WEBINAR FOR DATA PROVIDERS

From theory to action: Automatic data publishing

data.europa academy

20 January 2023

10.00 – 11.30 CET

Introduction

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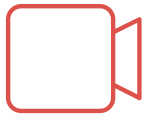
Rules of the game



The webinar will be recorded

Please mute yourselves during the webinar

Please reserve 3 min after the webinar to help us improve by filling in our feedback form

For questions, please use the Teams chat. We will respond to your questions during the Q&A.

Agenda

10.00 – 10.05	**Opening (OP)**
10.05 – 10.15	**How to describe your metadata with DCAT-AP (TJ)**
10.15 – 10.20	**What does automatic publishing mean for data.europa.eu? (TJ)**
10.20 – 10.35	**Two ways of automated data publishing provided by data.europa.eu (SD)**
10.35 – 10.55	**Dos and don’ts for the automated data publishing (SD)**
10:55 – 11:10	**Data publishing on data.europa.eu (BH – Guest Speaker)**
11.10 – 11.25	**Q&A**
11.25 – 11.30	**Closing and feedback**

DCAT-AP

How to describe your metadata using DCAT-AP

DCAT-AP

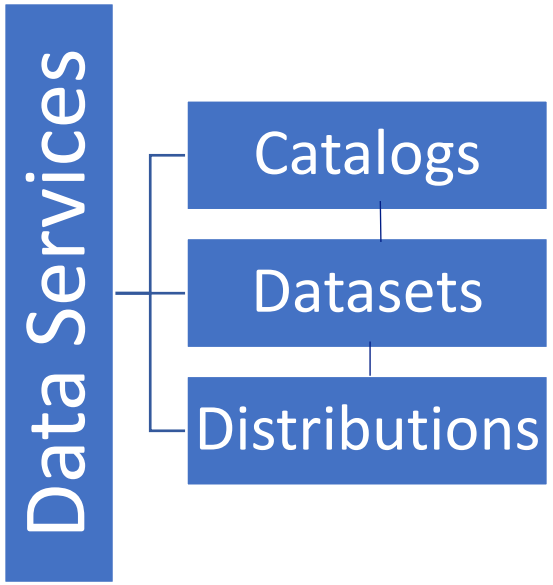
- Data Catalog Vocabulary - Application Profile
- Specification for describing public sector datasets in Europe.
- Used as the data model in data.europa.eu
- 117 catalogues in data.europa.eu are harvested in DCAT-AP
- The profile is based on Linked Data principles and the Resource Description Framework (RDF) & DCAT.

DCAT-AP

- It is designed to increase interoperability and allows the user to search for Open Data across multiple portals.
- The standard is constantly refined and currently published in version 2.1.1.
- Learn more about DCAT-AP at https://data.europa.eu/en/academy/dcat-and-dcat-ap-interoperability-data-model

