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co-located with Semantics 2021

TOWARDS NAPDCAT-AP:
ROADMAP AND REQUIREMENTS FOR A TRANSPORTATION METADATA SPECIFICATION

Mario Scrocca, Antonia Azzini, Petr Bures, Marco Comerio and Peter Lubrich
{mario.scrocca,antonia.azzini,marco.comerio}@cefriel.com
petr.bures@cvut.cz
lubrich@bast.de

INNOVATE › GROW › REPEAT

NAPs in Europe

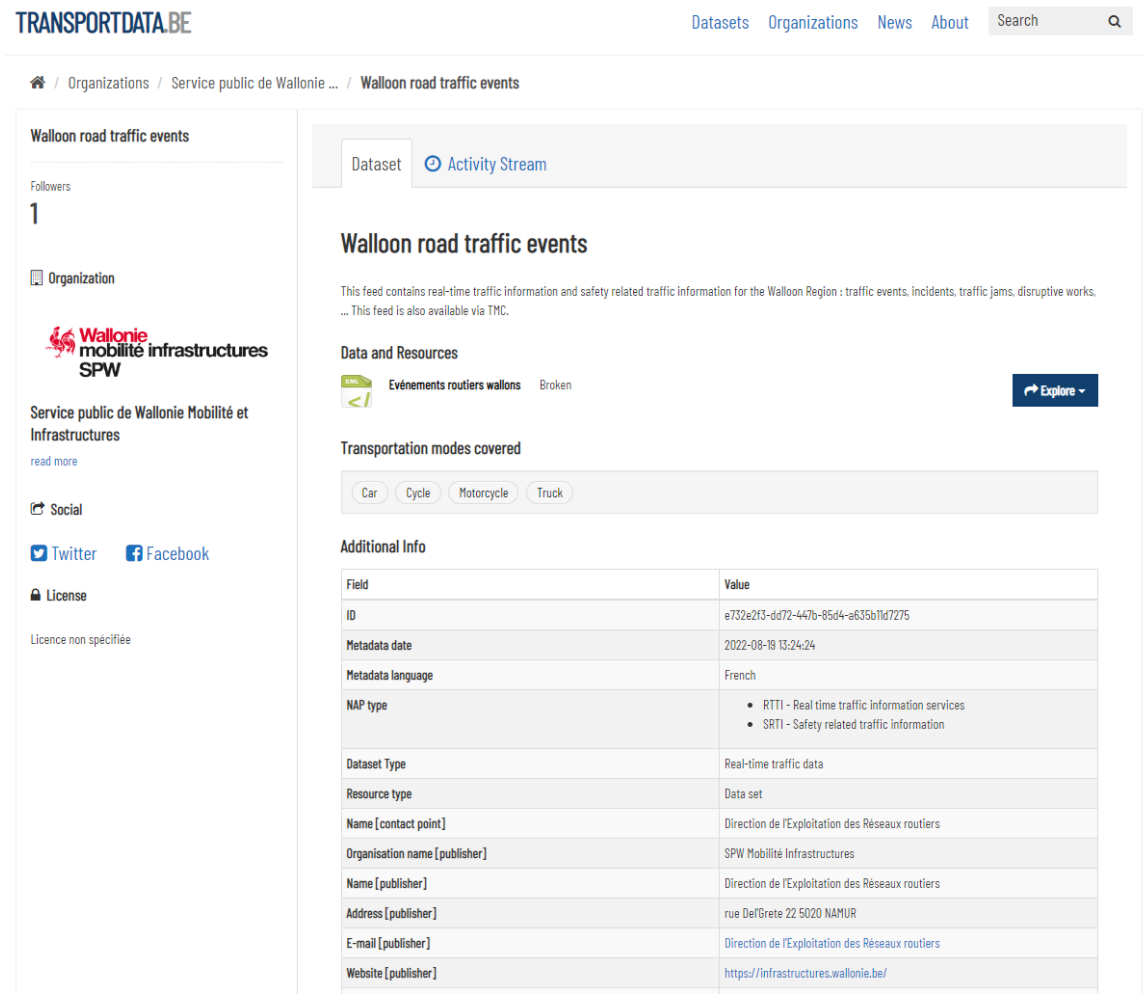
- The ITS Directive 2010/40/EU and its Delegated Regulations required each EU Member State to set up a **National Access Point** (NAP) to publish mobility data
- 30+ operational NAPs in Europe
- **Problem**: fragmentation of mobility data platforms (formats, standards, access interfaces, etc.)

National Access Point Coordination Organisation for Europe (NAPCORE)

