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# Integration of Heterogeneous Metadata in Europeana

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# Outline

- What is Europeana
- The Europeana data model
- The Europeana Semantic Elements (ESE)
- Case study: the data ingestion in the Europeana prototype
- Conclusion and next steps

# What is Europeana

- European Digital Library
- Open access to the digitized objects of European cultural institutions
- Cross multilingual search European cultural heritage at a single place
- Across cultural domains and across countries
- General public - User centered
- Digital Library technologies + Web 2.0

# What is Europeana

- The Europeana Digital Library will be the result of a number of projects run by different cultural heritage institutions, among them there are:
  - **Athena** an aggregator that helps museums bringing their content to Europeana
  - **APENet** a BPN whose objective is to build an Internet Gateway for Documents and Archives in Europe
  - **EUROPEANAlocal** that aims to improve the interoperability of the digital content held by regional and local institutions
  - **European Film Gateway**: find solutions for providing integrated access to the Europe's cinematographic heritage
- All are part-funded by the European Commission's eContentplus programme.

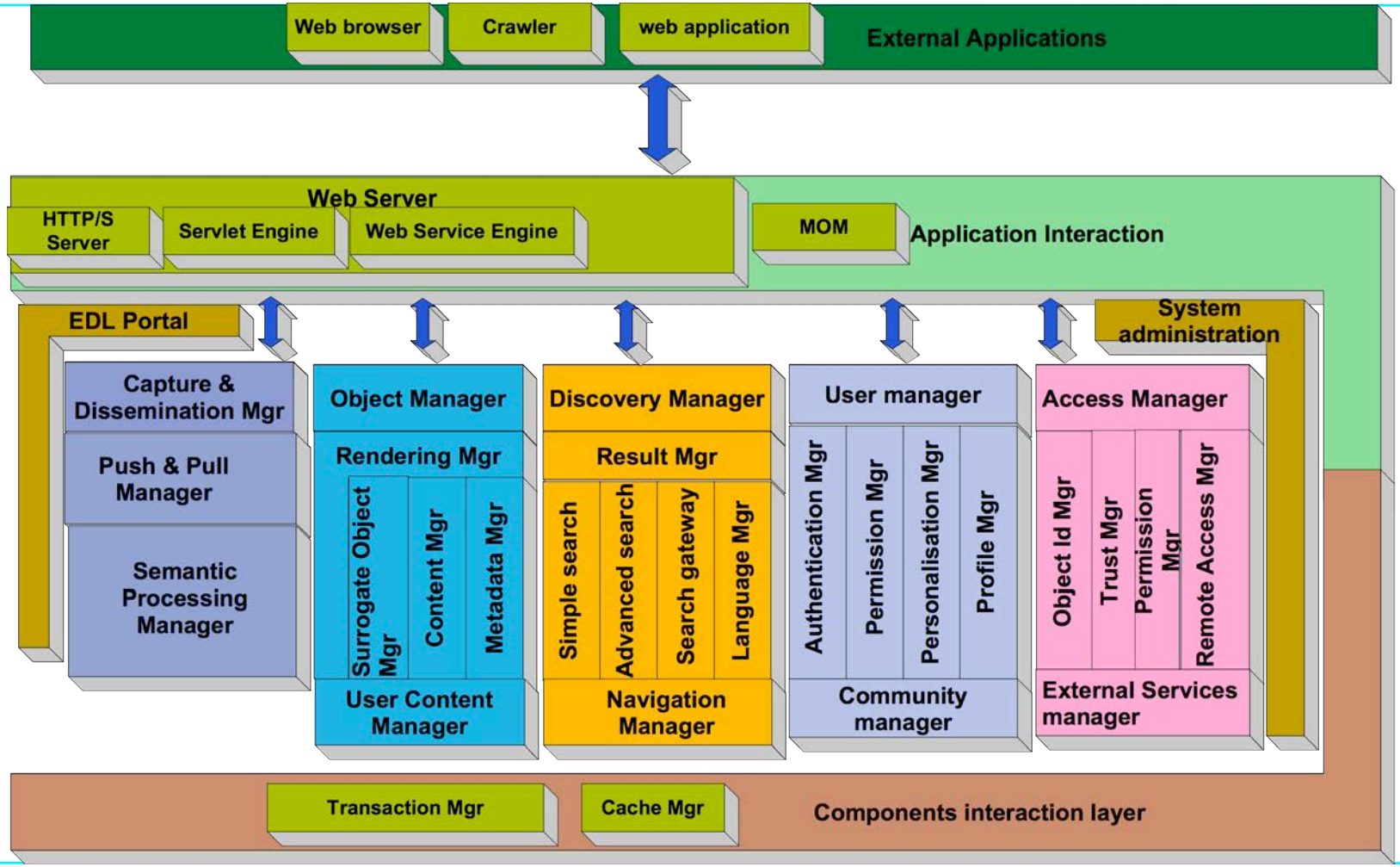
# What is Europeana

- The full implementation of the Europeana is the goal of the two “core technology” projects:
  - **EuropeanaConnect** that will provide the technologies and resources to semantically enrich the digital content in Europeana.
  - **Europeana V1.0** that will implement the technology platform
- They are successors to the **EDLNet** thematic network which created the EDL Foundation and the Europeana prototype (www.europena.eu)
  - in short Europeana v1.0 and EuropeanaConnect will turn the prototype into an operational service

# Europeana architecture

- Europeana is not a Web Portal
- Europeana is a **services platform** providing an Application Program Interface (API) enabling cultural institutions and users to
  - Access Europeana content
  - Provide content to Europeana
  - Build applications using Europeana functionalities for their own use.
- According to DELOS classification Europeana is a Digital Library System (DLS)
- The Europeana Portal is a web application using the Europeana API to access the Europeana Digital Library

# Europeana DLS functional architecture

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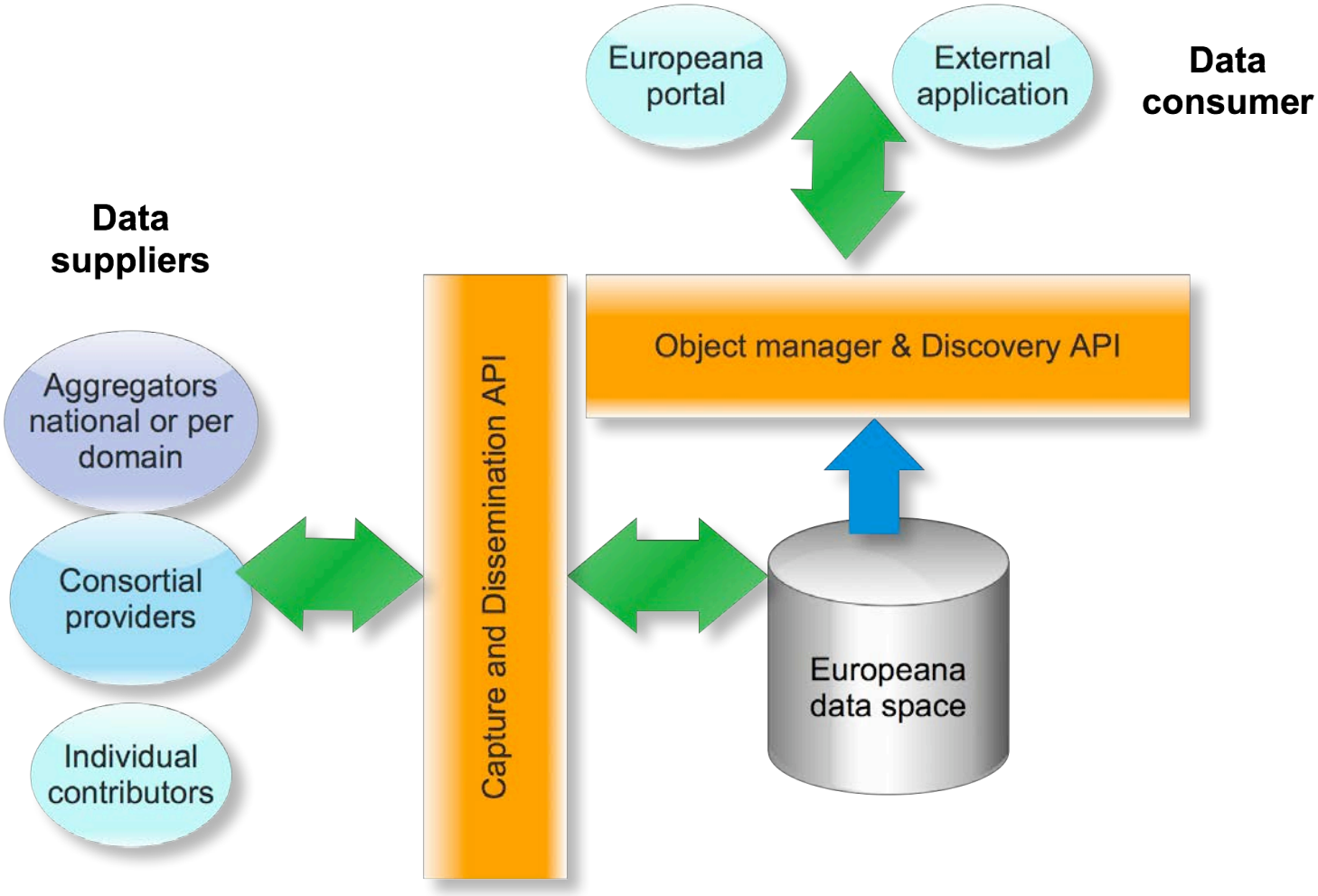
# Europeana data flow