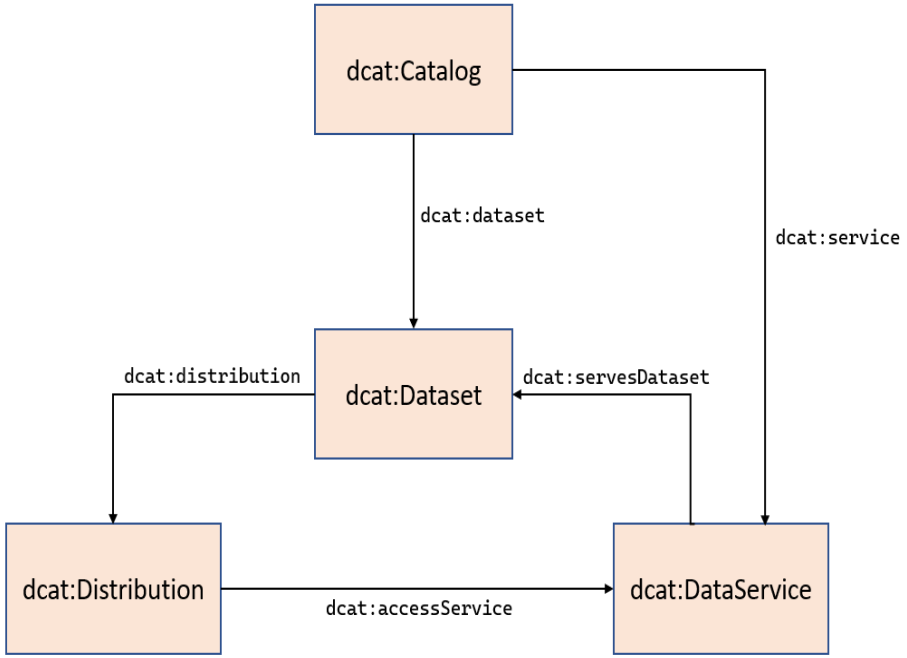
DCAT-AP

- In essence, DCAT-AP consists of four core classes.
- Catalogs combine a set of Datasets and each Dataset can have multiple Distributions.
- A Distribution represents the actual data and provides access via direct download.
- A Data Service represents a service that provides access to the actual data for a dataset or a whole catalogue.
- Further DCAT-AP specific classes are for instance Catalog Record or Category.
- Each class consists of a plethora of properties:
  - Catalogue – 18 properties
  - Dataset – 35 properties
  - Distribution – 23 properties
  - Data Service – 7 properties



Data Service

- Distribution: static link to files
- Data Service: points to endpoint with dynamic access
  - E.g. current traffic data
  - On-demand data export
- Data Service can have a Distribution or a Catalogue as parent



DCAT-AP

- Data Types and Languages

Title	dct:title	rdfs:Literal	This property contains a name given to the Dataset. This property can be repeated for parallel language versions of the name.	1..n

- Sub Data Structures

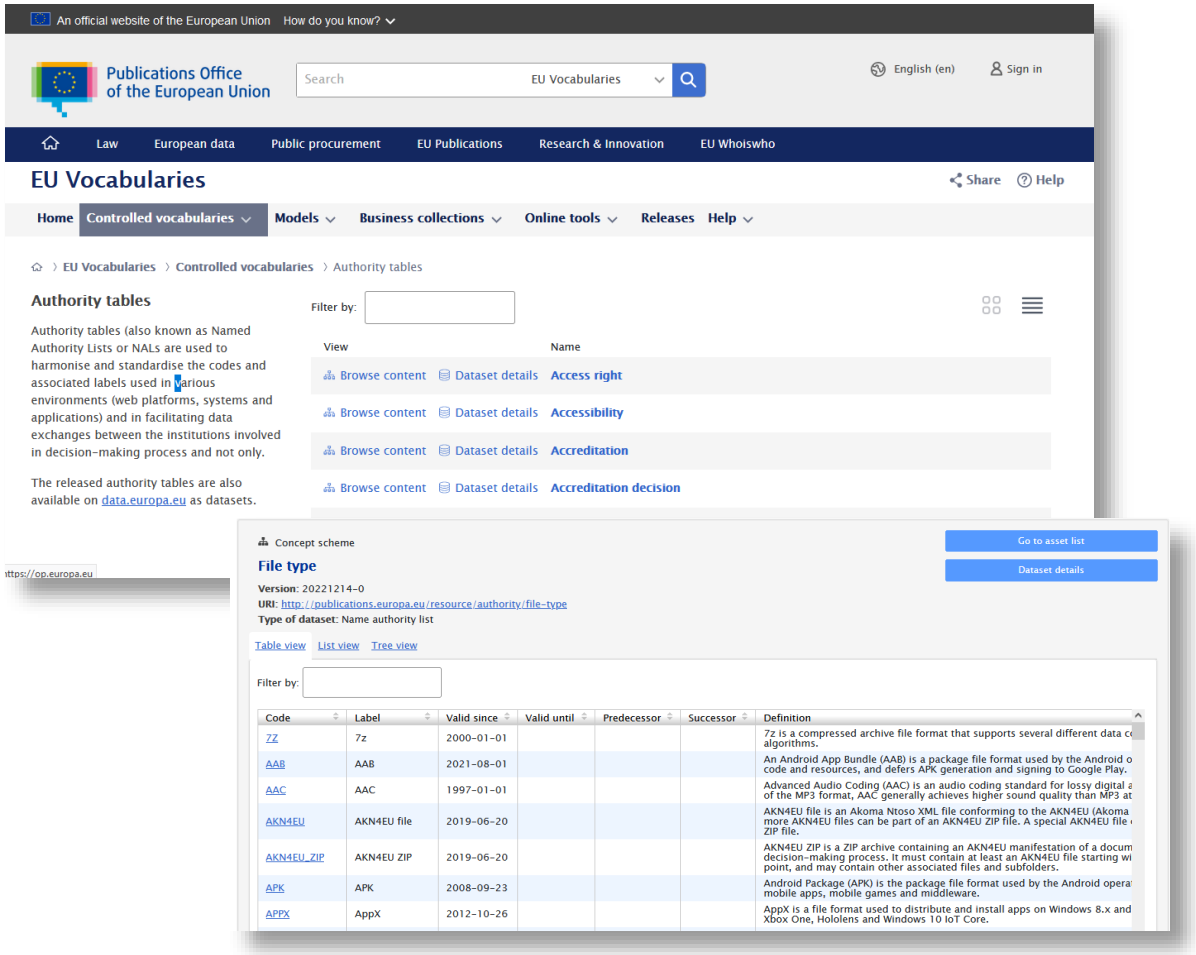
creator	dct:creator	foaf:Agent	This property refers to the entity responsible for producing the dataset	0..n