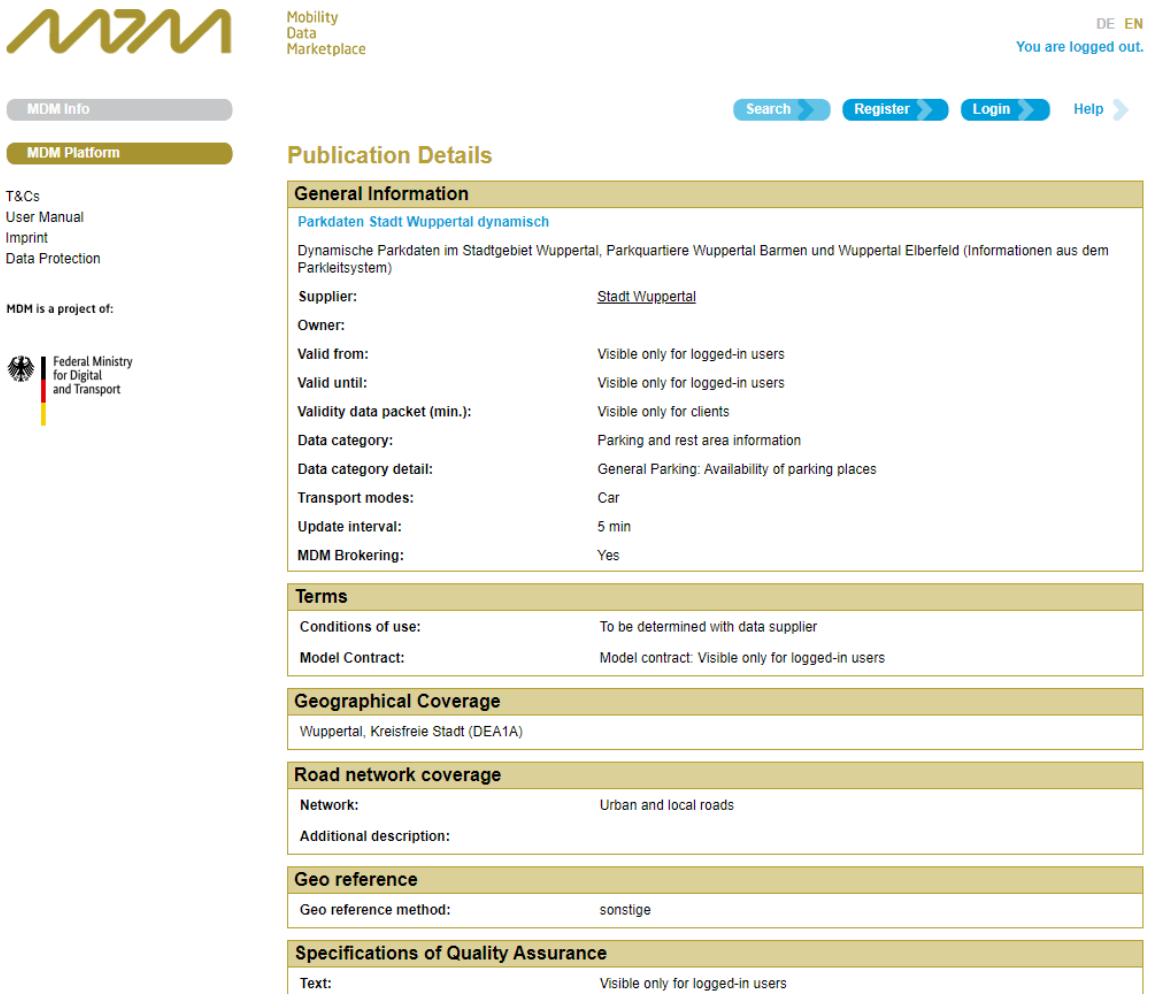
- The **NAPCORE** project (https://www.napcore.eu) aims at coordinating all NAPs in Europe on an organizational and technical level
- The objectives of NAPCORE are:
  - establish **common recommendations** on data exchange technology, standards, formats, processes used by the NAPs
  - increase interoperability for **common data discoverability and accessibility**, thus enabling pan-European services
  - define **common strategies** concerning existing and upcoming developments

Metadata in NAPs

Transportdata.be (**Belgian NAP**)



MDM (**German NAP**)



Heterogeneity of metadata in NAPs

Publication Details

General Information	
Parkdaten Stadt Wuppertal dynamisch	
Dynamische Parkdaten im Stadtgebiet Wuppertal, Parkquartiere Wuppertal Barmen und Wuppertal Elberfeld (Informationen aus dem Parkleitsystem)	
Supplier:	Stadt Wuppertal
Owner:	
Valid from:	Visible only for logged-in users
Valid until:	Visible only for logged-in users
Validity data packet (min.):	Visible only for clients
Data category:	Parking and rest area information
Data category detail:	General Parking: Availability of parking places
Transport modes:	Car
Update interval:	5 min
MDM Brokering:	Yes

NAP type	• RTTI - Real time traffic information services • SRTI - Safety related traffic information
Dataset Type	Real-time traffic data
Resource type	Data set
Name [contact point]	Direction de l'Exploitation des Réseaux routiers
Organisation name [publisher]	SPW Mobilité Infrastructures
Name [publisher]	Direction de l'Exploitation des Réseaux routiers
Address [publisher]	rue Del'Grete 22 5020 NAMUR
E-mail [publisher]	Direction de l'Exploitation des Réseaux routiers
Website [publisher]	https://infrastructures.wallonie.be/

Metadata are key **to implement a data-search functionality**

Harmonization needed to make (*cross-portal and cross-border*) data-search easier

- Different terminology (e.g., supplier vs publisher)
- Different set of metadata (e.g., NAP type)
- Different values for metadata properties (e.g., proprietary set of Data categories only used in a specific NAP)
- Not machine-readable

DCAT and DCAT-AP: Data Catalogue Interoperability

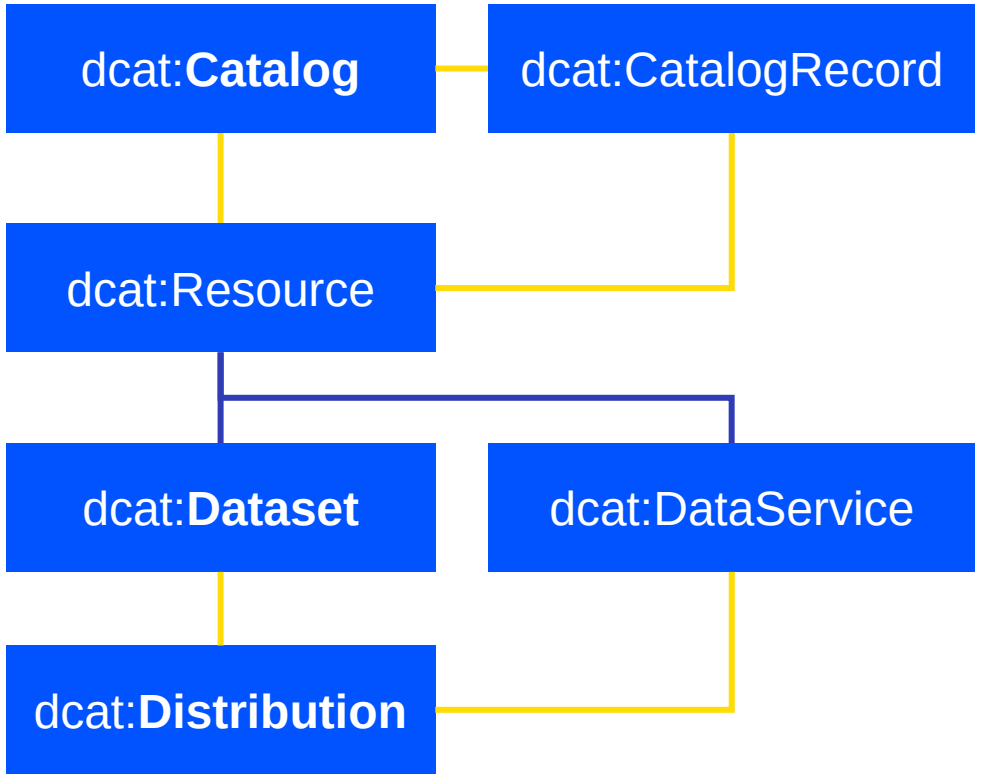
In the definition of metadata specifications, **Semantic Web technologies offer a valid solution to encode semantics** in an interoperable machine-readable format.

