Open Data Support is funded by the European Commission under SMART 2012/0107 ‘Lot 2: Provision of services for the Publication, Access and Reuse of Open Public Data across the European Union, through existing open data portals’ (Contract No. 30-CE-0530965/00-17).

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Training Module 1.5

Promoting the reuse of Open Government Data through the Open Data Interoperability Platform (ODIP)
Learning objectives

By the end of this training module you should have an understanding of:

• How you can overcome the barriers of reuse for your datasets.
• How Open Data Support can promote the reuse of datasets.
• What the DCAT Application Profile is and how it can be used.
• What Open Data Interoperability Platform (ODIP) is and how it can be used.
Content

This module contains...

- An outline of the context of Open Government Data in Europe.
- An outline of the Open Data Support project.
- Information about the DCAT Application Profile for Data Portals in Europe as a homogenised metadata model.
- Information on how to use the Open Data Interoperability Platform.
There are more than 160 portals in Europe hosting Open Government Data

Provenance? Licence? Persistence?

Trust? Availability? Quality?

160+
Open Data has a great potential to create social and economic value

**Publishing data**
- Public administrations share data online
- Developers / Companies integrate data into app (services)
- Citizens/businesses benefit from the app (services)

**Reusing data**
- Developers / Companies search for data
-
**Barriers to Open Data publishing and reuse**

<table>
<thead>
<tr>
<th>Data publishers</th>
<th>Data reusers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No view on which data is more likely to be reused / has a higher ROI potential.</td>
<td>Lack of overview of existing/available datasets.</td>
</tr>
<tr>
<td>Limited tool support.</td>
<td>Data is often of low quality, outdated, unstructured and/or not machine-readable.</td>
</tr>
<tr>
<td>Competing licenses for datasets.</td>
<td>Lack of licensing information or incompatible licenses.</td>
</tr>
<tr>
<td>Competing vocabularies for describing datasets.</td>
<td>Different vocabularies when searching for datasets.</td>
</tr>
<tr>
<td>Domain-specific metadata needs.</td>
<td>Lack of (good quality) metadata.</td>
</tr>
<tr>
<td>Effort required for keeping the metadata up-to-date.</td>
<td>Lack of provenance information.</td>
</tr>
</tbody>
</table>
No reuse = No social and economic value

Public administrations share data online

Developers / Companies search for data

Developers / Companies integrate data into app (services)

Citizens/businesses benefit from the app (services)
Open Data Support

...funded by the European Commission, DG CONNECT, aims at lowering accessibility and awareness barriers.
Open Data Support mission...

To Improve the **visibility** and facilitate the **access** to datasets published on local and national Open Data Data portals in order to increase their **reuse** within and across borders.

See also: [http://www.slideshare.net/OpenDataSupport](http://www.slideshare.net/OpenDataSupport)
By ...

Providing homogenised access to metadata descriptions of open datasets via a single point of access.

Pan-European Data portal

ODIPP
DCAT Application Profile

A common vocabulary for describing datasets hosted in data portals in Europe, based on the Data Catalogue vocabulary (DCAT).
A shared initiative of ...

Funded by the ISA Programme under Action 1.1. “Improving semantic interoperability in European eGovernment systems” (a.k.a the SEMIC project).
An international Working Group of experts

- Chair: Antonio Carneiro (Publications Office)
- 59 Working Group members representing:
  - 15 different European Member States (UK, IT, ES, DK, DE, SK, BE, AT, SE, FI, FR, IE, NL, GR, SI)
  - US
  - Several European Institutions and international organisations
  - 40 different Data Portals

See also:
https://joinup.ec.europa.eu/asset/dcat_application_profile/description
By using a common metadata schema to describe datasets and sharing metadata...

- **Data publishers** increase discoverability and thus reuse of their data.
- **Data reusers** can uniformly search across platforms without facing difficulties caused by the use of separate models or language differences.