- Vocabularies

dct:format	Distribution	EU Vocabularies File Type Named Authority List[25]	http://publications.europa.eu/resource/authority/file-type	

Vocabularies

- DCAT-AP includes mandatory controlled vocabularies.
- Most of them are published by the Publications Office of the EU.
- EU Vocabularies: https://op.europa.eu/en/web/eu-vocabularies
  https://op.europa.eu/en/web/eu-vocabularies/authority-tables



Example

```
@prefix dcatapde: <http://dcat-ap.de/def/dcatde/> .
@prefix senias: <http://senias.de/ns/sis#> .


<https://piveau.io/catalogue/test-catalog>
    a                       dcat:Catalog ;
    dct:type                "dcat-ap-2" ;
    dct:title               "Example Catalog"@en ;
    dct:description         "This is an example Catalog"@en ;
    dct:publisher           <http://publications.europa.eu/resource/authority/cor
    foaf:homepage           <http://www.catalog-homepage.com> ;
    dct:language            <http://publications.europa.eu/resource/authority/lan
    dct:license             <http://europeandataportal.eu/ontologies/od-licenses#
    dct:issued              "2015-08-27T22:00:00Z"^^xsd:dateTime ;
    dct:modified            "2018-04-03T11:48:21.950626Z"^^xsd:dateTime ;
    dcat:themeTaxonomy      <http://publications.europa.eu/resource/authority/dat
    dct:spatial             <http://publications.europa.eu/resource/authority/cou
    dct:hasPart             <https://piveau.eu/id/catalogue/test-catalog> ;
    dct:isPartOf            <https://piveau.eu/id/catalogue/test-catalog> ;
    dcat:catalog            <https://piveau.eu/id/catalogue/test-catalog> ;
                            eator          <https://piveau.eu/def/creator> ;
                            ghts           [ a          dct:RightsStatement ;
                                             rdfs:label ":public" ] ;
                            ataset         <https://piveau.eu/set/data/test-dataset> .

                            iveau.eu/set/service/test-service>
                                                    dcat:DataService ;
                            ndpointURL              <http://example.com/service/api/endpoint> ;
                            ndpointDescription      <http://example.com/service/api/manual> ;
                            ervesDataset            <https://piveau.eu/set/data/test-dataset> ;
                            cessRights              <http://publications.europa.eu/resource/authori
                            scription               "This is an example Data Service"@en ;
                            cense                   <http://europeandataportal.eu/ontologies/od-lic
                            tle                     "Example Data Service"@en .

                            iveau.io/set/data/test-dataset>
                                                    dcat:Dataset ;
                            pe                      <https://piveau.eu/def/type/dataset> ;
                            tle                     "Example Dataset"@en ;
                            tle                     "Beispieldatensatz"@de ;
                            nguage                  <http://publications.europa.eu/resource/a
    dct:language            <http://publications.europa.eu/resource/a
    dct:description         "This is an example Dataset."@en ;
    dct:description         "Das ist ein Beispieldatensatz."@de ;
    dcat:theme              <http://publications.europa.eu/resource/a
    dcat:theme              <http://publications.europa.eu/resource/a
    dct:subject             <http://eurovoc.europa.eu/10> ;
    dcat:distribution       <https://piveau.io/set/distribution/1> ;
    stat:attribute          <http://some.attribute.1.example.com> , <
```

```
    a dct:Location .

<https://piveau.io/set/distribution/1>
    a                               dcat:Distribution ;
    dcat:accessService              <https://piveau.eu/set/service/test-service> ;
    dcatap:availability             [ a              skos:Concept ;
                                      skos:prefLabel "stable" ; ] ;
    dct:title                       "Example Distribution"@en ;
    dct:description                 "This is a example Distribution"@en ;
    dcat:accessURL                  <http://accessurl.com> ;
    dcat:downloadURL                <http://download.de/file1.csv> ;
    dcat:downloadURL                <http://download.de/file2.pdf> ;
    dcat:mediaType                  <http://www.iana.org/assignments/media-types/text/csv> ;
    dct:issued                      "2015-08-27T22:00:00Z"^^xsd:dateTime ;
    dct:modified                    "2018-04-03T11:48:21.950626Z"^^xsd:dateTime ;
    dct:format                      <http://publications.europa.eu/resource/authority/file-type/CSV> ;
    dcat:compressFormat             <http://www.iana.org/assignments/media-types/application/gzip> ;
    dcat:packageFormat              <http://www.iana.org/assignments/media-types/application/gzip> ;
    dct:license                     <http://europeandataportal.eu/ontologies/od-licenses#CC-BY-SA3.0NL>
    dct:language                    <http://publications.europa.eu/resource/authority/language/ENG> ;
    dct:language                    <http://publications.europa.eu/resource/authority/language/DEU> ;
    dcat:spatialResolutionInMeters  "10"^^xsd:decimal ;
    dcat:temporalResolution         "P20M"^^xsd:duration ;
    odrl:hasPolicy                  [ a              odrl:Policy ;
```