The Data Catalog Vocabulary (DCAT) is an RDF vocabulary to describe data catalogues

DCAT Application Profile (DCAT-AP) is a **profile of DCAT for data portals in Europe**.
DCAT-AP defines:

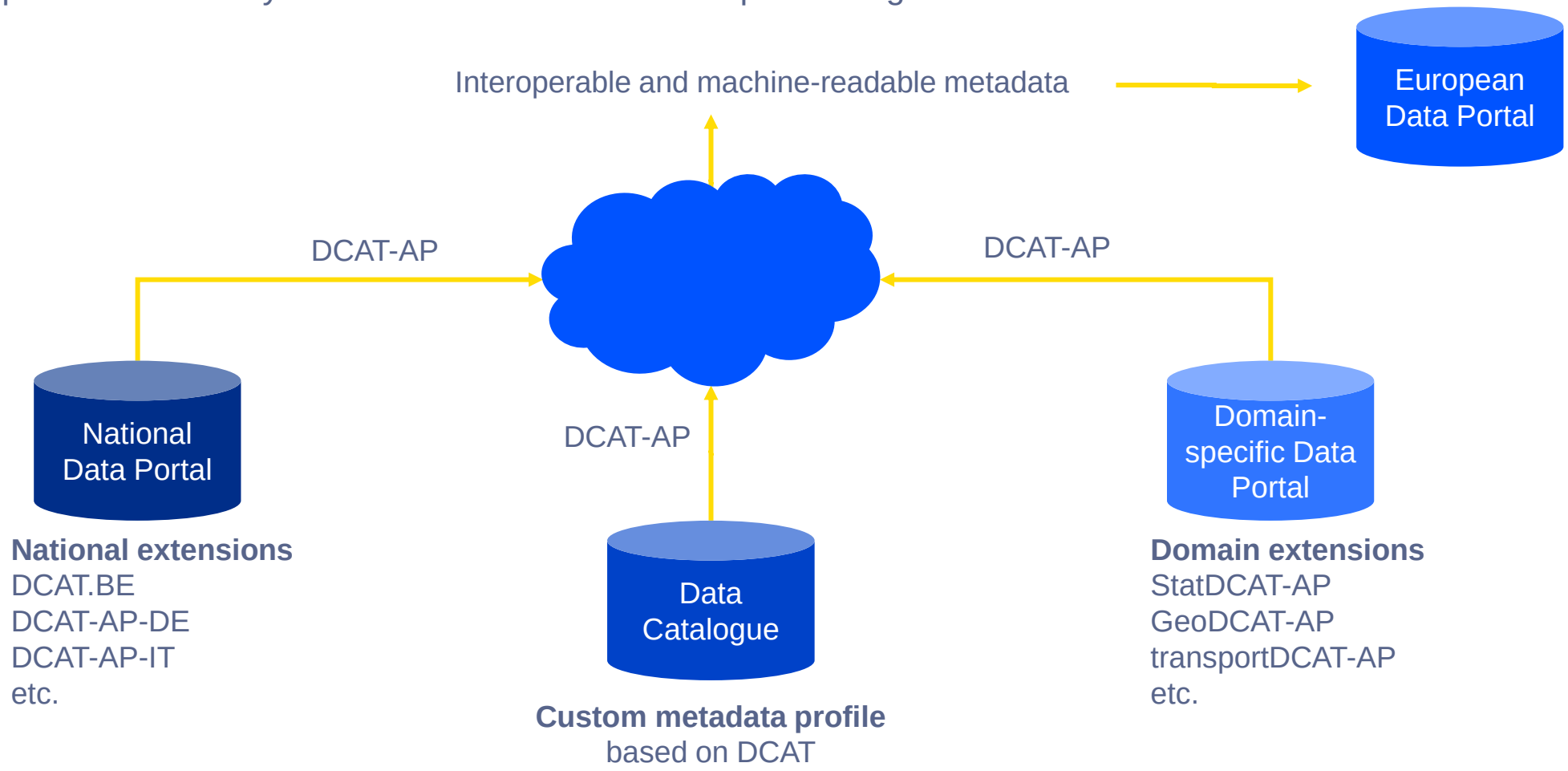
- cardinalities and obligations (mandatory, recommended, and optional) for DCAT elements to be provided
- recommendations for controlled vocabularies to be adopted for metadata values
- additional properties that can be used for metadata

The intended **DCAT-AP scope is cross-border and cross-domain**, for this reason several **DCAT-AP extensions** are defined to meet specific requirements.



DCAT and DCAT-AP: Data Catalogue Interoperability

Using DCAT, **publishers increase interoperability and discoverability** enabling the possibility for applications to easily consume metadata from multiple catalogues.



