European Commission

OPEN DATA SUPPORT

Training Module 2.1

The Linked Open Government Data & Metadata Lifecycle

Presentation metadata

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Learning objectives

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

- What a lifecycle for Linked Open Government Data (LOGD) is.
- The difference between supply and demand of data.
- The different steps of an LOGD lifecycle.
- Tools and best practices associated with each step in the lifecycle.

Content

This module contains ...

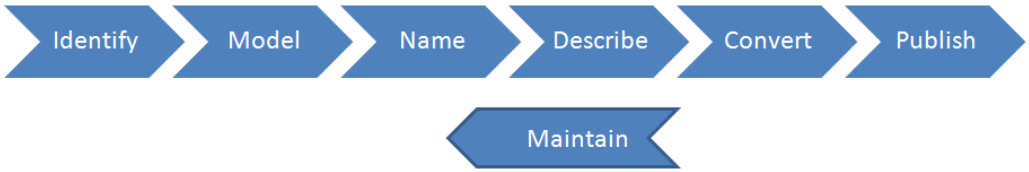
- An overview of existing lifecycles for Linked Open Government Data (LOGD).
- An hybrid lifecycle for LOGD and metadata, covering both the supply and the demand side.
- An overview of existing technologies for LOGD and metadata – including the Open Data Interoperability Platform (ODIP).

Different LOGD lifecycles

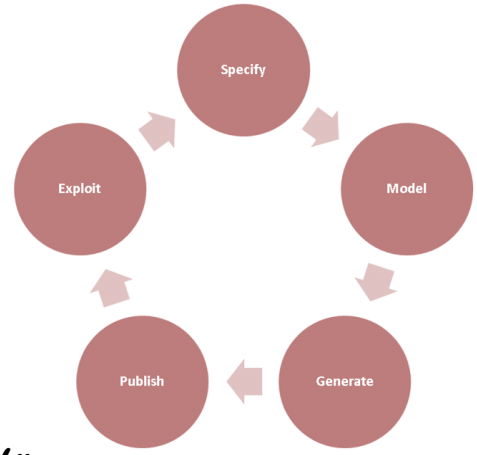
The state of play

See also:
http://www.w3.org/2011/gld/wiki/GLD_Life_cycle

Hyland et al.

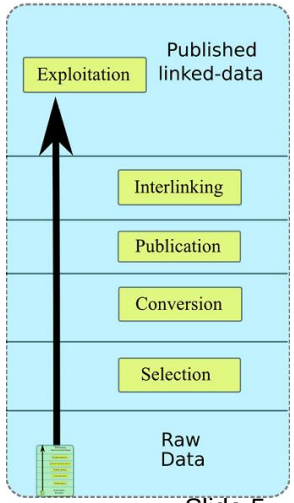


Hausenblas et al.



Villazon-Terrazas et al.

Datalift Vision



Different LOGD lifecycles
Observations

- No standardised LOGD lifecycle.
- Most approaches agree on a core set of phases, e.g. identify model, publish.
- The current lifecycles mainly focus on the *supply* of open data:
  - Identification and selection of LOGD.
  - Modelling and cleansing of LOGD.
  - Publishing and linking of data.
- But what about the *demand* side?
  - Find and retrieve LOGD.
  - Integrate and reuse of open data.
  - Provide feedback on LOGD.

What is metadata?

"Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information."

-- National Information Standards Organization

http://www.niso.org/publications/press/UnderstandingMetadata.pdf

Dataset description (DCAT)

```
:weather1-7 a dcat:Dataset ;
   dct:title "Measurements from weather stations 1-7" ;
   dct:description "Data from seven weather stations
                    showing temparture, humidity,
                    wind direction and wind speed" ;
   dct:modified "2013-07-01" ;
   dct:publisher <http://myweather.com/id/myweather> ;
   dcat:keyword "weather" ;
   dcat:landingpage <http://myweather.com/stations1-7.html> ;
   dcat:distribution :weatherdata-xlsx
   .

:weatherdata1-7-xlsx a dcat:Distribution ;
   dct:format <http://publications.europa.eu/resource/authority/file-type/XLSX> ;
   dct:licence <http://creativecommons.org/licenses/CC0> ;
   dcat:downloadURL <http://myweather.com/stations1-7.xlsx>
   .
```

Dataset

	Temp. ºC	Humidity %	Wind direction	Wind speed km/h
Station 1	18.1	60	WSW	18
Station 2	17.5	59	WSW	20
Station 3	18.2	55	SW	22
Station 4	19.0	62	SW	18
Station 5	18.0	65	WSW	19
Station 6	18.2	63	SSW	21
Station 7	17.9	61	SW	22

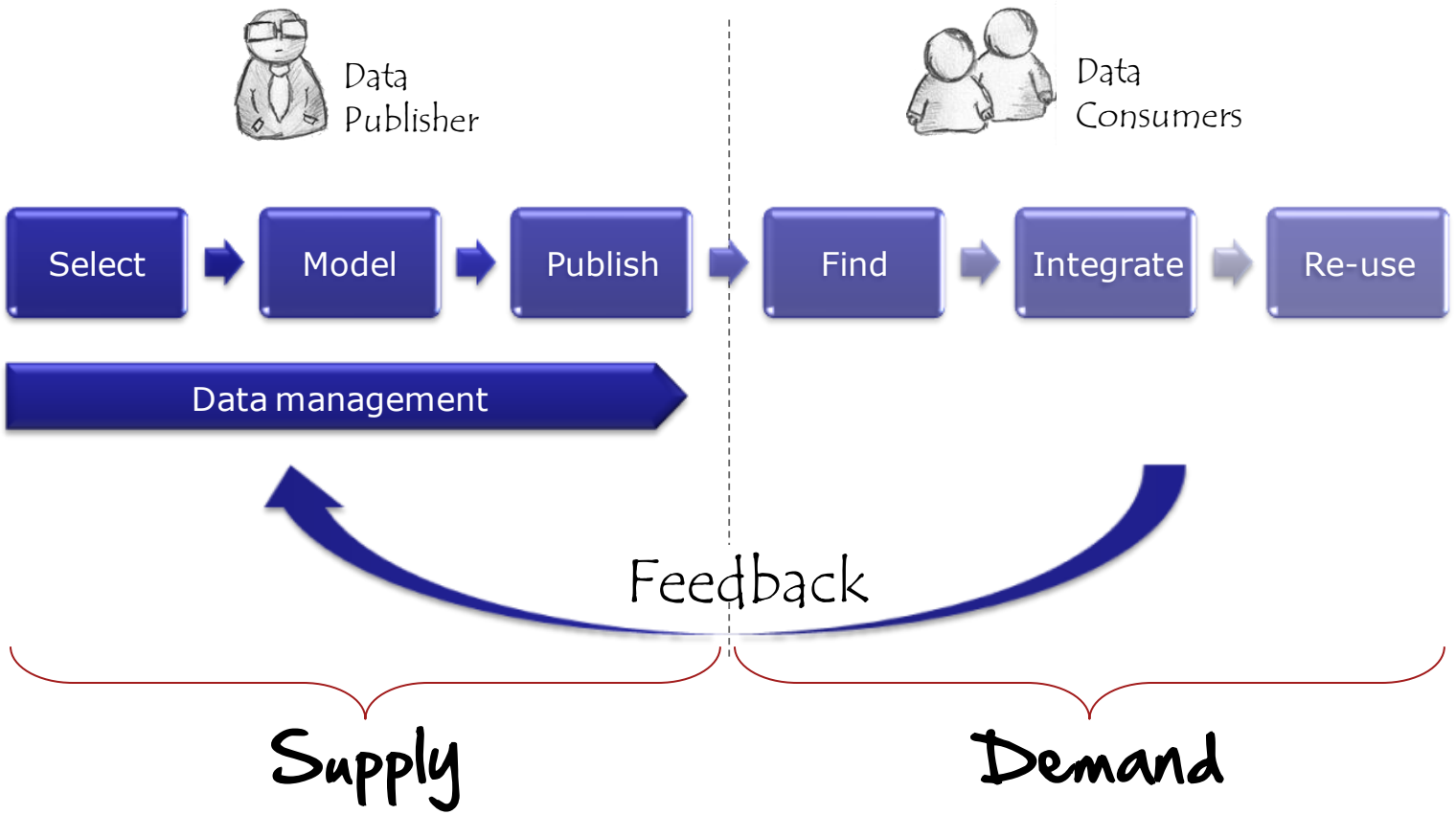
Best practices for publishing your data & metadata

W3C Linked Data Cookbook

1. Model the data;
2. Name things with URIs;
3. Reuse existing vocabularies whenever possible;
4. Publish human and machine readable descriptions – ***metadata****;*
5. Convert the data to RDF;
6. Specify an appropriate license;
7. Host the linked dataset and its metadata publicly and announce it!

See also:
http://www.w3.org/TR/gov-data/
http://www.w3.org/2011/gld/wiki/Linked_Data_Cookbook

LOGD and metadata lifecycle
focusing on supply and demand



LOGD & metadata supply

Governments opening up their data and publishing it as linked data along with appropriate metadata descriptions.