Automatic Publishing

What it means for data.europa.eu

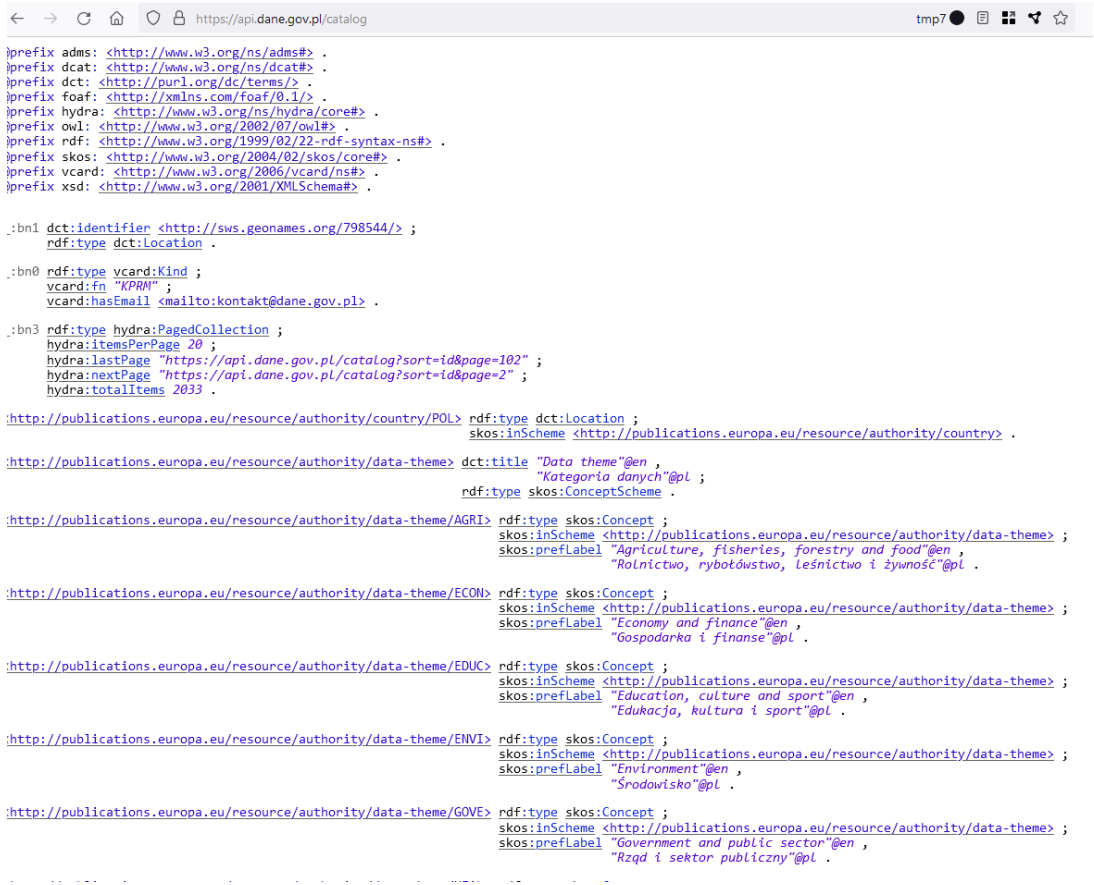
Requirements for automatic publishing

- Metadata has to be
  1. On a space that can be accessed
  2. In a Format that can be understood