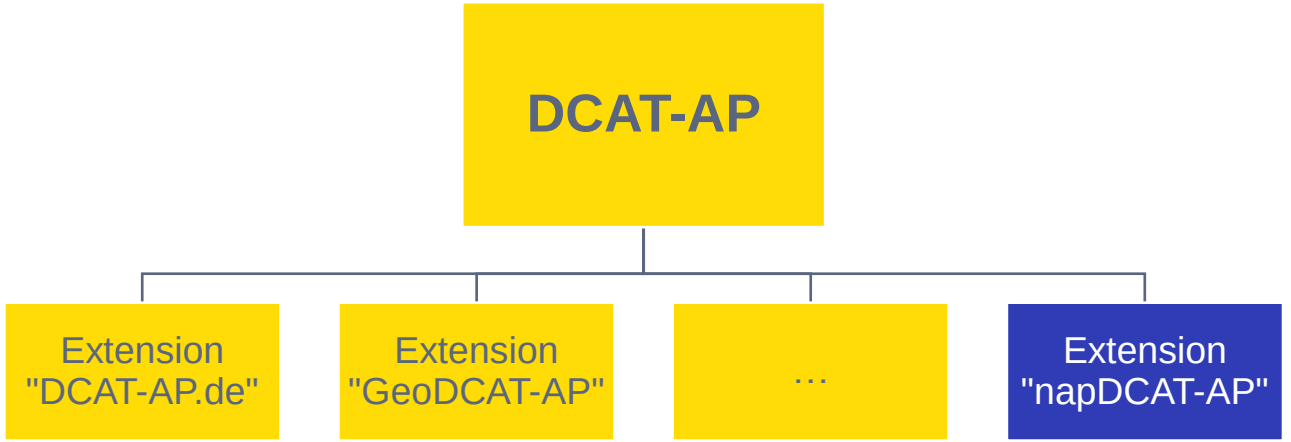
NAPCORE Metadata approach

The **Coordinated Metadata Catalogue** (CMC), defined under the former EU EIP project, represented a first elaboration towards NAP metadata harmonisation in the transportation domain.

The definition of **napDCAT-AP** would like to bridge the gap between metadata initiatives **considering specific requirements of the transportation domain**, and the set of **recommendations and best practices for metadata** in data catalogues.

Approach: Produce a new metadata specification **napDCAT-AP** for the NAP domain as a DCAT-AP extension

1. Requirements analyses & roadmap
2. Development of *napDCAT-AP*
3. Maintenance & governance of *napDCAT-AP*



Extending DCAT-AP

DCAT-AP extensions should **ensure the compatibility with DCAT-AP**, i.e., it should be possible to extract DCAT-AP compliant metadata from a set of metadata defined according to the DCAT-AP extension.

A DCAT-AP extension can:

- provide additional guidelines and recommendations on the usage of DCAT-AP class and properties
- extend the scope of the metadata profile

Three main types of modifications are usually defined through an extension:

1. Changes in cardinalities and obligations (mandatory, recommended, and optional)
2. Controlled vocabularies to be adopted for metadata values
3. Additional properties that can be used for metadata

Examples

1 The property *dct:publisher* (recommended for DCAT-AP) is made **mandatory** for each *dcat:Dataset* described

2 The property *dcat:theme* should have as **value an element of the controlled vocabulary** defined for the extension (e.g., a taxonomy of data categories for transportation datasets)

3 The **property** *napdcat:transportMode* is **introduced** as mandatory for each *dcat:Dataset* described

How to extend DCAT-AP?

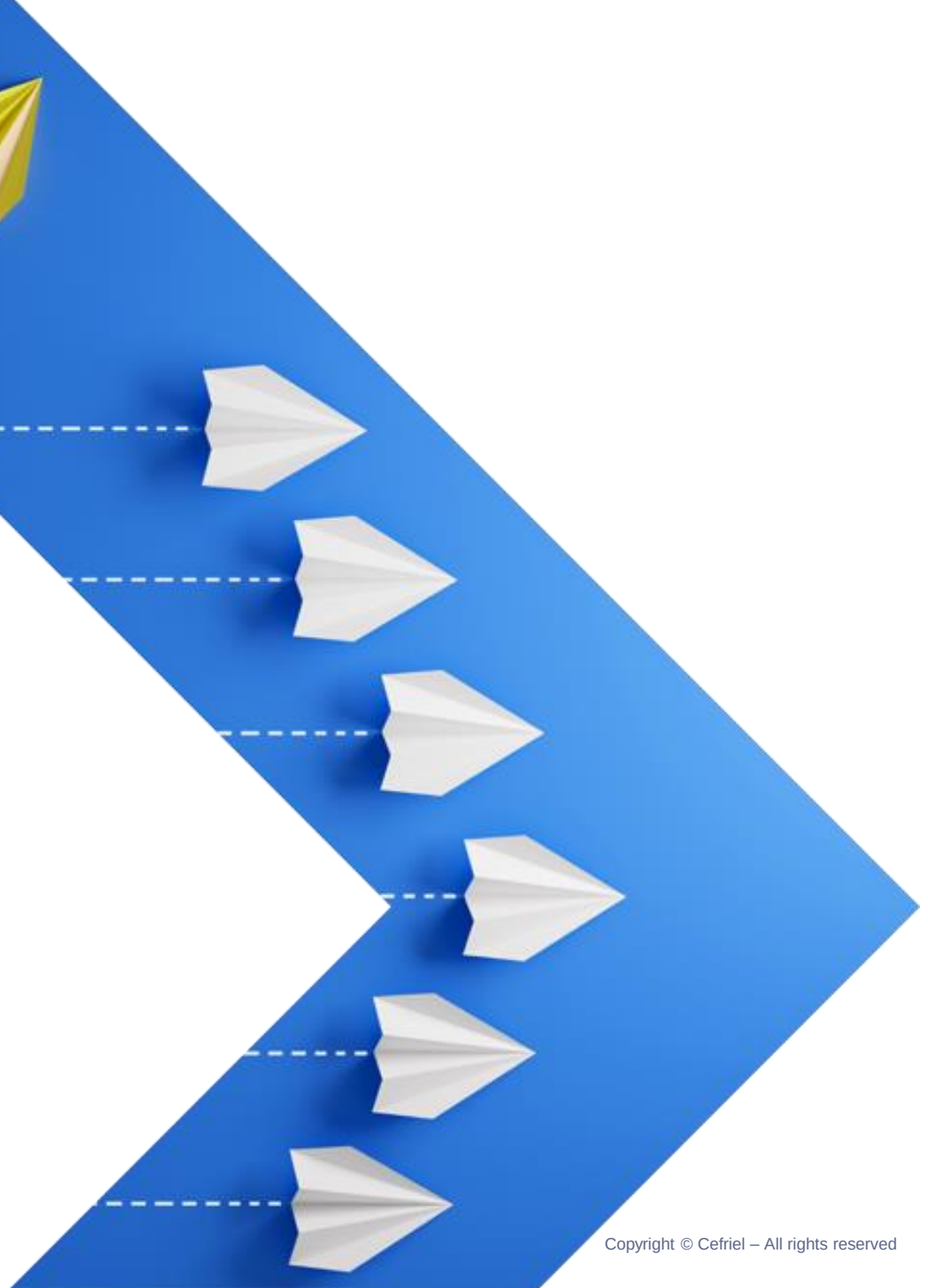
Objectives:

1. Identify **guidelines** and **best practices** to extend DCAT-AP
2. Define a **roadmap to extend DCAT-AP**

The following inputs were considered:

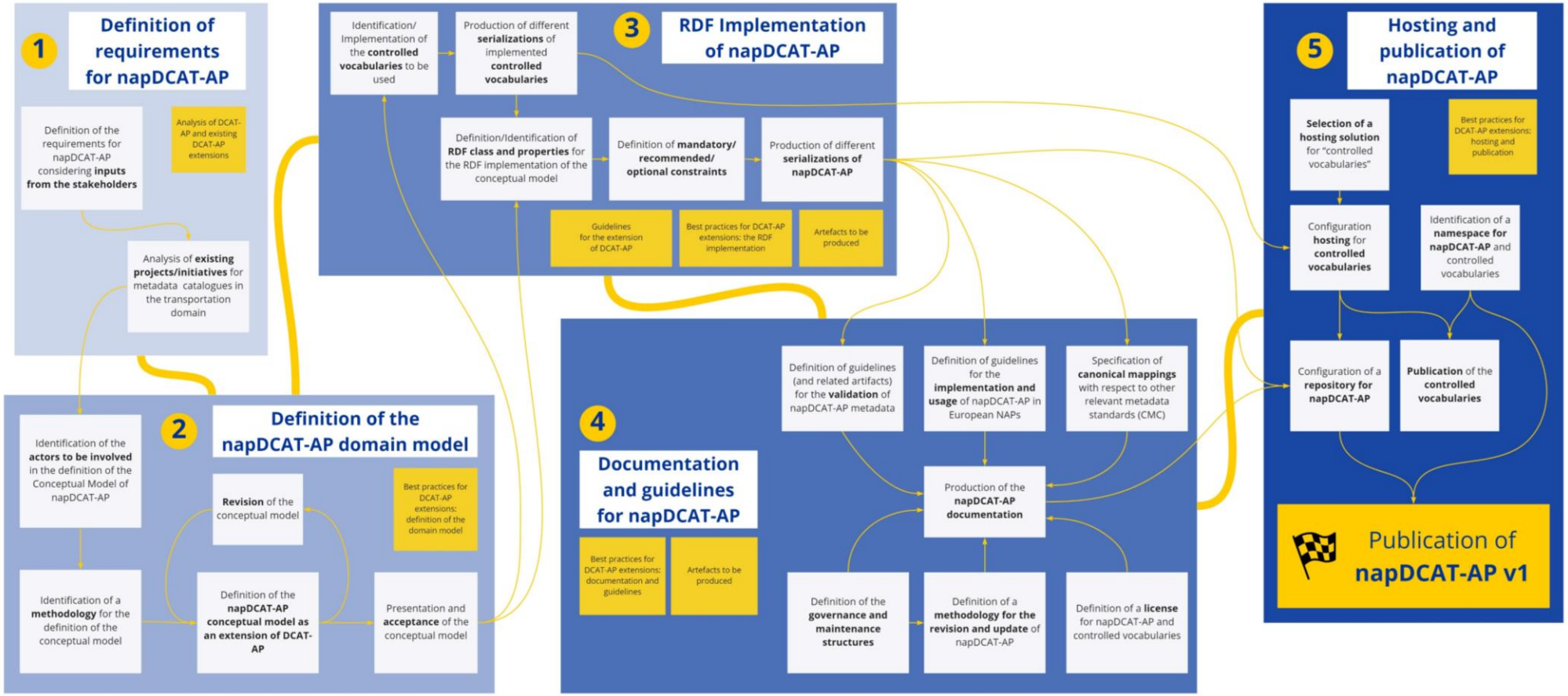
- documents from the literature describing DCAT-AP and its extensions,
- artefacts published online for DCAT-AP and its extensions, and
- interviews with DCAT-AP and SEMIC experts

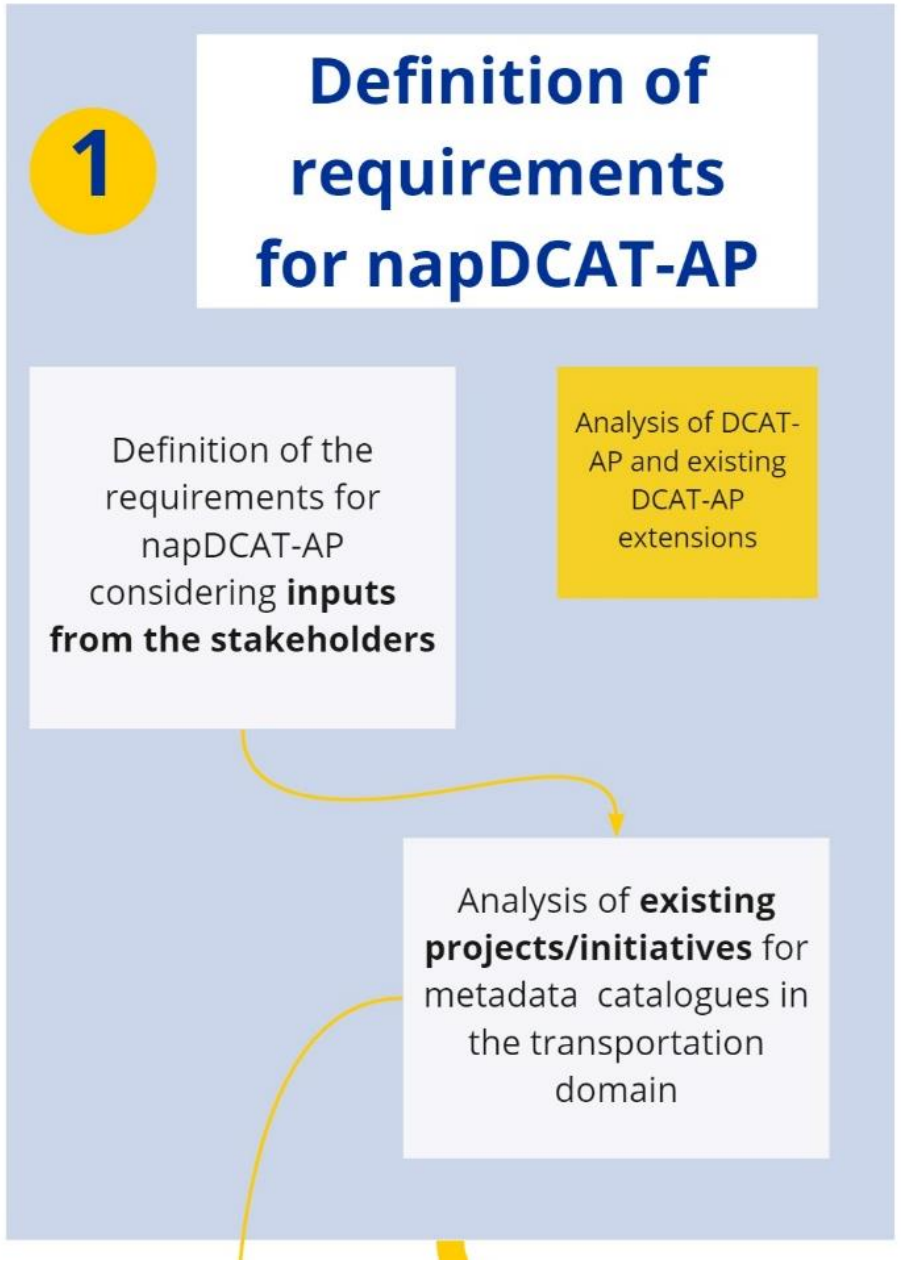
The performed literature review and the analysis of DCAT-AP and its extensions is available on the NAPCORE website (link)