The quality and the availability of the description metadata directly affects how easily datasets can be found!
The DCAT-AP enables the exchange of description metadata between data portals.
What’s in the specification?
The DCAT Application Profile data model

class DCAT-AP

- «mandatory» skos:Concept
  - «mandatory» dct:language
  - «optional» dct:spatial

- «mandatory» foaf:Agent
  - «mandatory» foaf:name

- «mandatory» skos:ConceptScheme
  - «mandatory» dct:title

- «optional» foaf:Document
  - «optional» dct:license

- «optional» adms:status

- «optional» dct:language

- «optional» dct:rights

- «optional» dct:temporal

- «optional» dct:meta

- «optional» dct:format

- «optional» dct:type

- «optional» dct:rights

- «optional» dct:temporal
Usage of the DCAT Application Profile

**Mandatory class**: a receiver of data **MUST** be able to process information about instances of the class; a sender of data **MUST** provide information about instances of the class.

**Recommended class**: a receiver of data **MUST** be able to process information about instances of the class; a sender of data **MUST** provide information about instances of the class, if it is available.

**Optional class**: a receiver **MUST** be able to process information about instances of the class; a sender **MAY** provide the information but is not obliged to do so.

**Mandatory property**: a receiver **MUST** be able to process the information for that property; a sender **MUST** provide the information for that property.

**Recommended property**: a receiver **MUST** be able to process the information for that property; a sender **SHOULD** provide the information for that property if it is available.

**Optional property**: a receiver **MUST** be able to process the information for that property; a sender **MAY** provide the information for that property but is not obliged to do so.
### Controlled vocabularies

<table>
<thead>
<tr>
<th>Property URI</th>
<th>Used for Class</th>
<th>Proposed vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>dcat:mediaType</td>
<td>Distribution</td>
<td>MDR File types Name Authority List</td>
</tr>
<tr>
<td>dcat:theme</td>
<td>Dataset</td>
<td>EuroVoc domains</td>
</tr>
<tr>
<td>dcat:themeTaxonomy</td>
<td>Catalog</td>
<td>EuroVoc</td>
</tr>
<tr>
<td>dct:accrualPeriodicity</td>
<td>Dataset</td>
<td>Dublin Core Collection Description Frequency Vocabulary</td>
</tr>
<tr>
<td>dct:format</td>
<td>Distribution</td>
<td>MDR File Type Named Authority List</td>
</tr>
<tr>
<td>dct:language</td>
<td>Catalog, Dataset</td>
<td>MDR Languages Named Authority List</td>
</tr>
<tr>
<td>dct:publisher</td>
<td>Catalog, Dataset</td>
<td>MDR Corporate bodies Named Authority List</td>
</tr>
<tr>
<td>dct:spatial</td>
<td>Catalog, Dataset</td>
<td>MDR Countries Named Authority List, MDR Places Named Authority List</td>
</tr>
<tr>
<td>adms:status</td>
<td>CatalogRecord</td>
<td>ADMS change type vocabulary</td>
</tr>
<tr>
<td>dct:type</td>
<td>License Document</td>
<td>ADMS license type vocabulary</td>
</tr>
</tbody>
</table>
Mapping example – data.gov.uk

Scottish Road Accident Statistics

Data about injury road accidents, accident costs, vehicles involved, drivers and riders, drink-drive accidents, drivers breath tested, casualties and international comparisons.

Source agency: Scottish Government
Designation: National Statistics
Language: English

Alternative title: Scottish Road Accident Statistics

Publisher
Scottish Government
Enquiries: No details supplied
FOI Contact:
• Web: http://www.whatdotheyknow.com/

Tags
accident, health-well-being-and-care, road, road-accidents, road-safety, roads, safety, transport, transport-accidents-and-casualties, travel-and-transport

About this dataset
• Added to data.gov.uk: 10/12/2011
• Modified on data.gov.uk: 10/06/2013
• History of changes
• JSON, API and URI for developers

Do more with this data
• Share your app
• Share an idea
• Request new data

Licence
UK Open Government Licence (OGL) [OPEN DATA]

Data Resources
2
Key statistics for 2007
2007 Volume

Openness score
⭐⭐⭐⭐⭐

Geographic coverage Scotland
National statistic yes
ONS Category Travel and Transport
Temporal coverage No value
Date added computed No value
Date updated computed No value

Example description of dataset with the DCAT-AP

<rdf:Description rdf:about="http://data.gov.uk/data">
  <rdf:type rdf:resource="http://www.w3.org/ns/dcat#Catalog"/>
  <dct:title xml:lang="en">data.gov.uk</dct:title>
  <dct:description xml:lang="en">Description of the data portal</dct:description>
</rdf:Description>