# Europeana data space

- Europeana will create a data space that is a representation of the content providers data spaces
- The Europeana data space will contain Digital Surrogate Objects (DSO) that are defined as follows:
  - "the minimal significant documentary object unit a given content provider is able / willing to identify (in the case of textual object there thus can be surrogates on the level of the entire document, on chapter level or on page, paragraph, sentence or even word levels)" [ EDLNet Deliverable 2.5]
- Each DSO will be a web resource, it will be identified by a URI owned by Europeana.

# Digital Surrogate Objects

- There are several kinds of DSO, depending on the kinds of objects to be represented:
  - Real Physical Object (RPO): the physical object, for instance a painting, a building, a book
  - Digital Representation Object (DRO): a digital object obtained by digitizing an RPO, usually created by the data provider
  - Digital Primary Object (DPO), a "born digital" object, i.e. a digital object that is not a DRO

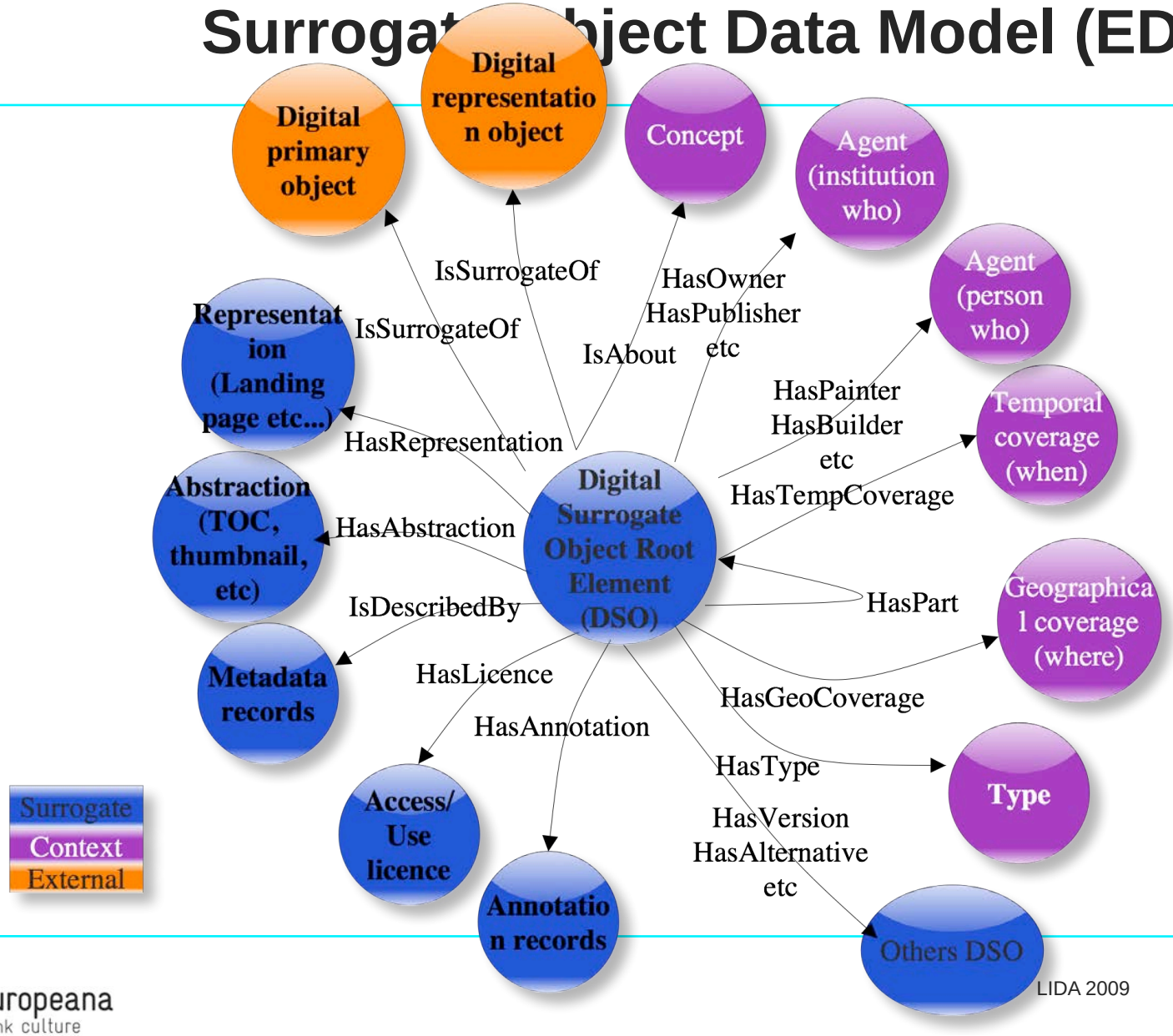
# Digital Surrogate Objects

- Each DSO contains at least an identifier, a link to the Object in the content provider data space, the metadata record describing the object and some elementary technical and licensing information
- There should be a one-to-one correspondence between remote object entities and DSOs
- Surrogates can be linked each others