Selection of high-value data

Several dimensions can be considered in the selection process of Linked Open Government Data, both from the publisher's and the re-user's point of view:

- **Transparency:** Does the publication of the dataset increase transparency and openness of the government towards its citizens?
- **Legal requirements**: Is there a law that makes open publication mandatory or is there no specific obligation?
- **Relation to public task:** Is the data the direct result of the primary public task of government or is it a product of a non-essential activity?
- **Current status of open publication:** Is the data already openly available or does it still need to be opened up?
- **Type of value:** Is the data useful for social engagement or does it have commercial value?
- **Audience:** Is the data primarily intended for the public or is it primarily aimed at back-office integration?

Selection based on transparency

In some cases the publication of a dataset can increase the transparency and openness of the government towards its citizens, e.g.:

- Parliaments' data, such as election results.
- The way governmental budgets are spent.
- Staff cost of public administrations

All the above-mentioned examples contribute to the transparency of the way public administrations are working.

Selection based on legal requirements

*Some data may be **covered by a law or regulation** that mandates its open publication, e.g.:*

- Text of laws, directives, regulations etc.
- Proposals and proceedings of parliament and committees.
- Election results.
- Public budgets and expenditures.
- Invitations to tender and contract awards.

*Other data may be the **by-product of government activity** and would be useful for citizens and business to have access to, e.g.:*

- Condition of infrastructure and public spaces (roads, trees) .
- Timetables of public transport and schedules of garbage collection.

Selection based on relation to public task

*Some data may be **the direct result of the primary public task** of government, for example the functions listed in COFOG, e.g.:*

- Executive, legislative organs, financial/fiscal affairs etc.).
- Public order and safety.
- Environmental protection.
- Health.
- Culture.
- Education.

*Other data produced by government are **non-essential** (they could be – and sometimes are – provided by the private sector) e.g.:*

- Mapping for navigation (cf. Google Street View)
- Weather forecasts (cf. Weather Channel)

Selection based on status of openness

*Some data is **already published** openly and electronically, e.g. (in some countries):*

- Cadastral information.
- Topographic maps.
- Traffic information.
- Weather forecasts.

Other data may still be hidden from the public (maybe because it is hard to publish or includes personal data, sensitive data or is partly subject to third-party licensing).

Selection based on type of value

*Some data may have primarily **societal value**, e.g.:*

- Laws and parliamentary data (e.g. voting records of representatives)
- Pre-election information (e.g. programmes of political parties)
- eDemocracy and eParticipation (e.g. public consultations)

*Other data may have more **commercial value** (business model), e.g.:*

- Road maps, real-time traffic information
- Real-time weather information
- Business information

Selection based on type of audience

*Some data is aimed at **society** (citizens and business), e.g.:*

- Legal information.
- eDemocracy, eParticipation and public consultation.
- Procurement.

*Other data are focused on **internal usage or for integration in the back office**, e.g.:*

- Various sources that are used for law enforcement.
- Service performance indicators.
- Job descriptions of civil servants.

Selection based on size of audience

*Some data are aimed at **large audiences** and **mass markets**, e.g.:*

- Traffic information.
- Public transport.
- Election data.

*Other data are essential for **small groups of people** and **niche markets**, e.g.:*

- Information about facilities and financial support for people with special needs.
- Economic statistics.
- Court decisions.

High value from a re-users perspective

From a re-user's perspective, the value of a dataset depends primarily on its ***use and re-use potential****, which can effectively lead to the generation of (new)* ***business models.***

The use and re-use potential of a dataset is defined by:

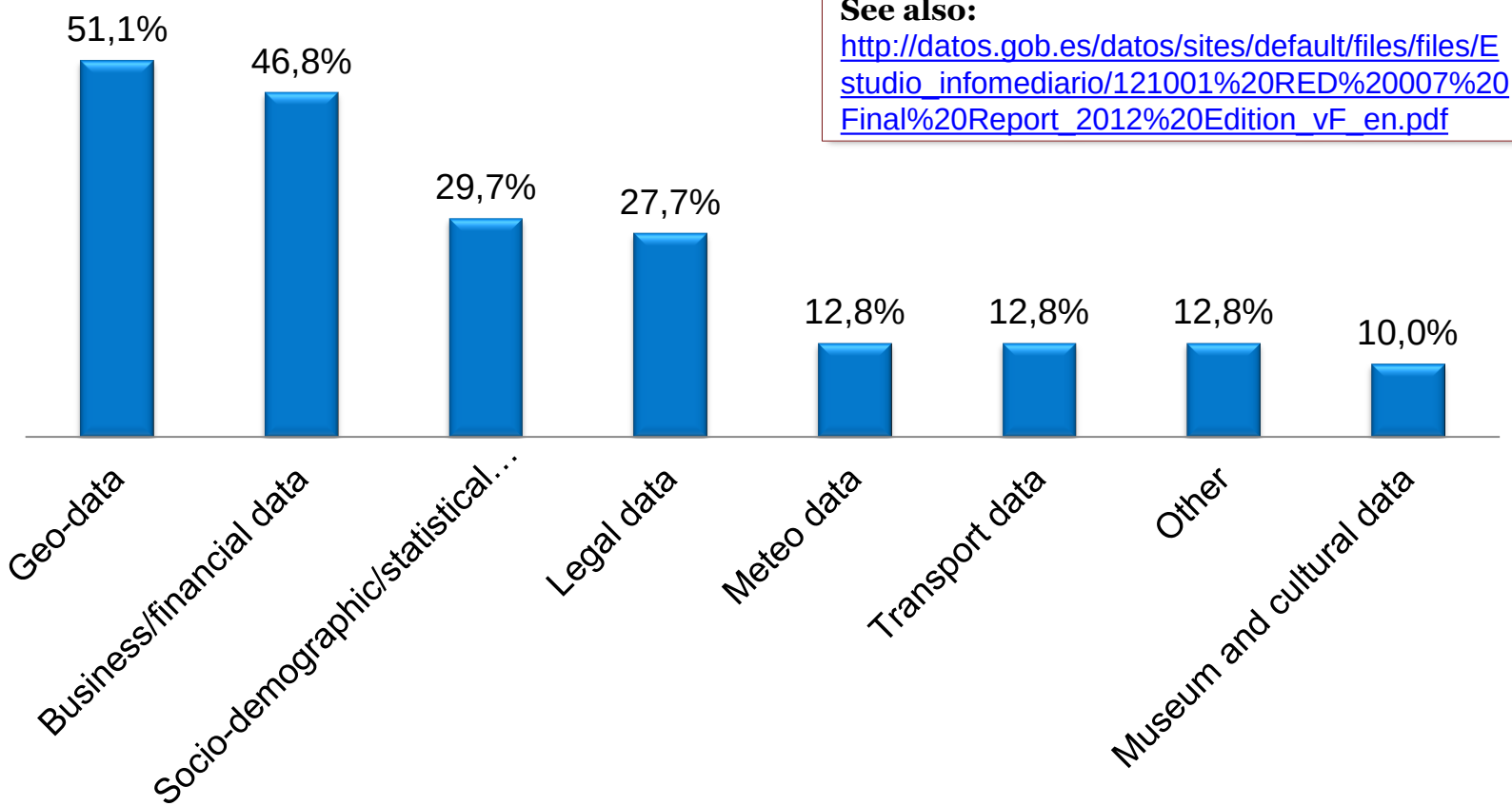
- The size and the dynamics of the target audience of the dataset; and
- The number of new and existing systems and services that are using the dataset.

Opening up datasets with a high use and re-use potential leads to the ***creation of new products and/or services*** *that have direct or indirect* ***economic or social impact*** *and/or positive* ***economic externalities****.*

Selection based on the needs of the audience

What data do the reusers need/want?