- Only Metadata can be automatically published, not the actual data

Catalogue Access

- Portal API
  - e.g. https://api.dane.gov.pl/catalog
- File on the Web
  - e.g. https://raw.githubusercontent.com/Fedict/dcat/master/all/datagovbe_edp.xml.gz
  - (compression possible)
- SPARQL Endpoint
  - e.g. https://data.gov.cz/sparql
- CSW/INSPIRE
  - http://gdk.gdi-de.org/gdi-de/srv/eng/csw



Format

Without transformation (Highly preferred)	With transformation/mapping
• DCAT-AP	• CKAN • uData • Socrata • JSON:API • INSPIRE

Push or Pull

Two ways of automated data publishing provided by data.europa.eu

Harvesting (Pull)

- We highly recommend that you provide DCAT-AP!
- Providing your complete catalogue
  - Via API
  - Via download file
- Uniquely identify each of your dataset
- Harvesting is regularly
  - Daily, Weekly, Monthly, … Finally, you decide how often and when.
- In case you’re not providing directly DCAT-AP, support us for the transformation/mapping!
  - Properties mapping
  - Value mapping

Identification when Source is DCAT-AP

If not specified, looking for:

1. dct:identifier
2. URIRef

Configuration

- dct:identifier
- URIRef
- Prefer URIRef over dct:identifier
- Partially URIRef (E.g., '/…')

From your Identifier to our URIRef

- Datasets
  http://data.Europa.eu/88u/dataset
- Catalogues
  http://data.Europa.eu/88u/catalogue
- Catalog Records
  http://data.Europa.eu/88u/record
- Distributions
  http://data.Europa.eu/88u/distribution

```
your-identifier

http://data.Europa.eu/88u/dataset/your-identifier
```

Identifier Duplication

- Problem: Same identifier in another catalogue. Actual examples:
  - “17” (four times)
    - open-data-greece
    - dati-gov-it
    - open-data-bulgaria
    - govdata
  - “123” (three times)
  - “public-toilets” (three times)