# Digital Surrogate Objects

- On a very abstract level Europeana can be seen as a large collection of DSOs representing born digital or digitised cultural heritage objects
- Surrogates will be linked to semantic resources  representing concepts as well as to reference entities such as persons, places and periods in time (contextualization)

# Surroga bject Data Model (EDLNet)



# Europeana Semantic Elements

- In EDLNet the Surrogate Data Model has been implemented using the Europeana Semantic Elements (ESE) metadata format
- The ESE, consists of the Dublin Core (DC) metadata elements, a subset of the DC terms and a set of twelve elements which were created to meet Europeana's needs.

# Europeana Semantic Elements

| Source | Element | Refinement(s) |
|---|---|---|
| DC | title | alternative |
| DC | creator | |
| DC | subject | |
| DC | description | tableOfContents |
| DC | publisher | |
| DC | contributor | |
| DC | date | created; issued |
| DC | type | |
| DC | format | extent; medium |
| DC | identifier | |
| DC | source | |
| DC | relation | isVersionOf; hasVersion; isReplacedBy; replaces; isRequiredBy; … |

| Source | Element | Refinement(s) |
|---|---|---|
| DC | coverage | spatial; temporal |
| DC | rights | |
| DC terms | provenance | |
| Europeana | relation | isShownBy; isShownAt |
| Europeana | userTag | |
| Europeana | unstored | |
| Europeana | object | |
| Europeana | language | |
| Europeana | provider | |
| Europeana | type | |
| Europeana | uri | |
| Europeana | year | |
| Europeana | hasObject | |
| Europeana | country | |