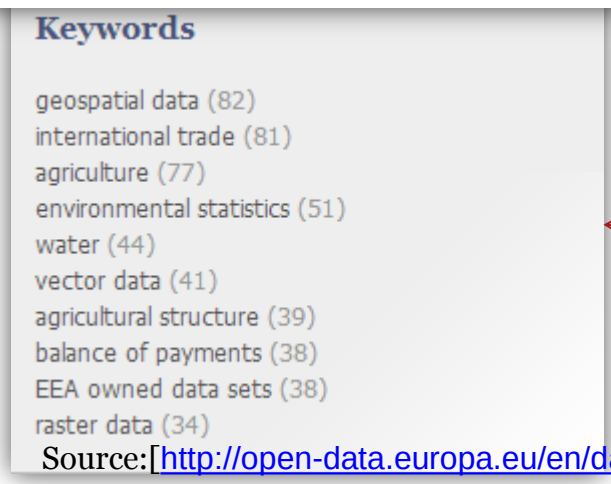
According to a Spanish study, the following types of information are reused the most by businesses:



See also:
http://datos.gob.es/datos/sites/default/files/files/Estudio_infomediario/121001%20RED%20007%20Final%20Report_2012%20Edition_vF_en.pdf

Datasets domains in European data portals

Source:[http://data.gov.uk/data]



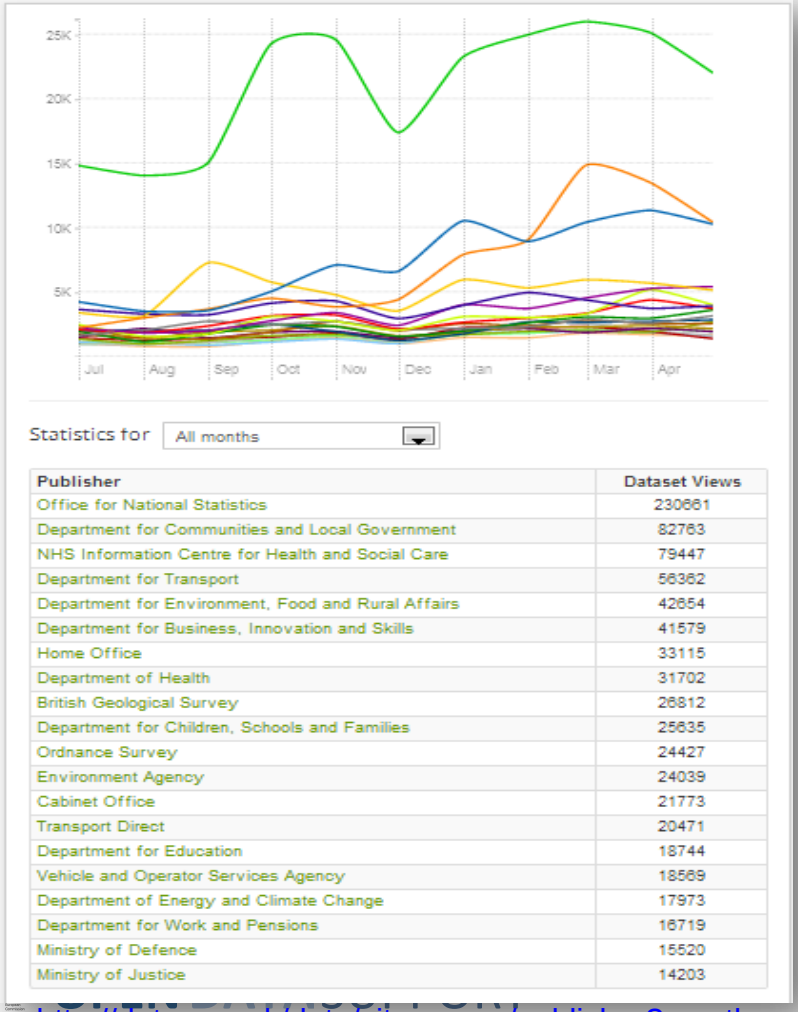
Source:[http://open-data.europa.eu/en/data/dataset]

Source:[http://publicdata.eu/]

Metadata

Which datasets are mostly viewed on Data.gov.uk

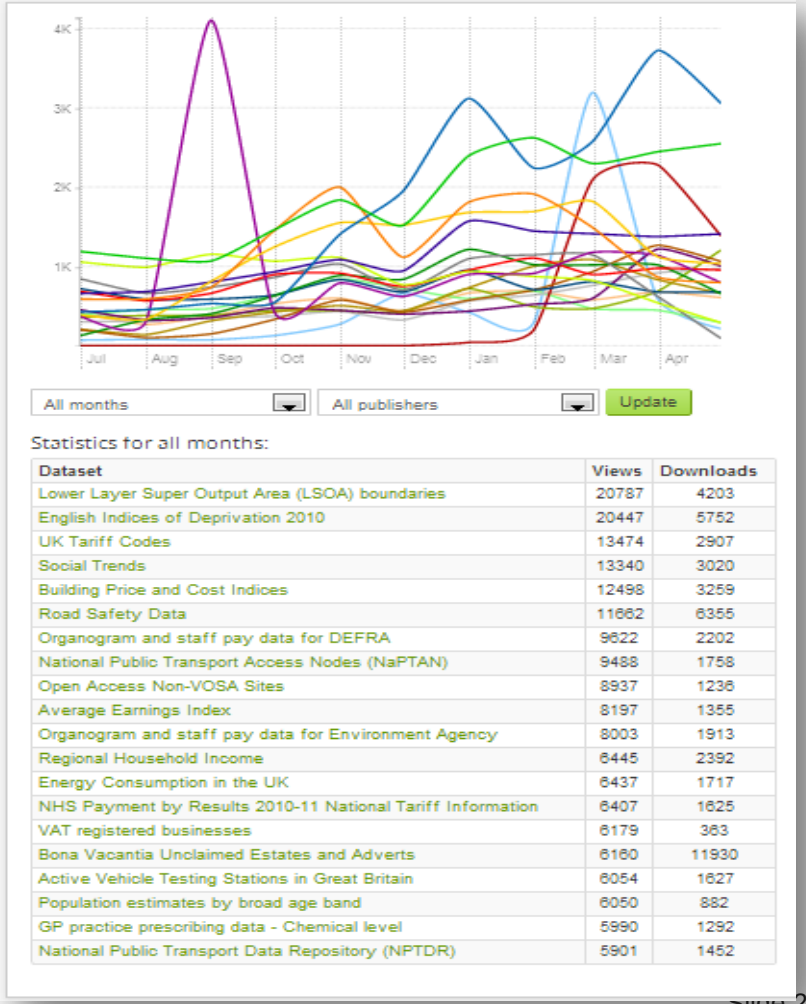
Per publisher



Publisher	Dataset Views
Office for National Statistics	230661
Department for Communities and Local Government	82763
NHS Information Centre for Health and Social Care	79447
Department for Transport	56362
Department for Environment, Food and Rural Affairs	42654
Department for Business, Innovation and Skills	41579
Home Office	33115
Department of Health	31702
British Geological Survey	26812
Department for Children, Schools and Families	25635
Ordnance Survey	24427
Environment Agency	24039
Cabinet Office	21773
Transport Direct	20471
Department for Education	18744
Vehicle and Operator Services Agency	18569
Department of Energy and Climate Change	17973
Department for Work and Pensions	16719
Ministry of Defence	15520
Ministry of Justice	14203

http://data.gov.uk/data/site-usage/publisher?month=

Per dataset



Statistics for all months:

Dataset	Views	Downloads
Lower Layer Super Output Area (LSOA) boundaries	20787	4203
English Indices of Deprivation 2010	20447	5752
UK Tariff Codes	13474	2907
Social Trends	13340	3020
Building Price and Cost Indices	12498	3259
Road Safety Data	11662	6355
Organogram and staff pay data for DEFRA	9622	2202
National Public Transport Access Nodes (NaPTAN)	9488	1758
Open Access Non-VOSA Sites	8937	1236
Average Earnings Index	8197	1355
Organogram and staff pay data for Environment Agency	8003	1913
Regional Household Income	6445	2392
Energy Consumption in the UK	6437	1717
NHS Payment by Results 2010-11 National Tariff Information	6407	1625
VAT registered businesses	6179	363
Bona Vacantia Unclaimed Estates and Adverts	6160	11930
Active Vehicle Testing Stations in Great Britain	6054	1627
Population estimates by broad age band	6050	882
GP practice prescribing data - Chemical level	5990	1292
National Public Transport Data Repository (NPTDR)	5901	1452

http://data.gov.uk/data/site-usage/dataset

Modelling your data & metadata is about …

- Making your data available in a **structured**, **comprehensible** and **machine-readabl**e way.
- **Reusing** what already exists in terms of vocabularies and reference data.
- Reaching the right quality level by **cleansing** your data.
- Providing **licensing information** so that data consumers know what the conditions of reuse are.
- Providing a rich description (**metadata**).
- Using **semantic technologies** (RDF, HTTP URIs…) for describing your data.

Model your data – reuse if possible, mint if necessary

- **Reuse** existing vocabularies **as much as possible**.
  - If you determine there is no reusable, authoritative source for the specific domain, **create your own using**:
    - RDF Schema (RDFS): Basic RDF vocabulary to describe the classes and properties of classes.
    - Web Ontology Language (OWL): knowledge representation language for describing ontologies.