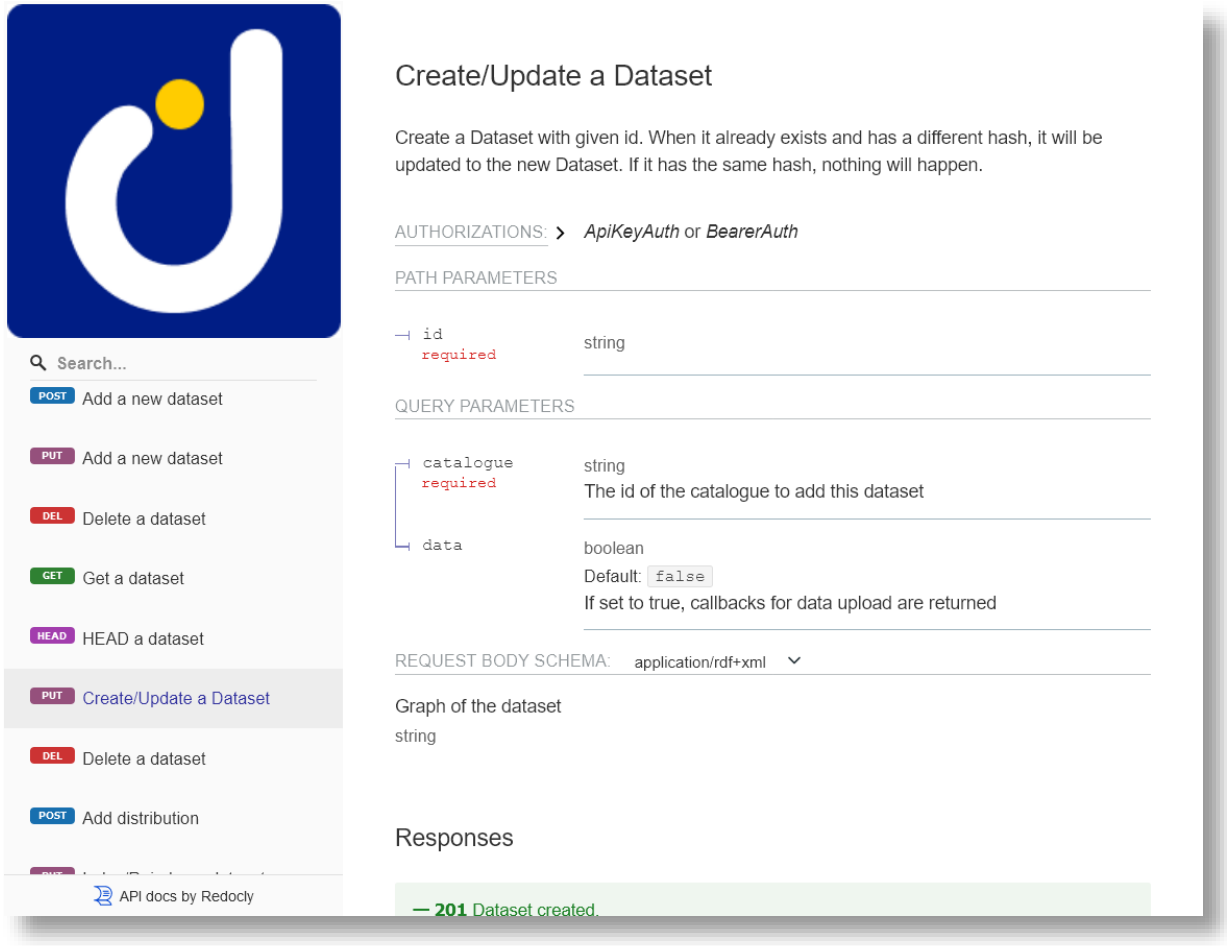
```
PREFIX dcat: <http://www.w3.org/ns/dcat#>
PREFIX dct: <http://purl.org/dc/terms/>

SELECT (COUNT(?id) as ?count) ?id WHERE
{
   ?record a dcat:CatalogRecord ;
         dct:identifier ?id
}
GROUP BY ?id
HAVING(COUNT(?id) > 1)
ORDER BY DESC(?count)
```

- => E.g., final URIRef could be http://data.europa.eu/88u/17~~1

API (Push)

- Repository API (https://data.europa.eu/api/hub/repo/)
- Authentication required (Bearer Auth - JWT)
- Organizational processes still open (offline registering for authentication credentials)



API Functionality

- Identification of datasets with client-side id (origin)
- Create and/or manage catalogues
- Create and manage datasets of your catalogues
- Upload actual data
- Draft, publish, unpublish

Dos and Don’ts

Avoiding pitfalls during automated publishing

Dataset Identification

Don’t

- export/provide your datasets without identifiers
- use different ways of identifying your datasets

Do

- uniquely identify each single dataset
- use always the same type of identifier for datasets, e.g. via dct:identifier

Unique Identification

On your side

- CKAN name
- OAI-PMH Identifier
- DCAT-AP
  - dct:identifier
  - URIRef
  - Partially URIRef
- INSPIRE
  - gmd:fileIdentifier

On our side

- Base URI plus your “normalized” id
- Normalization means:
  - Lowercase
  - Replacing special characters with ‘-’
  - Reducing multiple ‘-’ to one

Your-crazy-<*Special_~identifier-#1

http://data.Europa.eu/88u/dataset/your-crazy-special-identifier-1

Syntactical Correctness

Don’t

- publish syntactical incorrect presentations of your catalogue
- use “templates” to produce your metadata representation

Do

- use frameworks or tools to generate your metadata
- or apply some validation/checks of your metadata before publishing

Metadata RDF Representations

- RDF is a model to describe data in triples building a graph
- A graph can have a name, so each triple in a graph can also be a quadruple

Triples

- RDF/XML
- JSON-LD
- N-Triples
- N3
- Turtle

Quadruples

- N-Quads
- JSON-LD
- TRIX (XML for Quadruple)
- TRIG (Turtle for Quadruple)