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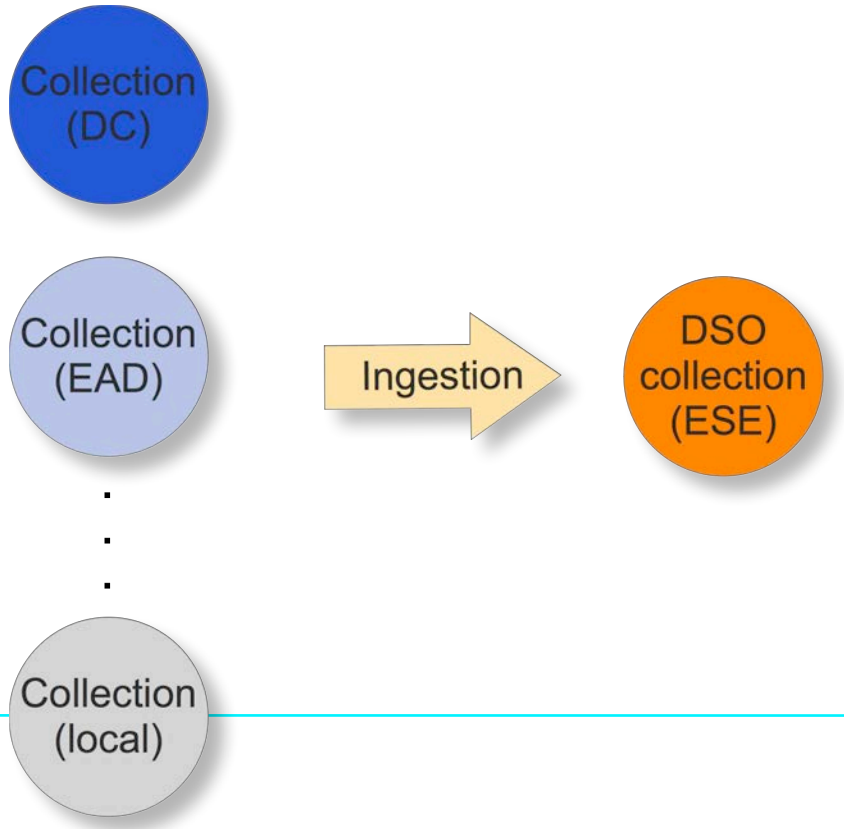
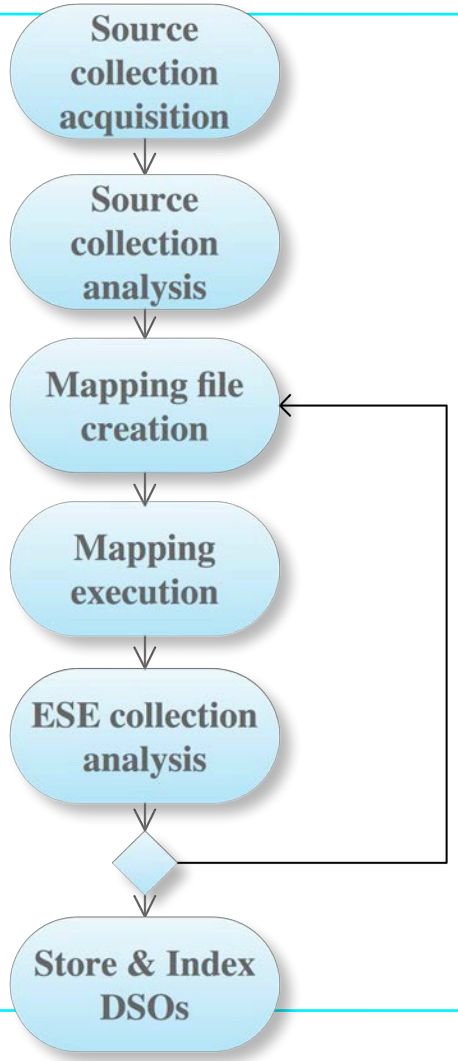
# Europeana Semantic Elements (ESE)

- DSOs are created during the Europeana *data ingestion* process using the information provided by the content suppliers