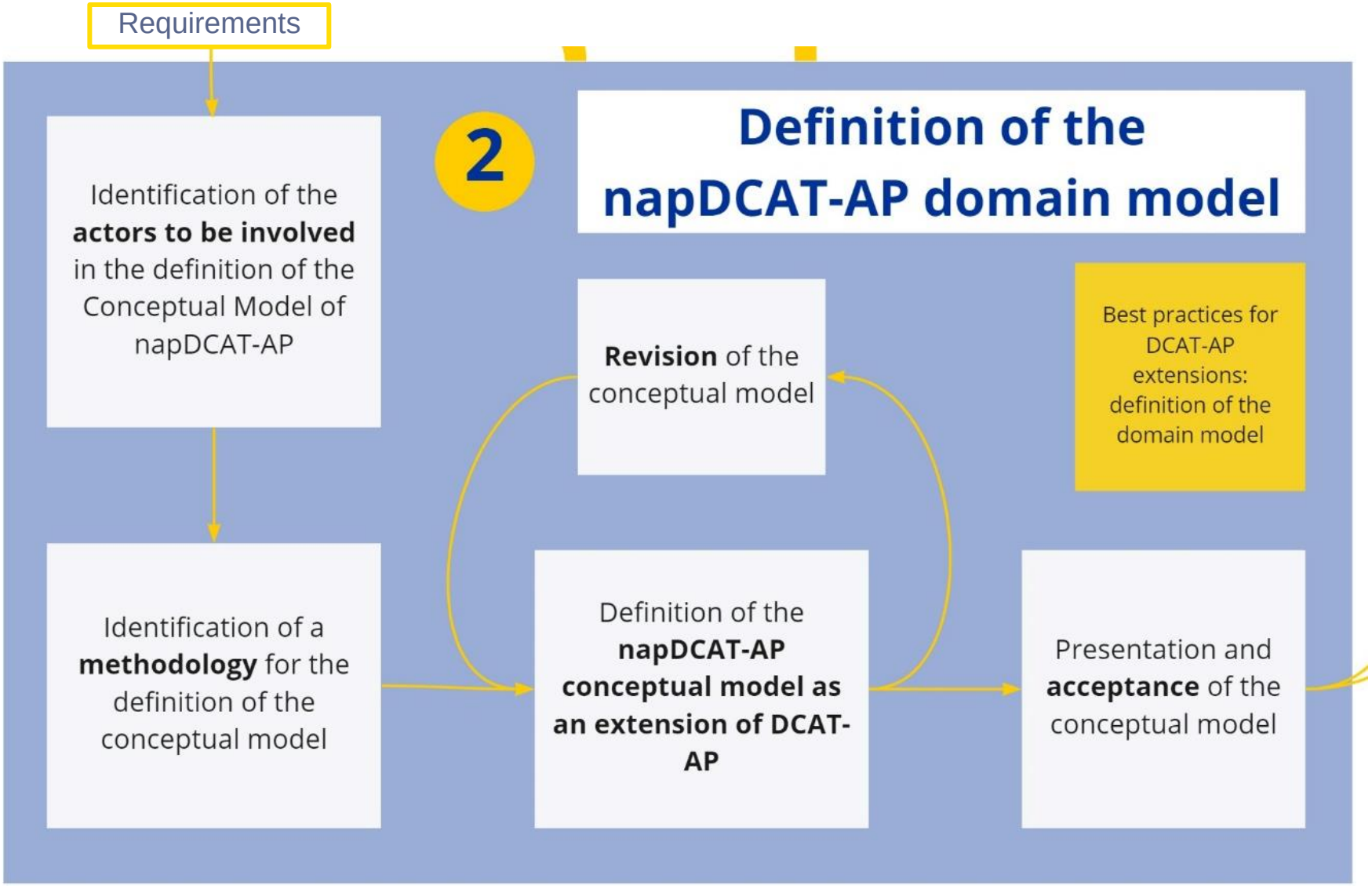


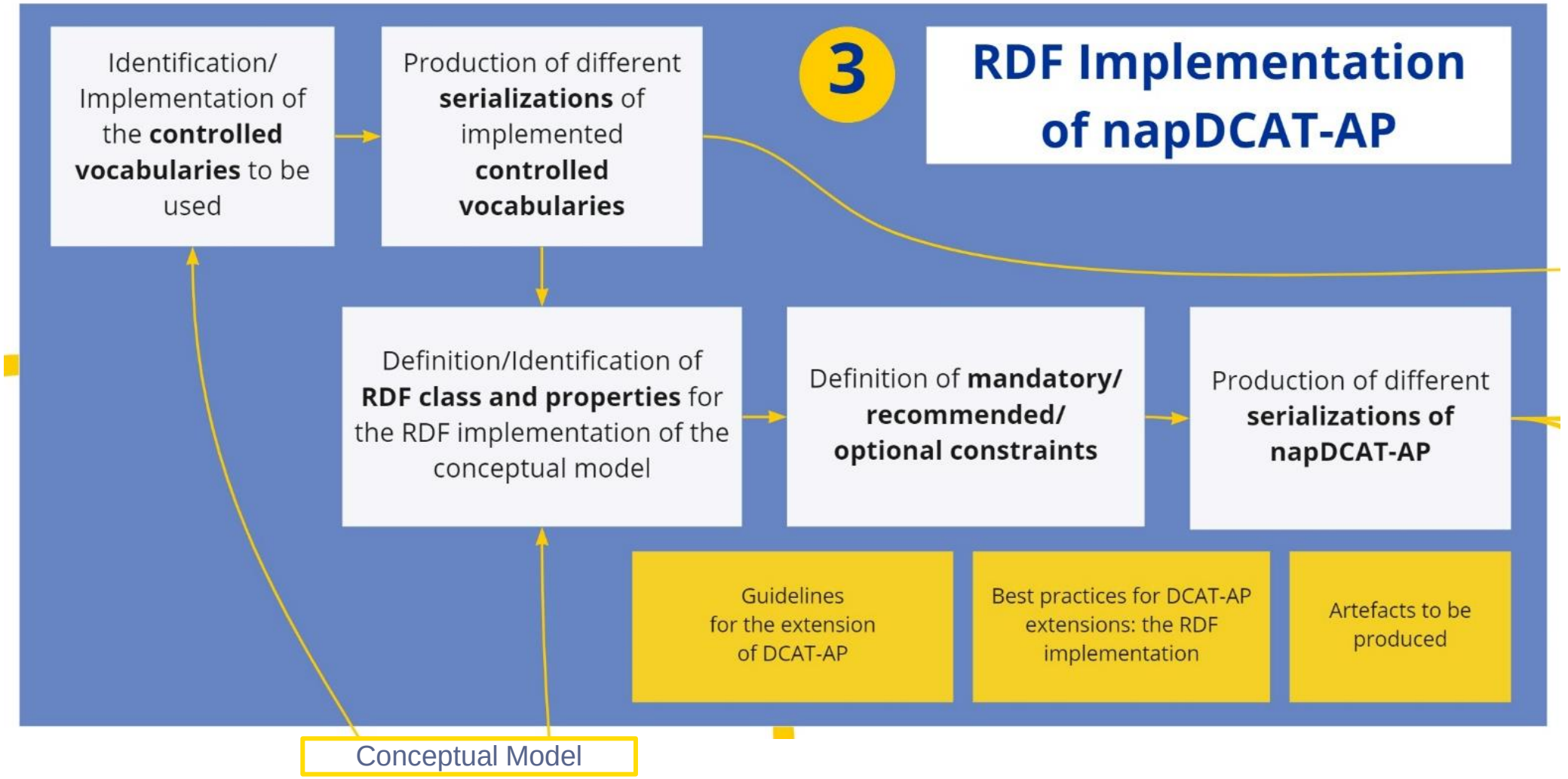
A roadmap towards napDCAT-AP

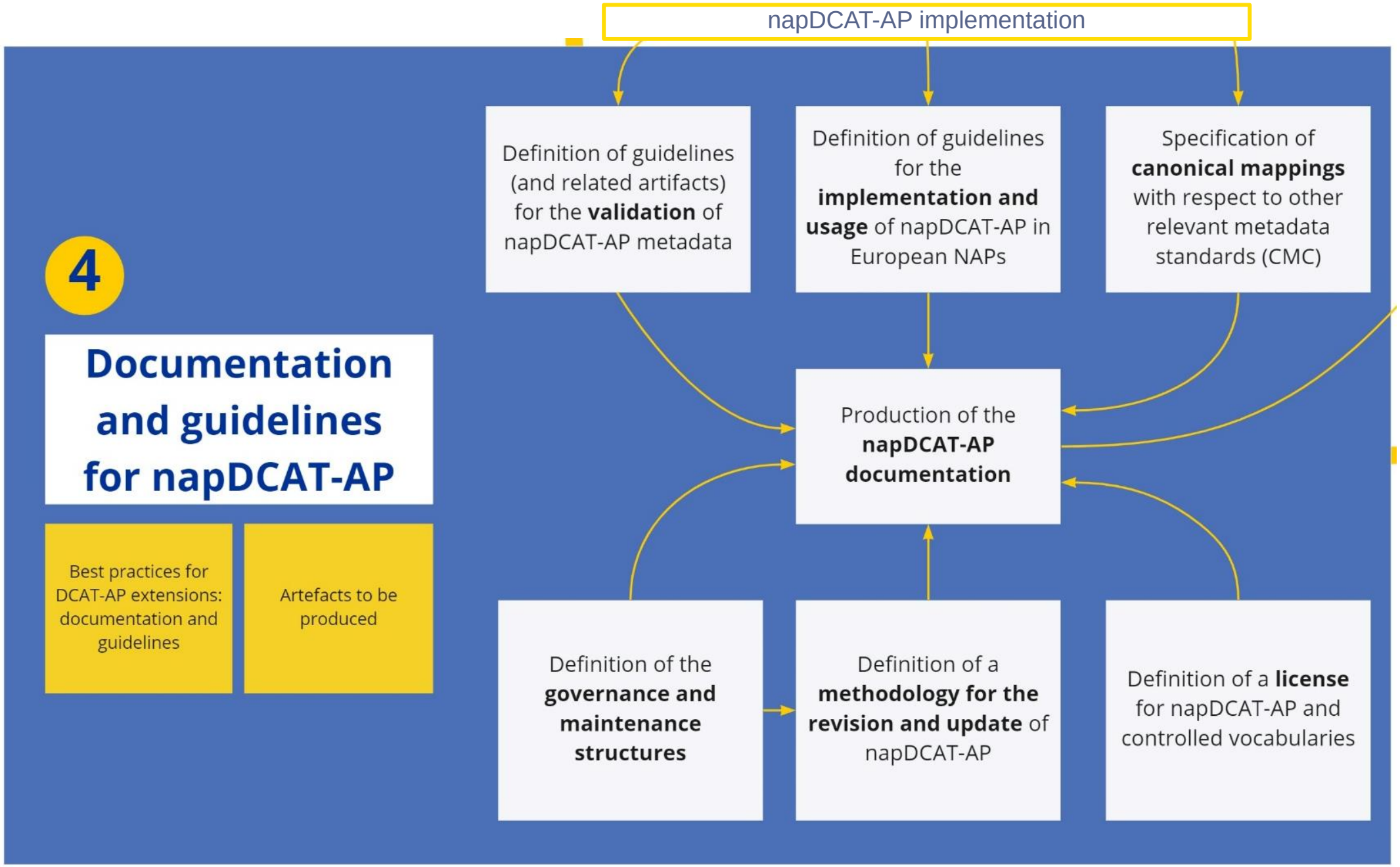
Diagram describing the defined roadmap to extend DCAT-AP. We will go through each of the 5 steps. Yellow boxes refer to guidelines and best practices discussed in the paper.