Check Syntactical Correctness

- Presentation Level:
  - XML
  - JSON
- RDF Level:
  - Structure within presentation
  - URIRefs
- RDF Tools
  - Frameworks
    - Apache Jena
    - RDF4J
    - RDFLib (Python)
  - CLI tools
    - Apache Jena
  - Online services
    - https://issemantic.net/

RDF/XML Structural Examples

Incorrect RDF/XML (valid XML)

- Only one Object per Predicate allowed

```
<dcat:Dataset>
   <dcat:distribution>
      <dct:title>Title</dct:title>
      <dcat:Distribution>

      </dcat:Distribution>
   </dcat:distribution>
   <dcat:keyword>keyword</dcat:keyword>
</dcat:Dataset>
```

Correct RDF/XML

```
<dcat:Dataset>
   <dct:distribution>
      <dcat:Distribution>
         <dct:title>Title</dct:title>
      </dcat:Distribution>
   </dct:distribution>
   <dcat:keyword>keyword</dcat:keyword>
</dcat:Dataset>
```

RDF/XML Structural Examples

Incorrect RDF/XML (valid XML)

- Only Predicates are allowed in a Subject

```
<dcat:Dataset>
   <dcat:Distribution>
      <dct:title>Title</dct:title>
   </dcat:Distribution>
   <dcat:keyword>keyword</dcat:keyword>
</dcat:Dataset>
```

Correct RDF/XML

```
<dcat:Dataset>
   <dct:distribution>
      <dcat:Distribution>
         <dct:title>Title</dct:title>
      </dcat:Distribution>
   </dct:distribution>
   <dcat:keyword>keyword</dcat:keyword>
</dcat:Dataset>
```

URIRefs Examples

- Special Characters [*space*, <, >, ^, |, `, {, }, “, \, *tab, newline, return*]
  - Invalid: http://example.com/path with spaces
  - Valid: http://example.com/path%20with%20spaces

- XML Attributes (RDF/XML)
  - RDF
    http://example.com/path?param1=value1&param2=value2
  - RDF/XML
    http://example.com/path?param1=value1&param2=value2

URIRefs in XML Attributes

Correct in Turtle

```
<http://example.com/path?key1=value1&key2=value2>
    a dcat:Dataset .
```

Incorrect in RDF/XML

```
<dcat:Dataset
            rdf:about="http://example.com/path?key1=value1&key2=value2">
</dcat:Dataset>
```

Pagination and Sorting

Don’t

- provide your catalogue as one huge chunk
- provide your datasets in an unpredictable order during pagination

Do

- offering a mechanism for pagination
- provide datasets in a sorted order during pagination

Pagination for bigger Catalogues

- HTTP/REST APIs
  - Http Headers, e.g.:

    Range: items=0-24
    Content-Range: items 0-24/66

  - Query parameters, e.g.:

    ../path?offset=0&limit=100

- Download DCAT-AP
  - As part of the RDF
  - E.g., ckanext-dcat uses Hydra Core Vocabulary

    https://www.hydra-cg.com/spec/latest/core/#client-initiated-pagination

Sorting

- Provide sorted access during pagination

- Preferable last modified or created datasets are served last, so they do not shift the remaining datasets

  => That will minimize the risk of skipping datasets or harvesting datasets twice

Access Infrastructure

Don’t

- underdesign your Infrastructure

Do

- provide enough performance when your catalogue is accessed

Harvesting Process

- Import abortion: Deletion phase missing
  - More Datasets on data.europa.eu

- Example Reasons:
  - ckanext-dcat: 500 Internal Server Error while fetching next page
  - Request timeout
  - Gateway timeouts

Infrastructure Issues

- Load Balancer
  - Different nodes serving different pages
- Updates during harvesting
  - Missing datasets
  - Twice importing datasets (not critical)
- Performance
  - GDI-DE ~450.000 Datasets last > ~8h. => around 20 datasets per second

Summary

- Make your catalogue access reliable!
- Make your catalogue access performant!
- Make sure your metadata data is correct!