<rdf:Description rdf:about="http://data.gov.uk/dataset/east-sussex-county-council-election-results">
  <rdf:type rdf:resource="http://www.w3.org/ns/dcat#Dataset"/>
  <dct:title xml:lang="en">East Sussex County Council election results</dct:title>
  <dct:description xml:lang="en">A list of elections to East Sussex County Council, which leads to data about candidates, parties, electoral divisions and votes cast. Uses the Open Election Data RDF vocabulary from http://openelectiondata.org/</dct:description>
</rdf:Description>

  <rdf:type rdf:resource="http://www.w3.org/ns/dcat#Distribution"/>
</rdf:Description>
Creating mappings to the DCAT-AP

<table>
<thead>
<tr>
<th>Dataset Properties</th>
<th>Example Value</th>
<th>Harmonized Predicate</th>
<th>Generated SPARQL</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSERT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>{?harms dct:title ?d}.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHERE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| { ?ds a <http://www.w3.org/ns/dcat#Dataset> ;
| http://data.gov.uk/predicate/unpublished | FALSE | | |
| http://data.gov.uk/predicate/update_frequency | other | dcat:accrualPeriodicity | prefix dct httpRequest/ontology/terms.owl:
| INSERT |
| {?harms dcat:accrualPeriodicity ?d}. |
| WHERE |
| { ?ds a <http://www.w3.org/ns/dcat#Dataset> ;
| http://data.gov.uk/predicate/update_frequency-other | quarterly | dcat:accrualPeriodicity | prefix dct httpRequest/ontology/terms.owl:
| INSERT |
| {?harms dcat:accrualPeriodicity ?d}. |
| WHERE |
| { ?ds a <http://www.w3.org/ns/dcat#Dataset> ;
Where can you find it?

https://joinup.ec.europa.eu/asset/dcat_application_profile/description
Share the metadata of your datasets on ODIP

The Open Data Interoperability Platform (ODIP) enables you to share metadata of datasets described using the DCAT-AP, thus improving the discoverability and visibility of your datasets, eventually leading to wider reuse.
What can ODIP do?

- **Harvest** metadata from an Open Data portal.
- **Transform** the metadata to RDF.
- **Harmonise** the RDF metadata produced in the previous steps with DCAT-AP.
- **Validate** the harmonised metadata against the DCAT-AP.
- **Publish** the description metadata as Linked Open Metadata.
- **Translate** metadata automatically in English.
**How can ODIP help you improve your metadata?**

- ODIP maps your metadata to a standard model, i.e. the DCAT-AP.
- ODIP helps you reuse standardised multilingual controlled vocabularies in your metadata, replacing error-prone text values or tailor-made lists.
- By means of its validation services, ODIP allows you to detect inconsistencies and errors in your metadata.
- ODIP assigns persistent URIs to your metadata.
- ODIP links your metadata with other metadata, thus adding context to it and enriching its meaning.
- ODIP automatically translates the title and description of the metadata to English.
How does ODIP look like?

http://odip.opendatasupport.eu
An ODIP Job

The ODIP job consists of three possible phases which need to be ran in order and that are composed of several plug-ins:

1. Extraction
2. Transformation
3. Loading

Furthermore these jobs can be scheduled to be launched periodically, in succession or manually.
Overview of ODIP’s Extract-Transform-Load process
1. Extraction

- The extraction phase entails retrieving (extracting) raw data from a given source Open Data portal using the appropriate plug-in, depending on the technology of the source.

- Available extractors:
  - CKAN Extractor
  - RDF extractor
  - SPARQL Extractor
  - Virtuoso Extractor
  - CSV Extractor
2. Transformation (1/3)

• The goal of the transformation phase is to harmonise, cleanse and prepare for storing on ODIP metadata harvested from Open Data portals.

