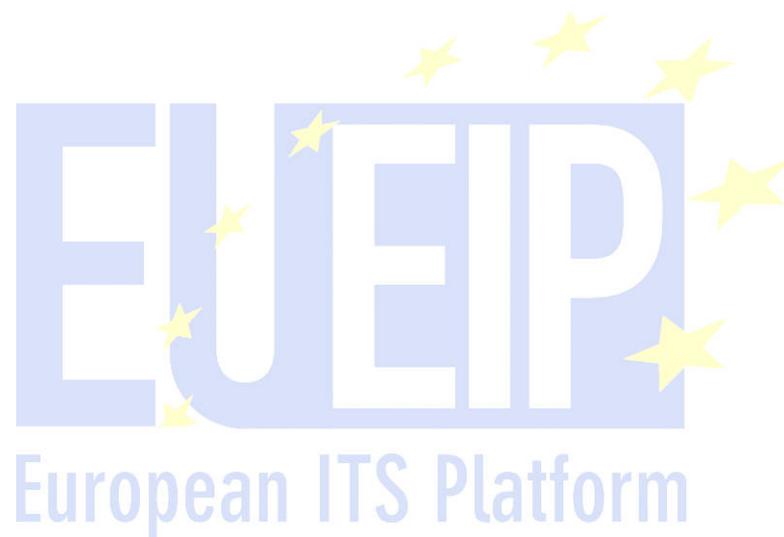
3. Current Practice of Metadata in NAPs

The current practice of Metadata implementation in selected individual NAPs has been reviewed based on questionnaires and interviews with NAP operators. A more complete picture, including all NAPs, will be elaborated during the later stage of EU EIP SA4.6. The individual Metadata approaches are summarized in the following table:

Country	NAP Name	NAP Status	Metadata approach		Remarks
			Coordinated Metadata Catalogue	DCAT-AP	
AT	Mobilitätsdaten	operating since 2016	X		
DE	Mobility Data Market Place (MDM)	operating since 2011	(X)		<i>The "Catalogue" is adopted to a large extent. In future, a full adaption is aimed.</i>
FI	Open Data Portal	operating	X		
IE	Open Data Portal	operating		X	
NL	Nationale Databank Wegverkeersgegevens (NDW)	operating	X		
NO	in preparation	in preparation		X	<i>Metadata are being discussed.</i>
PL	in preparation	in preparation	(X)		<i>Using the "Catalogue" in a slightly older version.</i>
PT	in preparation	in preparation	?	?	<i>Metadata are being discussed; NAP will cover multi-modal traffic information, requiring an expansion of "Catalogue".</i>
UK	Open Data Portal	operating		X	<i>e-GMS (UK e-Government Metadata Standard)</i>
SE	Open Data Portal	in preparation		X	<i>NAP realised as CKAN platform. Mapping table of Metadata descriptions with the "Catalogue" has been prepared.</i>

Table 2: Overview on Metadata approaches in individual NAPs

As stated above, the individual approaches in establishing Metadata structures vary to a certain extent. From ten reviewed NAPs, five use the Coordinated Metadata Catalogue (two of them in a modified version). Three NAPs use DCAT-AP. One NAP uses a proprietary national standard. For one NAP, the decision has not been made yet.



4. NAP checklist with regards to Metadata

4.1. Introduction

When developing a specific NAP, a suitable Metadata approach has to be discussed.

As a basic requirement, a harmonised Metadata approach across all European NAPs is envisioned for the mentioned reasons, such as to enable seamless, cross-border services. However, based on previous analyses, it has become evident that a complete Metadata harmonisation across all NAPs is challenging, as individual NAP environments are quite varied regarding system architectures, functionalities and IT / Open Data frameworks.

Therefore, some balance has to be found between the harmonisation needs on the one hand, and the consideration of the individual NAP environments in the other hand.

In the following section, considerations of individual NAP environments and their relevance with regards to Metadata are discussed in detail. Based on these considerations, NAP operators should have some orientation on the right choice for a Metadata approach.

4.2. General considerations

First of all, some strategic considerations have to be looked at, which refer to the envisioned users and use cases of a specific NAP, thus not only referring to Metadata:

- **What is the status of the current NAP implementation?**
 - For NAPs under development: what is the development phase? (e.g. conceptual preparation, technical specification, procurement process, pilot/initiation phase)
 - For existing NAPs: is there a plan to upgrade or expand the NAP (e.g. to adopt further EU Delegated Regulations)?
- *For NAPs under development, an appropriate Metadata approach should be discussed with all stakeholders. This should be done ideally at the beginning of the NAP preparation, i.e. during the conceptual phase.*
- *Existing NAPs already have a Metadata approach implemented. However, an alternative approach may be discussed, when a major upgrade or a migration of the running system is foreseen. In this case, it is not recommended to require all data providers, which are already in the system, to modify their Metadata information. Instead, a Metadata mapping or import (from one approach into another) should be considered.*

- **Which legal obligations have to be followed?**

- Which EU Delegated Regulations are to be covered?
- Are there any other, nation-specific obligations or initiatives for data provision?