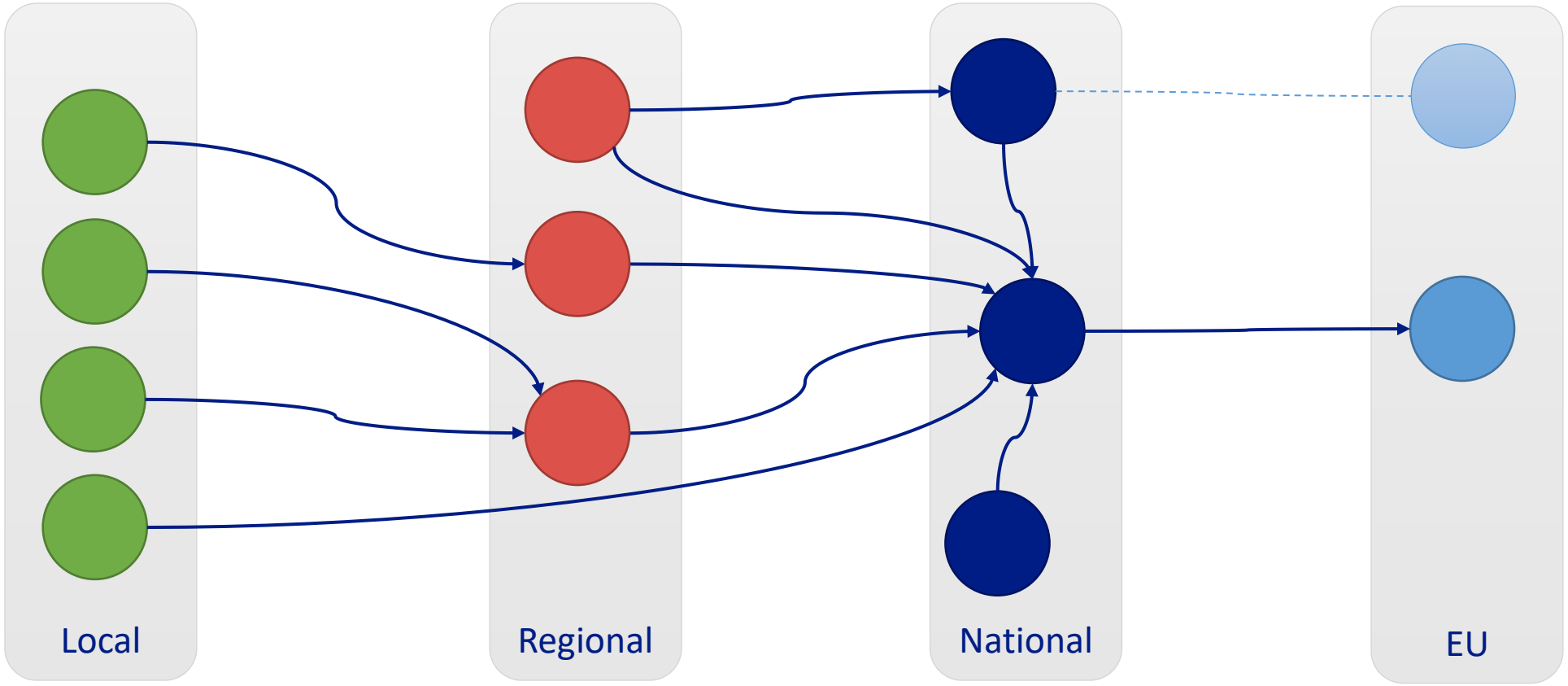
Data publishing on data.europa.eu

Data.gov.be on data.europa.eu

Data publishing on data.europa.eu

- Benefits for local / regional / national portal owners:
  - Extra visibility, administrations want to be visible cross-border
  - Extra features, e.g. machine translation

There is no such thing as “1 portal”



Indirect benefits

- Publishing on other sites creates awareness and food for thought
  - Metadata: are titles, descriptions … clear and concise ?
  - How to automate publication and updates of (meta)data ?
  - Who to contact for more information about the data?
- (Yes, this could mean extra work, but it’s worth it)

Evolution of data.gov.be

- Custom validation tools
- Almost no input in DCAT(-AP)
- Scripts and conversion tools
- Bare minimum

- Reuse of SHACL validation rules
- Roughly 50% in DCAT
- Less tooling, more SPARQL
- Focus on (Geo-)DCAT-AP 2.0

Informal community of portal owners

You’re not on your own

- Support by EU data portal team and other portal owners
- Metadata specifications increasingly supported by tools / portals
- “Don’t let perfect get in the way of good enough”
  - Strive for perfection, but accept that it is an iterative process

Questions ?

- opendata@bosa.fgov.be
- #data.gov.be:matrix.org

Questions & Answers

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