# EDLNet Data Ingestion Workflow

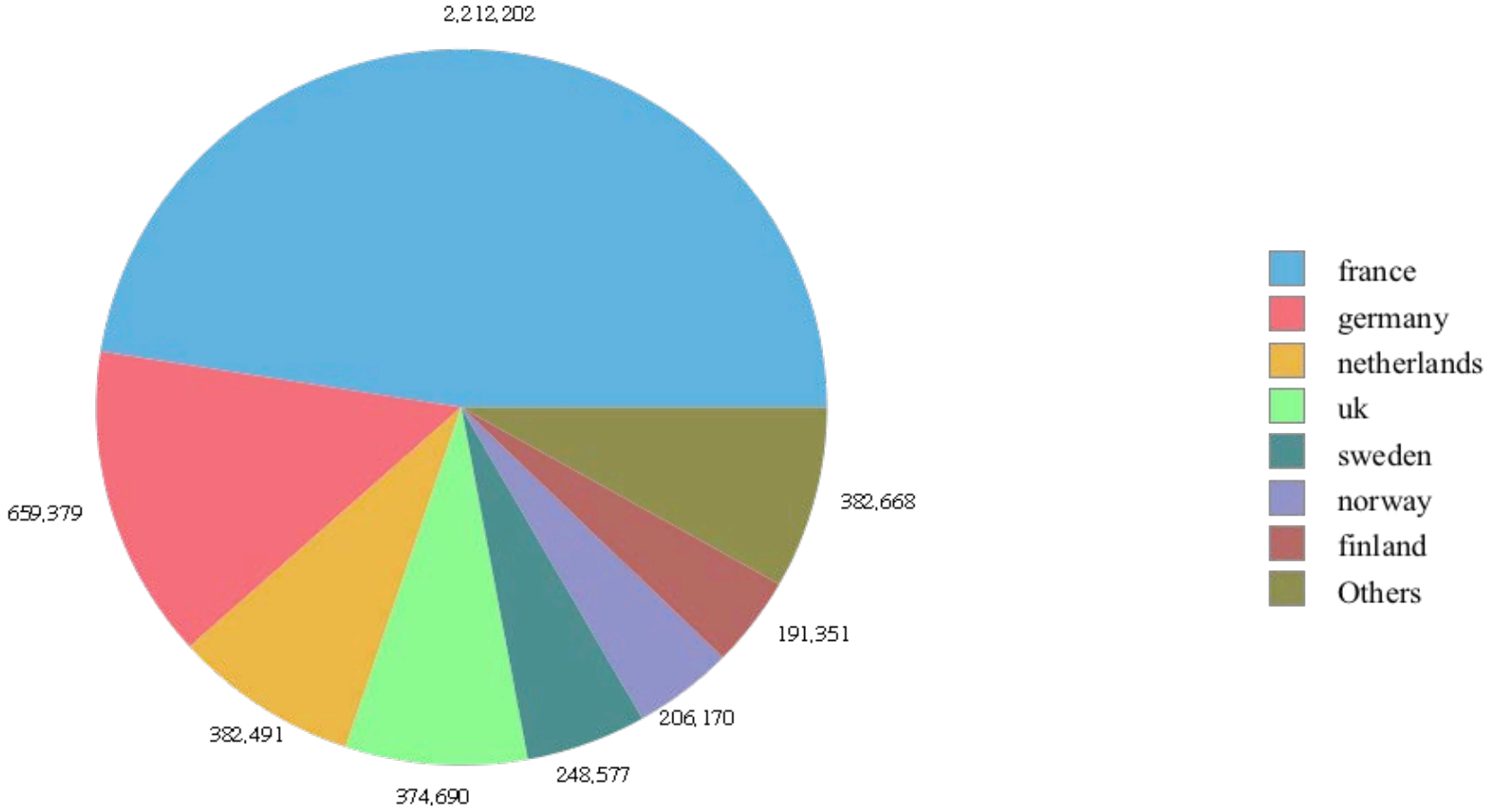
- Source collections are acquired via harvesting or received by content providers as XML files
- The *mapper* checks the source collections and creates the mapping rules
- XSLT is used to implement the mapping
- ESE collections are stored and indexed