See also:
http://www.slideshare.net/OpenDataSupport/model-your-data-metadata
http//www.w3.org/TR/owl-features/
http://www.w3.org/TR/rdf-schema/

Reuse common vocabularies to model and describe your data … (in RDF)

General purpose vocabularies: DCMI, RDFS

To name things: rdfs:label, foaf:name, skos:prefLabel

To describe people: FOAF, vCard, Core Person Vocabulary

To describe registered organisations: Registered Organisation Vocabulary

To describe addresses: vCard, Core Location Vocabulary

To describe public services: Core Public Service Vocabulary

…and metadata…

To describe datasets (metadata): DCAT, DCAT Application Profile, VoID

To describe projects: DOAP, ADMS.SW

To describe interoperability assets: ADMS

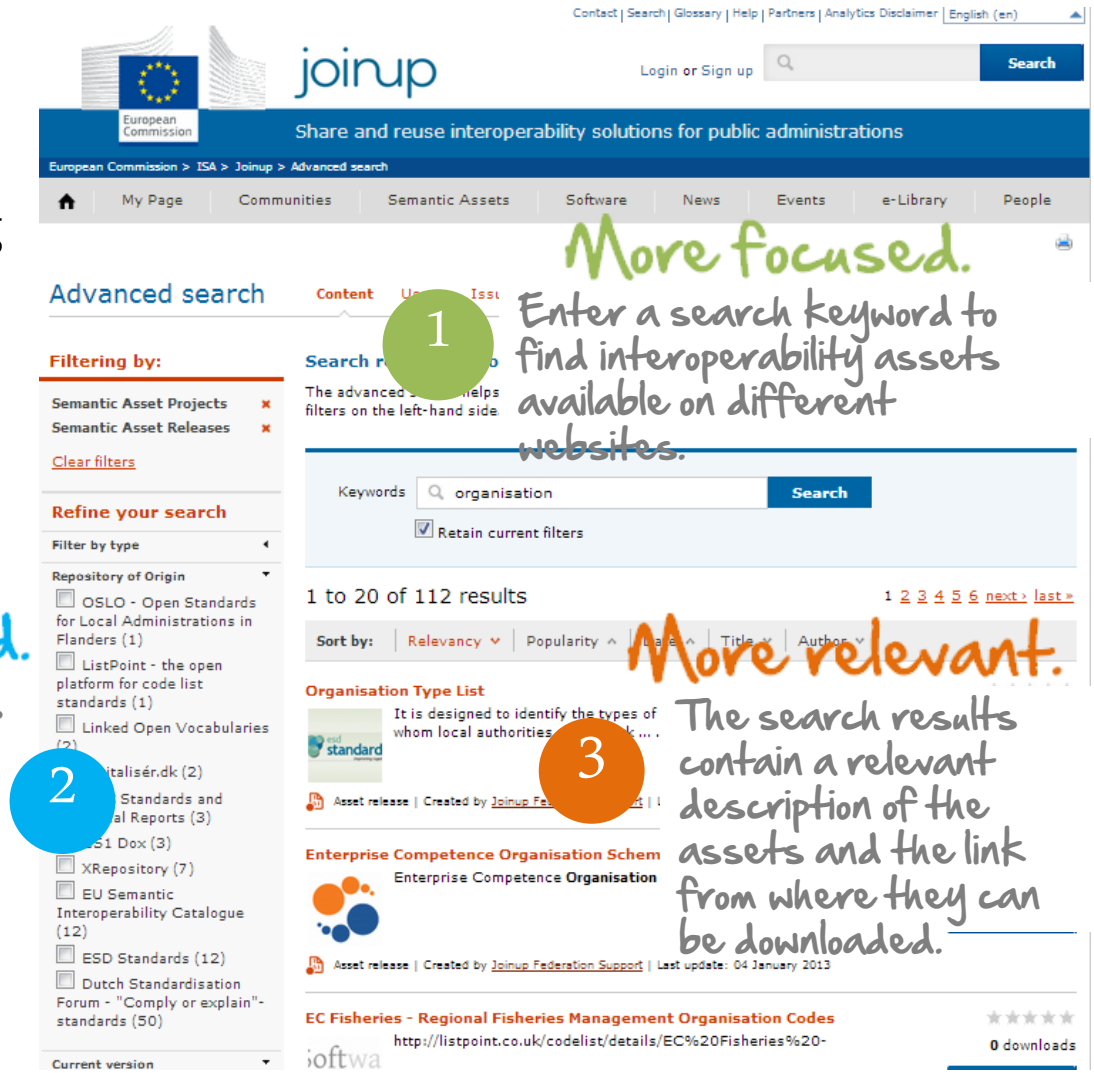
Find reusable vocabularies

Joinup

- Online platform for searching for and sharing interoperability assets described with ADMS.
  - Developed by the ISA Programme of the EC.

More targeted.

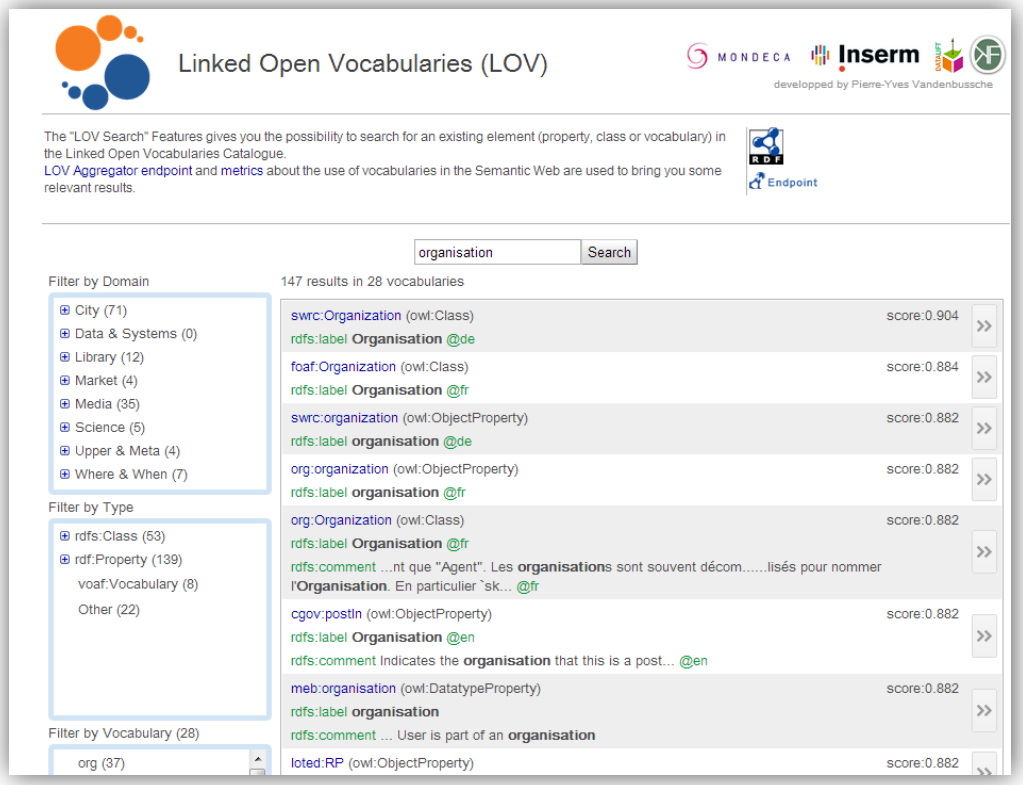
Refine the search results via the faceted search filters.



http://joinup.ec.europa.eu/

Find reusable vocabularies
Linked Open Vocabularies

- Provides easy access methods to the ecosystem of vocabularies .
- Makes the ways they link to each other explicit.
- Provides metrics on how they are used in the LOGD cloud.
- Developed by the Open Knowledge Foundation.



http://lov.okfn.org/

Cleansing your data & metadata

To ensure data and metadata can be published with an appropriate level of quality and minimum errors.

This means:

- Fixing errors.
- Transforming/homogenising formats.
- Aligning inconsistencies in data and metadata.
- Removing duplicate/redundant information.
- Adding lacking information.
- Making sure the information is up-to-date.

See also:
http://www.slideshare.net/OpenDataSupport/introduction-to-rdf-sparql
Cleanse your data with Open Refine (Google Refine) - https://code.google.com/p/google-refine/

Cleansing data - example

Duplicate

Formatting issue

error

Company_name	Registration date	Country	E-mail	# Establishments
Nikè	1991-04-28	Belgium	niké	7
BARCO	15 September 1986	BE	Barco@email.be	2
Nikè		België		
Coca-Cola		United States	coca@cola.com	3

Cleansing operations

Missing information

Inconsistent information

Redundant information

Company_name	Registration date	Country	E-mail
Nikè	1991-04-28	BE	niké@sport.org
BARCO	1986-09-05	BE	Barco@email.be
Coca-Cola	1964-03-26	US	coca@cola.com

Model your metadata

*The **DCAT Application profile for data portals in Europe** (DCAT-AP) is a specification based on the Data Catalogue vocabulary (DCAT) for describing public sector datasets in Europe.*

DCAT-AP improves the discovery of public sector datasets across borders and sectors.

DCAT
APPLICATION PROFILE FOR EUROPEAN DATA PORTALS

See also:
https://joinup.ec.europa.eu/asset/dcat_application_profile/description

Use persistent Uniform Resource Identifiers (URI) for naming things

Persistent URIs sets the foundations for Linked Data.

See also:
http://www.slideshare.net/OpenDataSupport/design-and-manage-persitent-uris
https://joinup.ec.europa.eu/community/semic/document/10-rules-persistent-uris

Licensing your data and metadata is about…

- Informing potential reusers on how the **data and metadata** can be (re)used and/or adapted.
- Not associating your **data and metadata** with licensing information, is an important barrier for reuse and thus lowers the value opening your data will create.
- Open data should be, by definition, published under an **open license**.
- Metadata should be published under a licence indicating it is public domain to reinforce the reuse and discoverability of your data.