→ *The EU Delegated Regulations contain some legal obligations for NAP operators, in particular regarding the data provision via a NAP. Each Delegated Regulation stipulates one NAP per EU Member State. One NAP may also cover obligations from multiple (or even all) Delegated Regulations. One NAP may even be created to cover several EU Member States. As a result, the data sets within a NAP may have a very different character. Thus, the Metadata descriptions may also be very different. Also, for some data types some existing domain-specific Metadata standards may have to be applied. As a recommendation, the Metadata approach has to be suitable and compatible with the majority of the provided data sets. For example: when there is a clear focus on geo-referenced, static data, a Metadata approach may be considered that is already often applied in this domain.*

→ *In certain cases, they might be other, nation-specific obligations for data provision. Any Metadata-relevant obligations in this context have to be considered as well.*

- **What is the target group?**

- NAP for experienced users, e.g. from the ITS domain?
- NAP for other domains, e.g. for app developers?

→ *Usually, the purpose of NAPs is to make data accessible for businesses from the traffic domain. The NAP set-up will therefore address users who are most likely familiar with relevant techniques how to access the data, as well as with the data characteristics. However, the NAP operator may also intend to make the data accessible to other domains, such as start-ups in the area of app development. In this case, the NAP set-up (such as data access techniques and support functions) may be adopted to also serve that audience.*

- **What are the envisioned business processes?**

- How do data suppliers and data users interact? Are there any contractual relationships?

→ Depending on the NAP concept, there are different processes for data suppliers and data users when accessing the NAP. This may include the registration at the NAP portal, the publication of a data set, the search for data sets, and the eventual installation of data delivery (for broker systems only). The interaction of data suppliers and data users can have different intensity levels, maybe including contractual relationships on a B2B-level. Besides the data set-related Metadata, a NAP may therefore also have user-related Metadata (e.g. describing the contact information and a status of a NAP user). It is important to verify, what needs are derived from the specific user processes towards the Metadata approach.

- **How sophisticated should the NAP system be?**

→ Depending on the concept, NAP functionalities may be clearly limited to its original purpose (e.g. from the obligations by the EU Delegated Regulations), or have other, far-reaching functionalities (e.g. to fulfil other, nation-specific needs). In the latter case, a more sophisticated Metadata approach may be sought. In any case, cost/benefit relations should be discussed upfront, to make sure the chosen approach is the most efficient one for the specific NAP needs.

4.3. Specific NAP Requirements

- **Functional Requirements**

- NAP as a Data Broker (data warehouse) or as a Link Repository (providing links to data sources)?

→ One important feature of a NAP is that data sets should be searchable. In a very simple concept, this may be achieved by a Link Repository, consisting of a pure list of links, not containing any Metadata descriptions. However, this is not recommended for any NAP, as its usability would be very restricted. Thus, both Data Brokers and Link Repositories should contain a certain Metadata approach. However, a Data Broker will require a higher number of Metadata fields than a Link Repository, as details on the actual data delivery are relevant here (such as data formats and communication techniques). Thus, the Metadata approach may have to consider the data delivery details, as well as any other system-specific details (e.g. the envisioned business processes, see above.)

- **Technical Requirements**

- Data access by human users and/or by other machines?
- Any requirements towards scalability, upgradability, flexibility?
- *The NAPs so far have been mainly designed for human users, who will search for and access data via a web portal (through a GUI). However, there is a tendency in the industry to allow machine interfaces between data platforms. This would enable other machines to access NAP data, e.g. for data harvesting via an API. Such a feature is also important for a cross-border data access across multiple NAPs. Machine-readability requires strict rules on the Metadata, e.g. clearly defined Metadata fields, preferably without any “free-text” fields. In this case, Metadata approaches should be considered, that are already common and proved for machine-readability.*
- *A running NAP system may have to adopt any additional functions in the future. Requirements towards scalability, upgradability and flexibility of the NAP setup should also be considered with the regard to Metadata. Thus, a Metadata approach should allow some flexibility, e.g. by adding new Metadata fields.*

- **Organisational Requirements**

- Who is responsible for Metadata within NAP processes?
- *Metadata are handled during several processes within a NAP, involving different responsibilities. A key process is to enter and maintain Metadata descriptions for a specific data set. Here, the quality of the Metadata descriptions is crucial, e.g. regarding correctness and completeness. While the data provider is clearly responsible for the Metadata quality, the NAP operator may implement some checking (e.g. by verifying that mandatory Metadata fields are filled in). Also, there might be some feedback channel for data users, in case incorrect Metadata have been identified.*

4.4. Consideration of IT frameworks

- Are there any relevant national IT frameworks or policies that have to be adopted for the NAP?
- In particular: is the NAP declared as an Open Data portal?