• Available transformers:
  - ODS Value Mapper.
  - SPARQL Update Query Transformer.
  - ODS Cleaner.
  - ODS DCAT Application Profile Harmoniser.
  - ODS Modification Detector.
  - ODS Validator.
  - Web Translations.
Loading

- In the loading phase, the harvested and harmonised metadata is stored on Virtuoso’s RDF repository using the Virtuoso Loader.
Example
Harvesting a CKAN-based Open Data portal

1. Create a new job on ODIP
2. Extraction phase
   - Add and Configure a CKAN Extractor to harvest data from a CKAN API.
3. Transformation phase
   - Add ODS Value mapper
   - Add a SPARQL Update Query Transformer with the pertinent queries
   - Add ODS Cleaner
   - Add and configure DCAT Application Profile Harmoniser
   - Add Modification detector
   - Add ODS Validator
   - Add Web Translations
4. Loading phase
   - Load the extracted data in a Virtuoso RDF Store via the Virtuoso Loader
5. Scheduling the job on ODIP
Example – 1. Create Job : Creating a job on ODIP

• To create a new job, click on "New Job".
• At the bottom part of the screen you can configure the actual tasks within each of the three phases by selecting a tab.
• For each phase you can add and configure modules accordingly.

Provide a name for the Job.

Present the job with a short description.

Press the “Add” button to determine the plug-ins to deploy.
Example – 2. Extraction: Adding and Configuring a CKAN Extractor to harvest data from a CKAN API

After adding the CKAN extractor plugin you will be prompted to fill out the following form:

Publisher, license, title and description: Used in the stored catalog for the dct:publisher, dct:license, dct:title and dct:description properties.

Subject prefix: The prefix used to create a URI for each the metadata of harvested dataset. The subject is created as <subjectprefix>/dataset/<datasetid>

Predicate prefix: JSON attributes are converted to predicates by appending them to the predicate prefix. The CKAN API response is in JSON, we then convert this into RDF.

Ignored keys: A comma seperated list of JSON attributes that should not be converted to RDF triples.

The Web location of the CKAN portal you wish to harvest. The portal should support API version 3 and the API must be enabled.
Example – 3. Transformation : Adding and configuring plug-ins to harmonise data (1/3)

• Start by adding the **ODS DCAT Application Profile Harmonizer**.
  ✓ This plugin will create the harmonized catalog data and a basic skeleton for each dataset it identifies.

• Use the **Modification Detector** to compare provenance data generated by the CKAN extractor between the current and previous version of the raw data to set the dct:modified field of the catalog records.
  ✓ No configuration is required.
Example – 3. Transformation: Adding and configuring plug-ins to harmonise data (2/3)

- Mapping the description of dataset to dct:description as required by the DCAT-AP.

- Use the **ODS Cleaner Plugin** to remove raw data loaded into the working set before storing it into a harmonized graph.
  ✓ No configuration is required.

Use the **SPARQL Update Query Transformer** to map existing properties and values to the ones of recommended by the DCAT-AP.
Example – 3. Transformation: Adding and configuring plug-ins to harmonise data (3/3)

**Result**
The final result of your harmonisation pipeline should look similar to the following:

<table>
<thead>
<tr>
<th>Extractors</th>
<th>Transformers</th>
<th>Loaders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SELECTED TRANSFORMERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODS DCAT Application Profile Harmonizer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODS Modification Detector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPARQL Update Query Transformer [INSERT (?harmds <a href="http://purl.org/dc/terms/p">http://purl.org/dc/terms/p</a>]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPARQL Update Query Transformer [INSERT (?harmds <a href="http://purl.org/dc/terms/t">http://purl.org/dc/terms/t</a>]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPARQL Update Query Transformer [INSERT (?harmds <a href="http://purl.org/dc/terms/id">http://purl.org/dc/terms/id</a>]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODS Cleaner</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Configure the Virtuoso Loader to load the harmonized data into Virtuoso.
Example – 4. Loading: Load the extracted data in a Virtuoso RDF Store via the Virtuoso Loader

The Virtuoso Loader will store the generated triples in the Virtuoso RDF store. The triples will be inserted into a graph of your choice. The Virtuoso Loader needs host, port and user credentials to connect to your Virtuoso server.
5. Scheduling a job on ODIP

A job can be scheduled to run at a set interval or chained after another job:

- **Interval Scheduling:**
  <sec> <min> <hour> <day-of-month> <month> <day-of-week>
  