See also:
http://www.slideshare.net/OpenDataSupport/licence-your-data-metadata

Open licenses

See also:
http://discovery.ac.uk/files/pdf/Licensing_Open_Data_A_Practical_Guide.pdf

- Creative Commons (CC) (http://creativecommons.org/licenses/)
  - Attribution (BY): The creator of the work should be mentioned.
  - Non Commercial (NC): The work can not be used for commercial purposes.
  - No Derivatives (ND): The work cannot be adapted or merged with other work.
  - Share Alike (SA): The work can be adapted but must be attributed with the same license if you make it available.
  - CC Zero (CC0): The work is public domain
- Open Data Commons (http://opendatacommons.org/licenses/)
  - Open Data Commons Attribution Licence (ODC-By): compatible with CC BY
  - Open Data Commons Open Database Licence (ODC-ODbL): compatible with CC BY SA)
  - Public Domain Dedication Licence (PDDL): compatible with CC Zero
- The Open Government Licence (http://www.nationalarchives.gov.uk/doc/open-government-licence/)

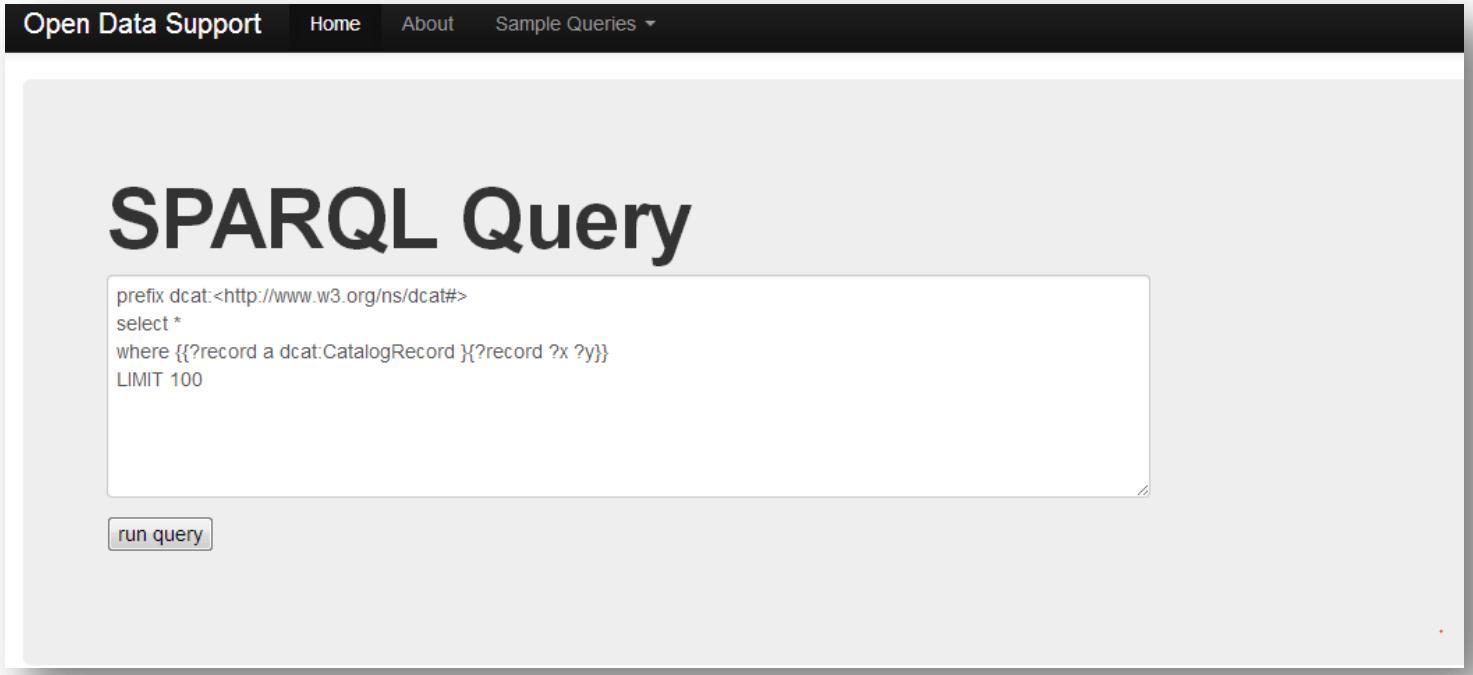
Publishing linked data is about …

Breaking down the walls of the silos in order to create more value.

- Making your data and metadata publically and easily accessible on the Web.
- Linking your data and metadata to other data (or metadata) in order to:
  - Attach meaning and content to it.
  - Give context to it.
  - Enrich it.
  - Allow people to discover more.

Provide a SPARQL Endpoint

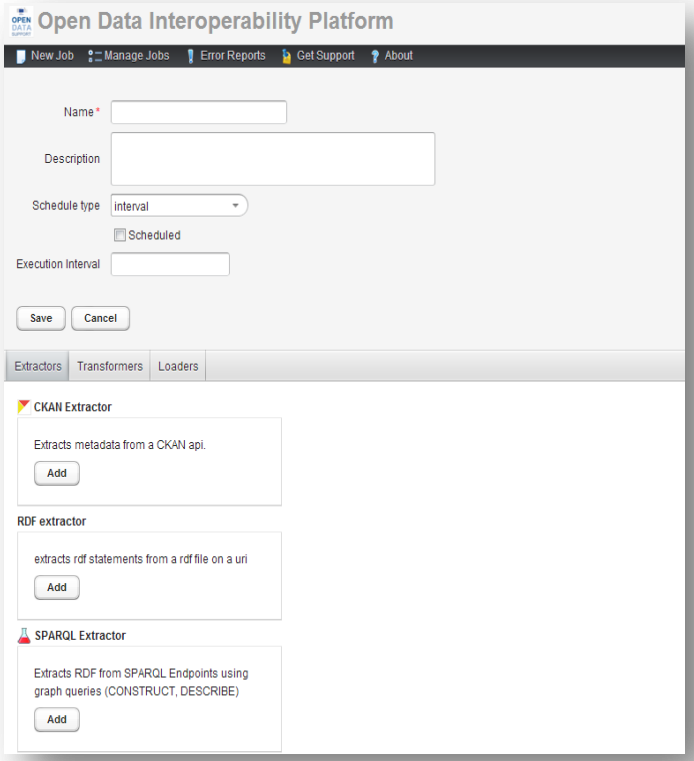
A SPARQL Endpoint is a service that allows others to query your linked data (and/or metadata).



http://data.opendatasupport.eu

Publish your metadata

Publish your metadata on a central data broker to give it more visibility and increase the reuse of your datasets.



The Open Data Interoperability Platform (ODIP):

- ODIP is a central data broker developed by the European Commission to enable the cross-border European search for datasets.
- ODIP data publishers and data portals to publish description metadata of datasets centrally.

See also:
http://www.slideshare.net/OpenDataSupport/promoting-the-re-use-of-open-data-through-odip

Data & metadata management is about…

- Managing the lifecycle of the data – creation, update and keeping up to data, and decommissioning of datasets.
- Managing the lifecycle of the metadata.
- Putting in place processes for making sure your data and metadata has an appropriate level of quality.
- Stating ownership of data(sets) and metadata.

See also:
http://www.slideshare.net/OpenDataSupport/introduction-to-metadata-management

Collecting feedback from the reusers of your data

Ask feedback to the (potential) users of data:

- Which data do they need.
- How did they use the data.
- What did they think about the quality.
- Make sure that requests and fixes reach you – crowdsource data quality!

