WEBINAR FOR DATA PROVIDERS

From theory to action: Automatic data publishing

20 January 2023
10.00 – 11.30 CET
Introduction

Simon Steuer
Publications Office of the EU
Head of Sector

Simon Dutkowski
Fraunhofer FOKUS,
Digital Public Services

Torben Jastrow
Fraunhofer FOKUS,
Digital Public Services

Bart Hanssens
Data.gov.be,
Belgium Federal
Public Service Policy
and Support (BOSA)
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.
<table>
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<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
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<tr>
<td>10:00 – 10:05</td>
<td>Opening (OP)</td>
</tr>
<tr>
<td>10:05 – 10:15</td>
<td>How to describe your metadata with DCAT-AP (TJ)</td>
</tr>
<tr>
<td>10:15 – 10:20</td>
<td>What does automatic publishing mean for data.europa.eu? (TJ)</td>
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<tr>
<td>10:20 – 10:35</td>
<td>Two ways of automated data publishing provided by data.europa.eu (SD)</td>
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<td>10:35 – 10:55</td>
<td>Dos and don’ts for the automated data publishing (SD)</td>
</tr>
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<td>10:55 – 11:10</td>
<td>Data publishing on data.europa.eu (BH – Guest Speaker)</td>
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<td>11:10 – 11:25</td>
<td>Q&amp;A</td>
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<td>11:25 – 11:30</td>
<td>Closing and feedback</td>
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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.
**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

<table>
<thead>
<tr>
<th>Title</th>
<th>dct:title</th>
<th>rdfs:Literal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>This property contains a name given to the Dataset. This property can be repeated for parallel language versions of the name.</td>
</tr>
<tr>
<td></td>
<td>1..n</td>
<td></td>
</tr>
</tbody>
</table>

• Sub Data Structures

<table>
<thead>
<tr>
<th>creator</th>
<th>dct:creator</th>
<th>foaf:Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>This property refers to the entity responsible for producing the dataset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0..n</td>
</tr>
</tbody>
</table>

• Vocabularies

<table>
<thead>
<tr>
<th>dct:format</th>
<th>Distribution</th>
<th>EU Vocabularies File Type Named Authority List</th>
<th><a href="http://publications.europa.eu/resource/authority/file-type">http://publications.europa.eu/resource/authority/file-type</a></th>
</tr>
</thead>
</table>
Vocabularies

• DCAT-AP includes mandatory controlled vocabularies.
• Most of them are published by the Publications Office of the EU.
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

<table>
<thead>
<tr>
<th>Without transformation (Highly preferred)</th>
<th>With transformation/mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>• DCAT-AP</td>
<td>• CKAN</td>
</tr>
<tr>
<td></td>
<td>• uData</td>
</tr>
<tr>
<td></td>
<td>• Socrata</td>
</tr>
<tr>
<td></td>
<td>• JSON:API</td>
</tr>
<tr>
<td></td>
<td>• INSPIRE</td>
</tr>
</tbody>
</table>
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

• Catalog Records
  http://data.Europa.eu/88u/record

• Distributions

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)

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

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)
API (Push)

- 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

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

Correct RDF/XML
```
<dcat:Dataset>
  <dcat:distribution>
    <dcat:Distribution>
      <dct:title>Title</dct:title>
    </dcat:Distribution>
  </dcat:distribution>
  <dcat:keyword>keyword</dcat:keyword>
</dcat:Dataset>
```
RDF/XML Structural Examples

Incorrect RDF/XML (valid XML)
• Only Predicates are allowed in a Subject

Correct RDF/XML

```xml
<dcat:Dataset>
    <dcat:Distribution>
        <dct:title>Title</dct:title>
    </dcat: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&#38;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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