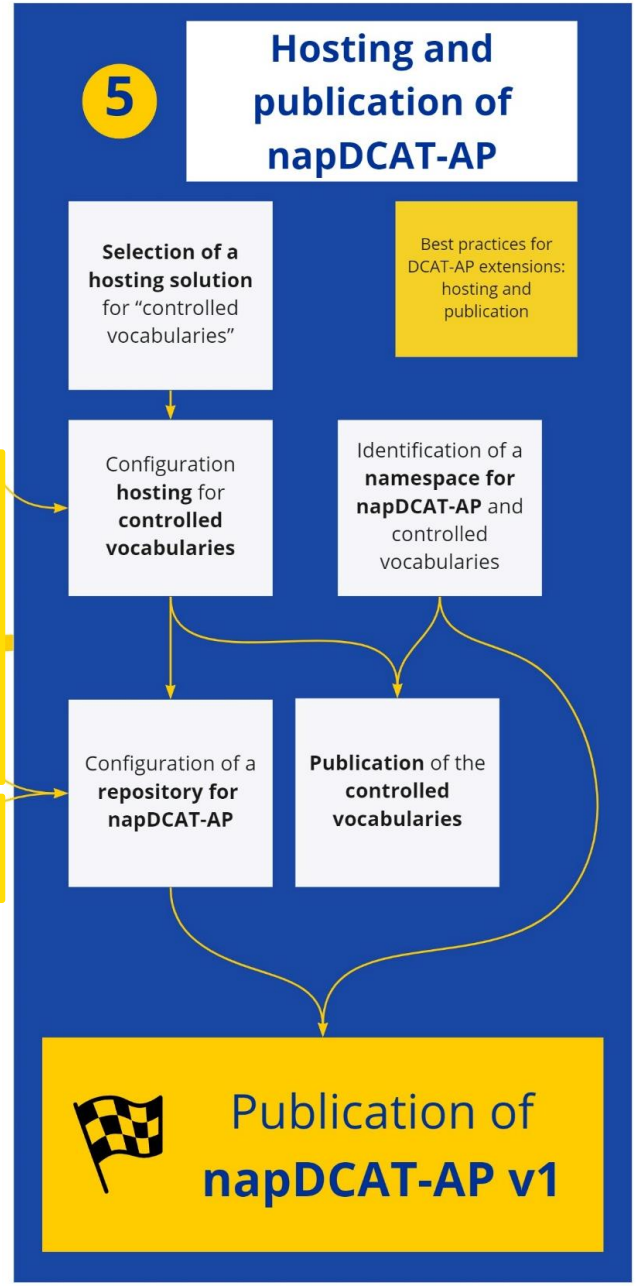






napDCAT-AP implementation

napDCAT-AP documentation and guidelines



Requirements for napDCAT-AP

Applying the first step of the roadmap for napDCAT-AP

The elicitation of requirements for a transportation metadata specification was based on:

- **Literature review**: references analysed include previous research, policy documents, and project documentation.
- **Involvement of stakeholders:** collect insights and inputs from different perspectives in the NAP context
  - Identify the stakeholders → NAP developer, NAP metadata provider, NAP metadata user, Metadata experts
  - Adopt a template-based approach to collect user needs and requirements

Different requirements elicited (link) and divided into different categories: General (8), Existing Vocabularies (5), Content (22), Implementation (5).

Content requirements for napDCAT-AP

Metadata	date/time for creation/modification of the metadata, the metadata language, the responsible for creation and maintenance of the metadata, conditions of usage of the metadata
Content	name, description, type of resource, dataset type category, service type category, language
Regulation	type(s) of Delegated Regulation (DR) covered
Temporal	temporal validity of the information
Geographic	area covered, regions in which data are valid and details on the transport network considered
Georeferencing	location referencing methods and coordinate reference system (CRS) used within the data
Transportation	transportation system information (transportation modes and operators)
Responsibilities	publisher(s) and owner(s) of the data
Usage	license, contract or any other condition to use the data
Access	encoding, syntax, grammar and data model
Data Samples	data samples
Quality	update rate, the quality criteria of the data, the history and status of procedures to assess the compliance of the Delegated Regulations regarding the provisioning of data via a NAP
Version	changelog and information about the version

Conclusions

- Generic **guidelines and best practices to extend DCAT-AP** for specific requirements
- **Roadmap for the definition of napDCAT-AP** as a planned extension of DCAT-AP for National Access Points and the transportation domain.
- Elicited **list of requirements for napDCAT-AP**, collected by involving transportation stakeholders, describes the expected technical, organizational and functional features that should guide the development of napDCAT-AP.
- The presented roadmap and the requirements will guide the next steps of a dedicated working group within the NAPCORE project (SubWG4.4), which currently works towards the **publication of napDCAT-AP**.
- As **future work**, we will investigate automatic approaches for the harmonisation of NAP metadata based on the defined napDCAT-AP specification

Thank you
for your attention!

MARIO SCROCCA
Knowledge Technologies
Cefriel

marioscrocca @mario_scrock

mario.scrocca@cefriel.com