data.overheid.nl

data.gov.uk

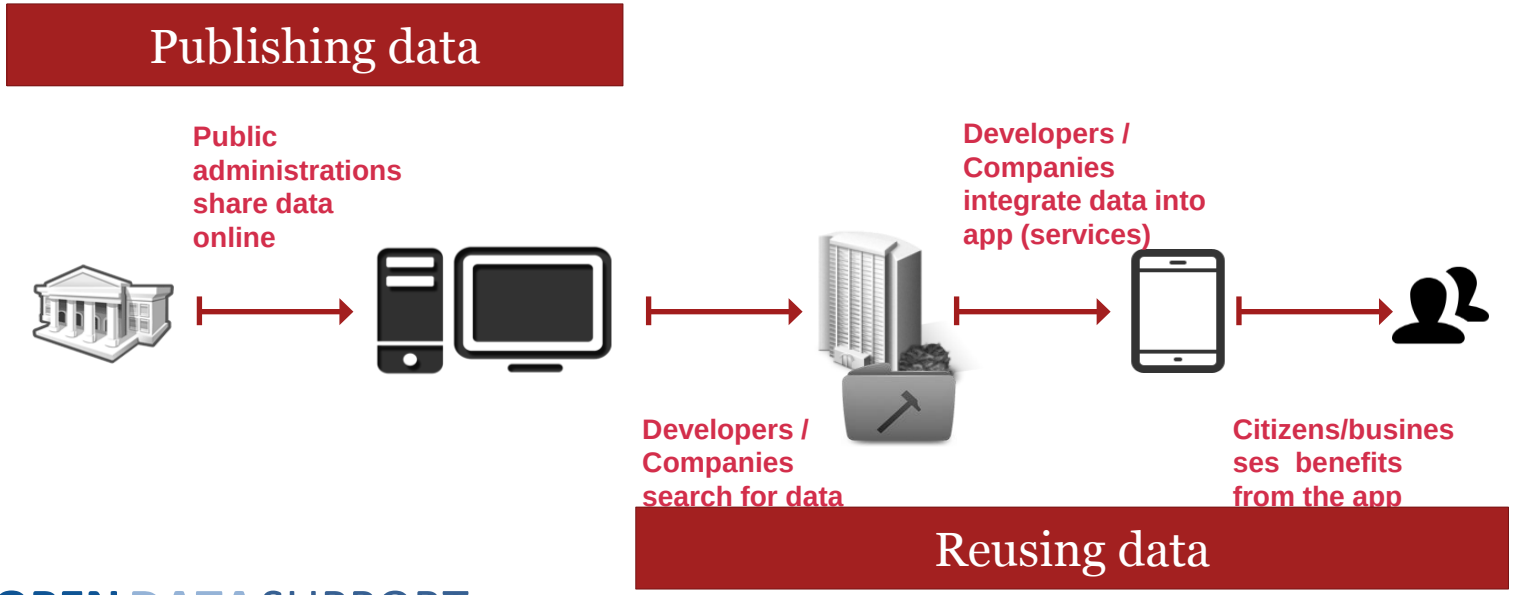
LOGD demand

The needs of businesses, entrepreneurs, researchers and governments for linked data.

The LOGD lifecycle demand side is about …

Data reusers being able to

- find appropriate datasets;
- use the datasets for analysis, building apps and services;
- know what their government is doing (transparency);
- save costs.



Where to find datasets?

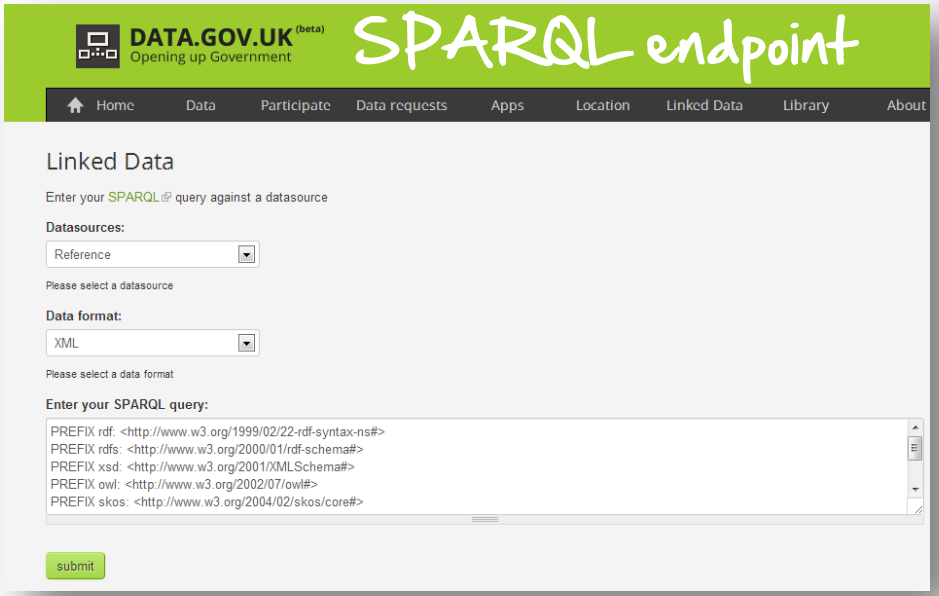
Datasets are made available on various platforms spread across Europe.

*"A Data Broker collects the **metadata** from various open data platforms and publishes it using a **common metadata model**. This way the datasets are **searchable** in a **uniform way** from **a single point of access**."*

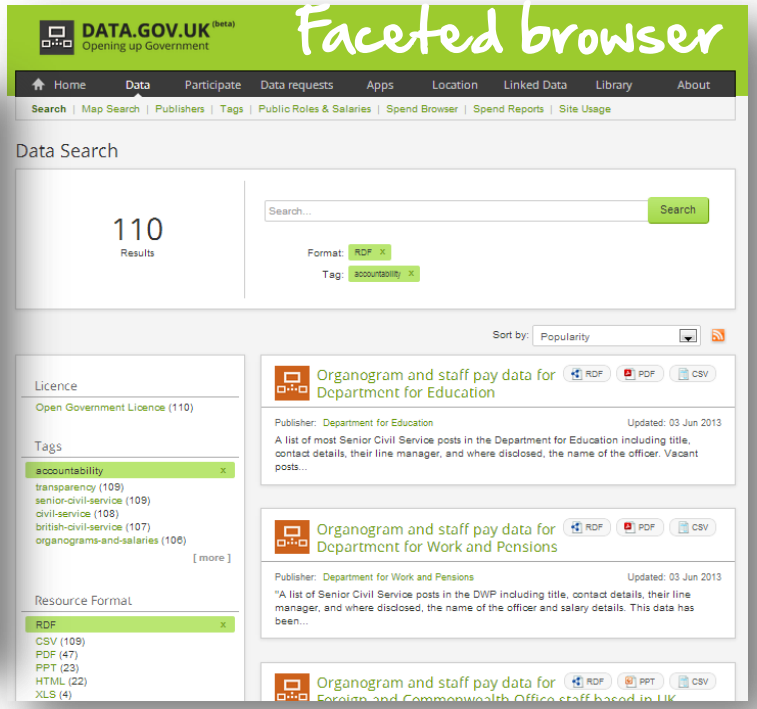
- Local Open Data Portals, e.g.
  - opendatamanchester.org.uk
  - Data.gent.be
- Regional Open Data Portals e.g.
  - opendata.regionpaca.fr
  - Open public data of the government of Catalonia
- National Open Data Portals
  - Opendata.at
  - opendata.lu
- European Open Data Portals, e.g.
  - open-data.europa.eu
- Open Data Brokers, e.g.
  - Publicdata.eu
  - ODIP

Use SPARQL endpoint or faceted browser to find datasets

A user looking can execute a SPARQL query on a **SPARQL endpoint** to find datasets or “filter his way” through the collection of datasets using a **faceted browser**.

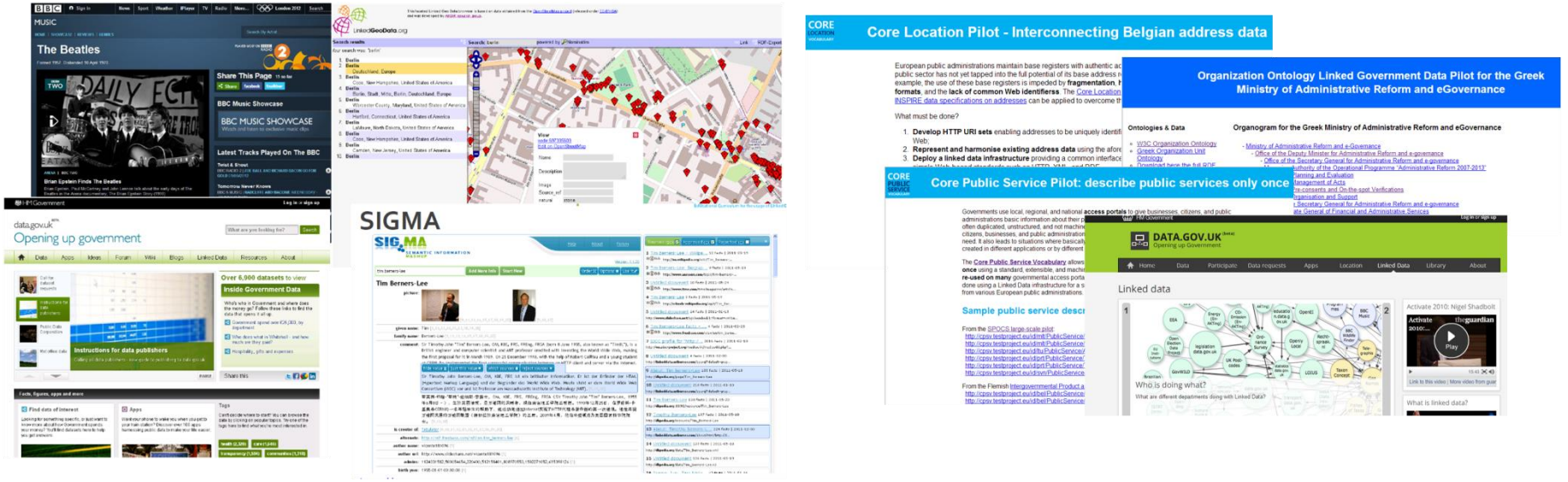


http://data.gov.uk/sparql



http://data.gov.uk/data/search

Integrating datasets and building apps & services



Some tools for integrating datasets:

- Karma (http://www.isi.edu/integration/karma/)
- Talend (http://www.talend.com/products/data-integration)

See also:
http://www.slideshare.net/OpenDataSupport/introduction-to-linked-data-23402165