  - Example:
    - 0 0 4 * * * - each day at 4 am
    - 0 0 0 * * 1 - each Monday at midnight
    - 0 30 * * * - every half past the hour

- **Chained scheduling:** Select a job after which this job should be executed.
**ODIP Reporting tool**

Whenever a “job” is ran, a report is created and can be reviewed as can be seen in the following screenshot:

- Select the appropriate job
- Informs user whether or not a plug-in functioned correctly or not.
Discover datasets through ODIP

The Open Data Interoperability Platform (ODIP) enables you to share metadata of datasets described using the DCAT-AP, thus improving the discoverability and visibility of your datasets, eventually leading to wider reuse.
The public SPARQL endpoint of ODIP Query interface

http://data.opendatasupport.eu
The public SPARQL endpoint of ODIP

Result set

```
SPARQL Query

prefix dcat: <http://www.w3.org/ns/dcat#>
select *
where {?
 where {?record a dcat:CatalogRecord} (?record ?x ?y) LIMIT 160
```

```
x
http://data.opendatasupport.eu/id/catalog/test/
http://data.opendatasupport.eu/id/catalog/test/
http://data.opendatasupport.eu/id/catalog/test/
http://data.opendatasupport.eu/id/catalog/rela -quarterly-
http://data.opendatasupport.eu/id/catalog/rela -quarterly-
http://data.opendatasupport.eu/id/catalog/rela -quarterly-
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http://data.opendatasupport.eu/id/catalog/rela -living-conditions-and-poverty
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http://data.opendatasupport.eu/id/catalog/rela -living-conditions-and-poverty

y
http://data.opendatasupport.eu/id/catalogRecord
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http://data.opendatasupport.eu/id/catalogRecord
http://data.opendatasupport.eu/id/catalogRecord
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http://data.opendatasupport.eu/id/catalogRecord
http://data.opendatasupport.eu/id/catalogRecord
http://data.opendatasupport.eu/id/catalogRecord
```

More about ODIP

- ODIP is based on the LOD Management Suite, originally created by the Semantic Web Company in the context of LOD2 FP7 project.

- The LOD Manager Suite was further extended by TenForce in the context of Open Data Support for the deployment of ODIP.

- It will be made available on GitHub under GPLv2.
Conclusions

- Good quality description metadata can improve the discoverability of open datasets.
- DCAT-AP can be used for homogenising metadata of datasets hosted on different Open Data portals and allows for querying them using a uniform vocabulary.
- ODIP can support harvesting, harmonising according to the DCAT-AP and publishing as linked data metadata of datasets published on different Open Data portals.
- ODIP, through its public SPARQL endpoint, provides a single point of access to datasets from all over Europe.
- Easier access to datasets means higher reuse of datasets.
Group questions

How many Open Government Data portals do you know in your country?

In your country, are you aware of any applications or services that were built upon Open Government Data?

How would you compare the visibility of Open Government Data portals with that of traditional data providers such as national statistics offices?

Have you heard about the Open Government Data initiatives of the European Commission?

Take also the online test here!
Thank you!
...and now YOUR questions?
This presentation has been created by Open Data Support

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Authors:
Michiel De Keyzer, Nikolaos Loutas and Stijn Goedertier
References

Slide 4, 6, 9, 10, 11 & 12:

- Open Data Support: How can we help you?. Open Data Support.
  http://www.slideshare.net/OpenDataSupport/open-data-support-service-description

Slide 12:

- Data Catalogue Vocabulary. http://www.w3.org/TR/vocab-dcat/

Slide 13-21:

- DCAT Application Profile for data portals in Europe Community. ISA Programme.
  https://joinup.ec.europa.eu/asset/dcat_application_profile/description
  https://joinup.ec.europa.eu/asset/dcat_application_profile/asset_release/all

Slide 23-35:

- LODMS User Manual for Open Data Support. Open Data Support

Slide 29:

- Figure from http://www.semantic-web.at/linked-open-data-management-suite-lodms
Related projects and initiatives


Publicdata.eu, [http://www.w3.org/2011/gld/wiki/Main_Page](http://www.w3.org/2011/gld/wiki/Main_Page)

LOD2 FP7 Project, [http://lod2.eu/](http://lod2.eu/)


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