-
- *The installation of NAPs has been originally driven by initiatives to promote ITS applications. However, there seem to be other, higher-level objectives that are sometimes described in national IT frameworks or policies. It is being realised that data is seen as “resource of the digital age”, being a prerequisite for future technologies, e.g. in the context of automated driving. A specific policy may be that data from different domains and sources are to be consolidated as much as possible, in order to facilitate access and re-use of different data. Any policies relevant to the NAP set-up, also with regards to Metadata, have to be considered.*
- *A current trend in the domain of government-owned data is the provision of Open Data⁶. If a NAP is embedded into an Open Data-strategy, the NAP setup has to be carefully discussed. This refers to data privacy/ownership issues, as some data sets within a NAP may be supplied by private parties (e.g. service providers). Thus, these may not fall under Open Data definitions. In this case, it has to be clarified if and how the Open Data audience can look up and access privately-owned data sets (and the corresponding Metadata). As a solution, a classification of data sets (as Open Data or not) and a definition of access rules may be necessary. Further, DCAT and DCAT-AP may be predestined as Metadata standards in this case, as these are quasi-standards for Open Data portals.*

⁶ In 2013, the G8 summit defined the importance of Open Government Data by creating the Open Data Charter (<https://opendatacharter.net/resource/g8-open-data-charter/>). This charter emphasises the role that Open Data can play in both governance and growth stimulation. The charter defines five principles that nations that open up their data should follow.

- Open data by default: all government data will be published openly by default.
- Quality and quantity: data should be released as early as possible in its original form and fully described in clear language. This principle denotes the importance of metadata and user feedback to improve quality.
- Usable by all: data will be published in open formats for humans and machines wherever possible and will be free.
- Releasing data for improved governance: governments will share their technical expertise with each other and document their own open data initiatives.
- Releasing data for innovation: G8 governments will promote open data literacy and the provision of data in machine-readable formats

5. Summary and Recommendations

The general goal for an individual NAP operator is to find an approach that is generic and flexible, so all relevant data types within the specific NAP are covered, and to allow interoperability, so that data can be easily processed by data users.

So far, various metadata approaches are parallel applied in the landscape of European data portals. This is also a fact for the NAPs, where different circumstances play role on the individual Metadata approach.

When discussing specific Metadata approaches, some general trends and recommendations can be described, based on the analyses made for this Guideline.

Regarding Metadata standards, both the Coordinated Metadata Catalogue and DCAT-AP have been identified as suitable metadata alternatives for NAPs.

The DCAT-AP standard seems to be more applicable in the following cases:

- The NAP is embedded into rather cross-domain and heterogenic data landscapes.
- The NAP is considered as an Open Data environment.
- There is a high priority to ensure compatibility and interoperability between datasets published by any public bodies. (In particular: where datasets are intended to be harvested by other data portals, eventually allowing to be found by a bigger user community).
- It allows flexibility to allow use country-specific extensions.

The Coordinated Metadata Catalogue was developed by the NAP community as a list of required metadata for that particular domain. There are some arguments to use this Catalogue:

- The definitions are specifically made for NAP use cases.
- It has a short “minimum-set” list of relevant Metadata fields. (DCAT-AP is more generic.)
- It allows some flexibility to allow use country-specific extensions.

It can be concluded that the Catalogue is rather applied in “isolated” NAP environments, addressing a limited group of professional users, whereas DCAT-AP is used in environments where policies for data handling require such a generic standard.

However, before the choice for a Metadata standard is made, considerations of individual NAP environments and their relevance with regards to Metadata have to be analysed, such as:

- general considerations, especially the definition of users and uses cases, and the application of any higher-level policies (see section 4.2),
- specific NAP requirements, especially the NAP set-up on a functional, technical and organizational level (see section 4.3), and
- consideration of IT frameworks, especially potential Open Data environments (see section 4.4).

These analyses should be preferably made during the conceptual phase of a NAP.

Eventually, different NAPs across Europe may result in different Metadata approaches.

To achieve the required interoperability between NAPs, even if they have different Metadata approaches, some integration between those approaches is needed. This may be realised by Metadata import or mapping functions.

As a basic recommendation for NAPs which are embedded in an Open Data environment, a DCAT-AP interface on the NAP is recommended, based on the current state-of-the-art for the Open Data domain. In this case, a NAP still can have its own “standard” (such as the Coordinated Metadata Catalogue), but it should expose its data via a DCAT-AP interface as well. Mapping from the Coordinated Metadata Catalogue to DCAT-AP has been proven as possible. Sweden, for example, has prepared a corresponding mapping table. However, some extensions of vocabularies are still needed and that could be a possible work item in future.

This way, an interoperable and cross-border usage of European NAPs can be enabled in the future, e.g. by allowing simultaneous data searching across multiple NAPs. Another vision would be a central portal that is able to harvest all national NAPs and present a complete view of all data.

EU EIP sub-activity 4.6, being the author of this Metadata Guideline, will further promote the harmonisation of European NAPs, especially in the area of Metadata.