Publishing LoGD using Open Refine

Using Open Refine to model and publish open data
Getting started

1. Install Open Refine from: https://github.com/OpenRefine
2. Install the RDF extension : http://refine.deri.ie/

And then…

1 Describe your data in a spreadsheet.

2 Create a project and upload it in Open Refine.

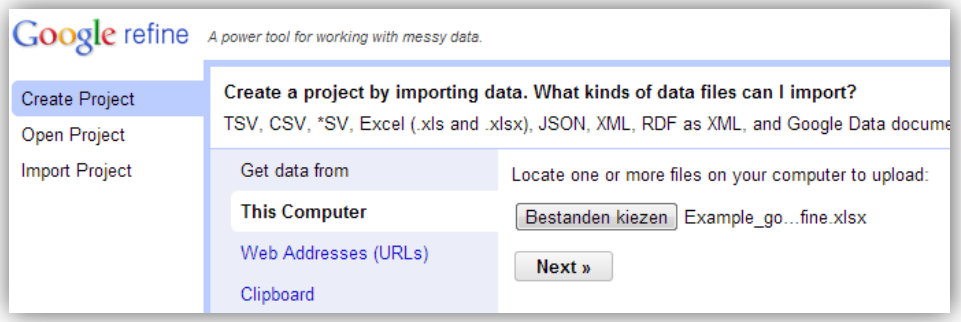
3 Map your data to appropriate RDF classes & properties.

4 Export the data in RDF.

1 *Describe your data in a spreadsheet*

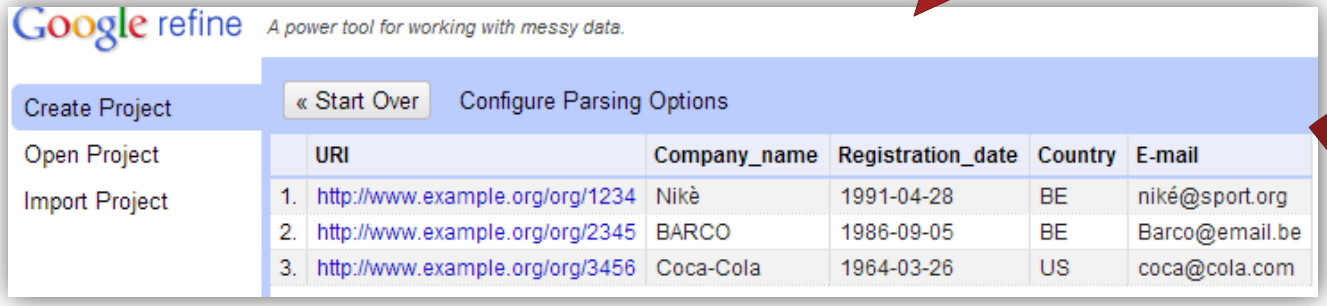
Company_name	Registration date	Country	E-mail
Nikè	1991-04-28	BE	niké@sport.org
BARCO	1986-09-05	BE	Barco@email.be
Coca-Cola	1964-03-26	US	coca@cola.com

2 Create a project and upload it in Google Refine



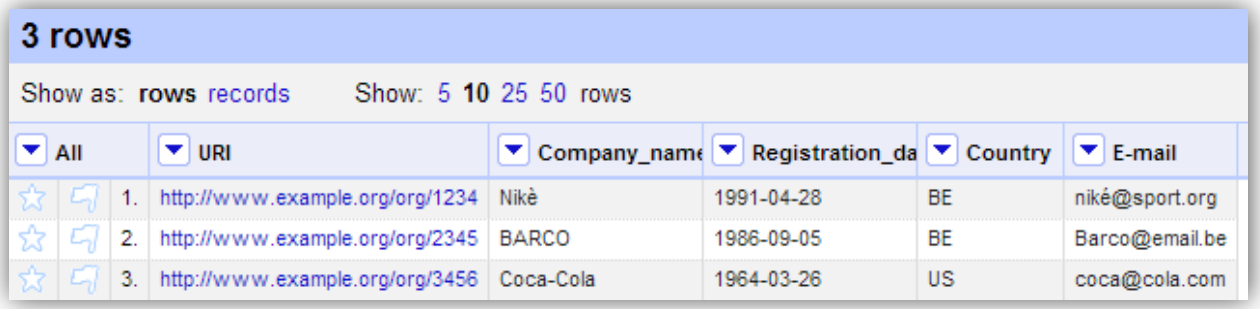
Upload the spreadsheet

Select relevant tabs



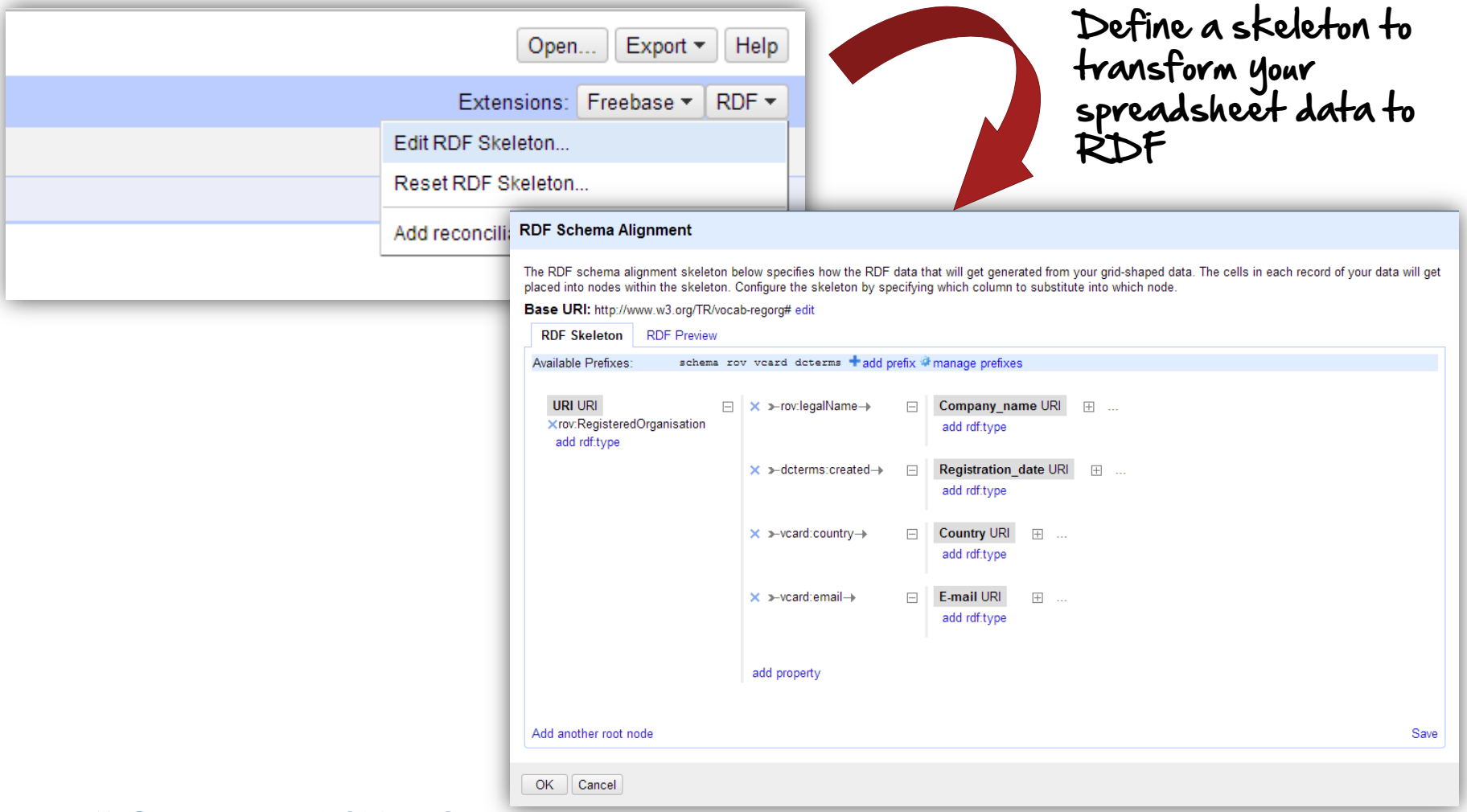
	URI	Company_name	Registration_date	Country	E-mail
1.	http://www.example.org/org/1234	Nikè	1991-04-28	BE	niké@sport.org
2.	http://www.example.org/org/2345	BARCO	1986-09-05	BE	Barco@email.be
3.	http://www.example.org/org/3456	Coca-Cola	1964-03-26	US	coca@cola.com

Create the project

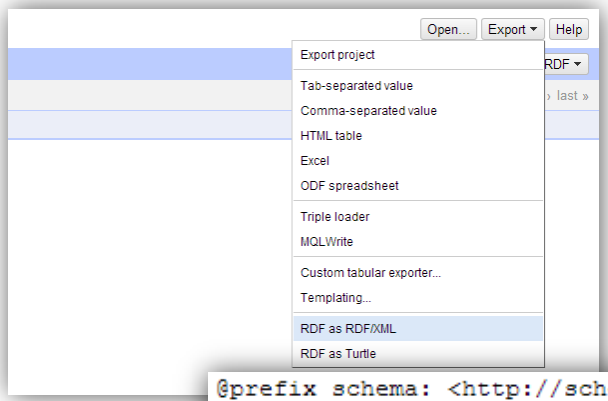


All		URI	Company_name	Registration_da	Country	E-mail
1.		http://www.example.org/org/1234	Nikè	1991-04-28	BE	niké@sport.org
2.		http://www.example.org/org/2345	BARCO	1986-09-05	BE	Barco@email.be
3.		http://www.example.org/org/3456	Coca-Cola	1964-03-26	US	coca@cola.com

3 *Map your data to appropriate RDF classes & properties (model your data)*



4 Export your data to RDF/XML or Turtle




```
@prefix schema: <http://schema.org/> .
@prefix rov: <http://www.w3.org/TR/vocab-regorg/> .
@prefix vcard: <http://www.w3.org/2006/vcard/ns#> .
@prefix dcterms: <http://purl.org/dc/terms/> .


<http://www.example.org/org/1234> a <http://www.w3.org/TR/vocab-regorg#RegisteredOrganisation> ;
        <http://www.w3.org/TR/vocab-regorg#legalName> <http://www.w3.org/TR/vocab-regorg#Nikè> ;
        dcterms:created <http://www.w3.org/TR/vocab-regorg#1991-04-28> ;
        vcard:country <http://www.w3.org/TR/vocab-regorg#BE> ;
        vcard:email <http://www.w3.org/TR/vocab-regorg#niké@sport.org> .

<http://www.example.org/org/2345> a <http://www.w3.org/TR/vocab-regorg#RegisteredOrganisation> ;
        <http://www.w3.org/TR/vocab-regorg#legalName> <http://www.w3.org/TR/vocab-regorg#BARCO> ;
        dcterms:created <http://www.w3.org/TR/vocab-regorg#1986-09-05> ;
        vcard:country <http://www.w3.org/TR/vocab-regorg#BE> ;
        vcard:email <http://www.w3.org/TR/vocab-regorg#Barco@email.be> .

<http://www.example.org/org/3456> a <http://www.w3.org/TR/vocab-regorg#RegisteredOrganisation> ;
        <http://www.w3.org/TR/vocab-regorg#legalName> <http://www.w3.org/TR/vocab-regorg#Coca-Cola> ;
        dcterms:created <http://www.w3.org/TR/vocab-regorg#1964-03-26> ;
        vcard:country <http://www.w3.org/TR/vocab-regorg#US> ;
        vcard:email <http://www.w3.org/TR/vocab-regorg#coca@cola.com> .
```

The LOD2 Stack

tools for publishing and querying LOGD

Publishing your data with the LOD2 Stack

"The LOD2 stack is an integrated distribution of aligned tools which support the lifecycle of Linked (Open) Data from extraction, authoring/creation over enrichment, interlinking, fusing to visualization and maintenance. The stack comprises tools from the LOD2 partners and third parties."

Source: [http://stack.lod2.eu/]

Silk – A tool for linking your data

"*The Silk framework is a tool for discovering relationships between data items within different Linked Data sources.*
Data publishers can use Silk to set RDF links from their data sources to other data sources on the Web."

For download and more information:

http://wifo5-03.informatik.uni-mannheim.de/bizer/silk

Conclusions

- The LOGD and metadata lifecycle should address both the supply and demand side.
- Choosing on which data and metadata to open up means taking into account different dimensions.
- Modelling is about getting the data and metadata structured and reaching an appropriate quality level.
- Publishing is about making the data and metadata public, easily accessible and searchable.
- Data and metadata management should ensure that processes and policies are in place to govern the lifecycle of data and metadata.
- The data publisher should provide means to receive feedback from the data reuser – sensing demand and crowd sourcing quality.
- Several tools are available for modelling and publishing LOGD –few are at production-level quality.

Group questions

http://www.visualpharm.com

Do you have any data and/or metadata governance methodology at the corporate level?

http://www.visualpharm.com

Is there supply and demand for (Linked) Open Government Data in your country? If so, who provides what to whom?

http://www.visualpharm.com

In your opinion, what are the main obstacles to the provision of (Linked) Open Government Data in your country?

Take also the online test here!

Thank you!

...and now YOUR questions?

References

Slide 5:

- GLD Life cycle. W3C. http://www.w3.org/2011/gld/wiki/GLD_Life_cycle

Slide 8:

- Linked Data Cookbook. W3C. http://www.w3.org/2011/gld/wiki/Linked_Data_Cookbook

Slide 14:

- United Nations Statistics Division. COFOG (Classification of the Functions of Government). http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=4

Slide 21:

- Characterization Study of the Infomediary Sector - 2012 Edition. Datos.gob.es. http://datos.gob.es/datos/sites/default/files/files/Estudio_infomediario/121001%20RED%20007%20Final%20Report_2012%20Edition_vF_en.pdf

Slide 21:

- http://data.gov.uk/data
- http://publicdata.eu/
- http://open-data.europa.eu/en/data/dataset

Slide 21:

- http://data.gov.uk/data/site-usage/publisher?month=
- http://data.gov.uk/data/site-usage/dataset

Slide 24-25:

- Cookbook for translating Data Models to RDF Schemas. IAS Programme. https://joinup.ec.europa.eu/community/semic/document/cookbook-translating-data-models-rdf-schemas

Slide 26:

- ADMS Brochure. ISA Programme. https://joinup.ec.europa.eu/elibrary/document/adms-brochure

Slide 27:

- http://lov.okfn.org/

Slide 29:

- DCAT application profile for data portals in Europe. ISA Programme. https://joinup.ec.europa.eu/asset/dcat_application_profile/description

Slide 31:

- 10 Rules for Persistent URIs. ISA Programme. https://joinup.ec.europa.eu/community/semic/document/10-rules-persistent-uris

Slide 32-33:

- Licensing Open Data: A Practical Guide. Naomi Korn and Professor Charles Oppenheim. http://discovery.ac.uk/files/pdf/Licensing_Open_Data_A_Practical_Guide.pdf

Slide 51:

- Announcement of intermediate LOD2 Stack release, March 2012. Martin Kaltenboeck. http://lod2.eu/BlogPost/1034-announcement-of-intermediate-lod2-stack-release-march-2012.html

Slide 52:

- Silk - A Link Discovery Framework for the Web of Data. University of Mannheim. http://wifo5-03.informatik.uni-mannheim.de/bizer/silk/

Further reading (1/2)

Linked Data Cookbook. W3C.

http://www.w3.org/2011/gld/wiki/Linked_Data_Cookbook

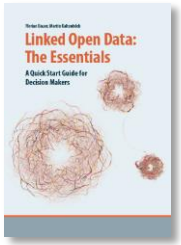
Cookbook for translating Data Models to RDF Schemas. ISA Programme.
https://joinup.ec.europa.eu/community/semic/document/cookbook-translating-data-models-rdf-schemas

Publishing Open Government Data. Daniel Bennett & Adam Harvey.
http://www.w3.org/TR/gov-data/

N. Korn & C. Oppenheim, Licensing Open Data: A Practical Guide.

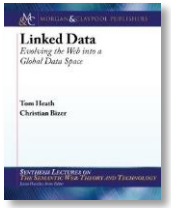
http://discovery.ac.uk/files/pdf/Licensing_Open_Data_A_Practical_Guide.pdf

Further reading (2/2)



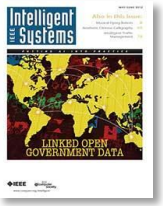
Linked Open Data: The Essentials. Florian Bauer, Martin Kaltenböck.

http://www.semantic-web.at/LOD-TheEssentials.pdf



Linked Data: Evolving the Web into a Global Data Space. Tom Heath and Christian Bizer.

http://linkeddatabook.com/editions/1.0/



Linked Open Government Data. Li Ding Qualcomm, Vassilios Peristeras and Michael Hausenblas.

http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6237454

EUCLID - Course 1: Introduction and Application Scenarios

http://www.euclid-project.eu/modules/course1

Related projects and initiatives (1)

LOD2 Technology Stack, http://stack.lod2.eu/

Open Data Publishing Pipeline DERI, http://sw.deri.ie/content/odpp

W3C Linked Data Cookbook, http://www.w3.org/2011/gld/wiki/Linked_Data_Cookbook

Cookbook for translating Data Models to RDF Schemas, https://joinup.ec.europa.eu/community/semic/document/cookbook-translating-data-models-rdf-schemas

Related projects and initiatives (2)

EUCLID FP7 Project, http://projecteuclid.org/

LOD Around The Clock FP7 project, http://latc-project.eu/

Generic Statistical Business Process Model, http://www1.unece.org/stat/platform/display/GSBPM/Generic+Statistical+Business+Process+Model+Paper

Be part of our team…

Find us on

Open Data Support
http://www.slideshare.net/OpenDataSupport

Open Data Support
http://goo.gl/y9ZZI

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contact@opendatasupport.eu