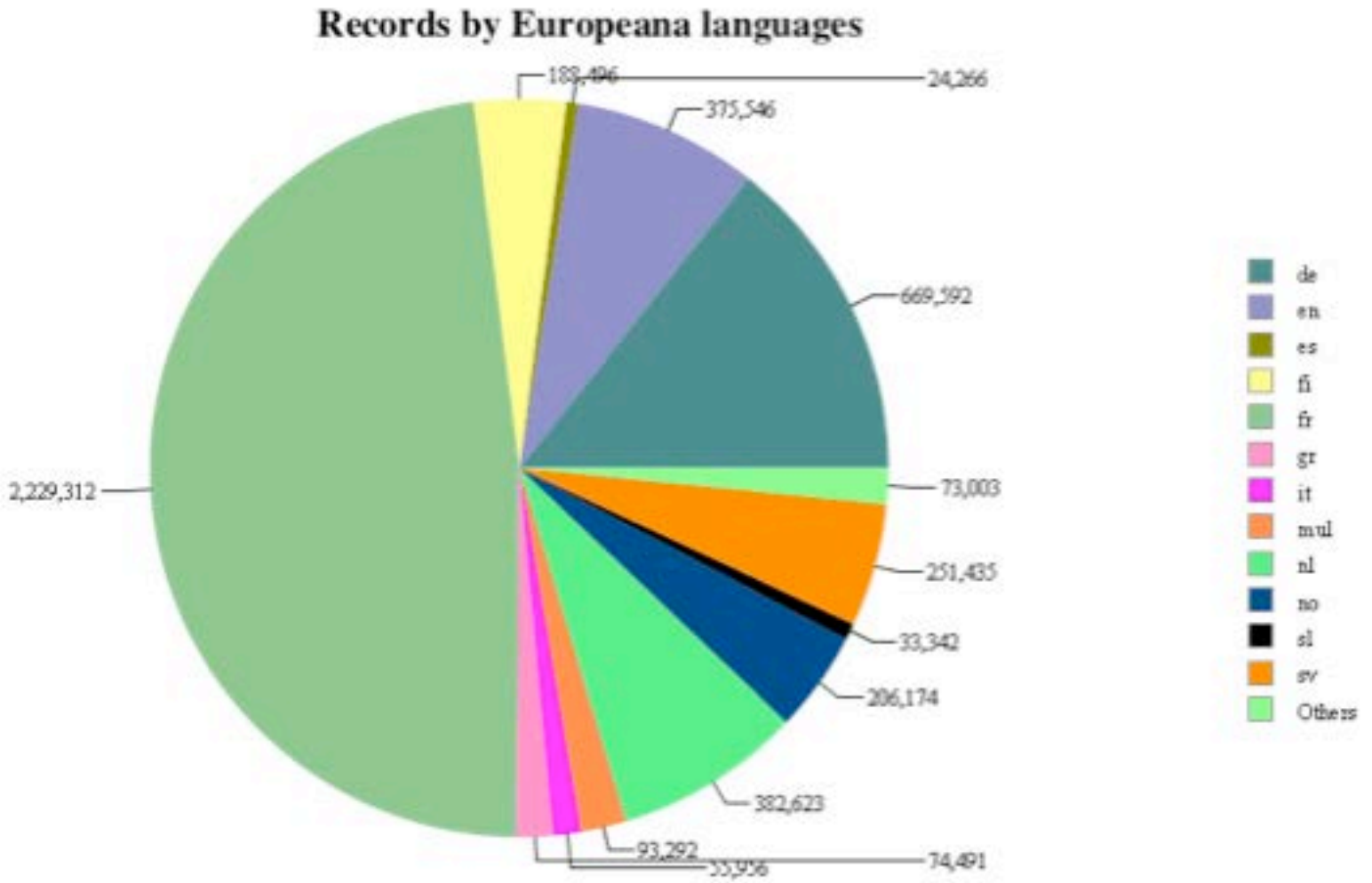
# Europeana prototype data space

- The first Europeana prototype has been presented in November 08 as result of the EDLNet project
  - Next prototype will be released in September 09
- As of April 09, it contains DSOs referring information objects provided by 54 cultural institutions from 24 European countries
  - 4.5 milion of surrogate digital objects stored in the data space
- 15 different metadata formats

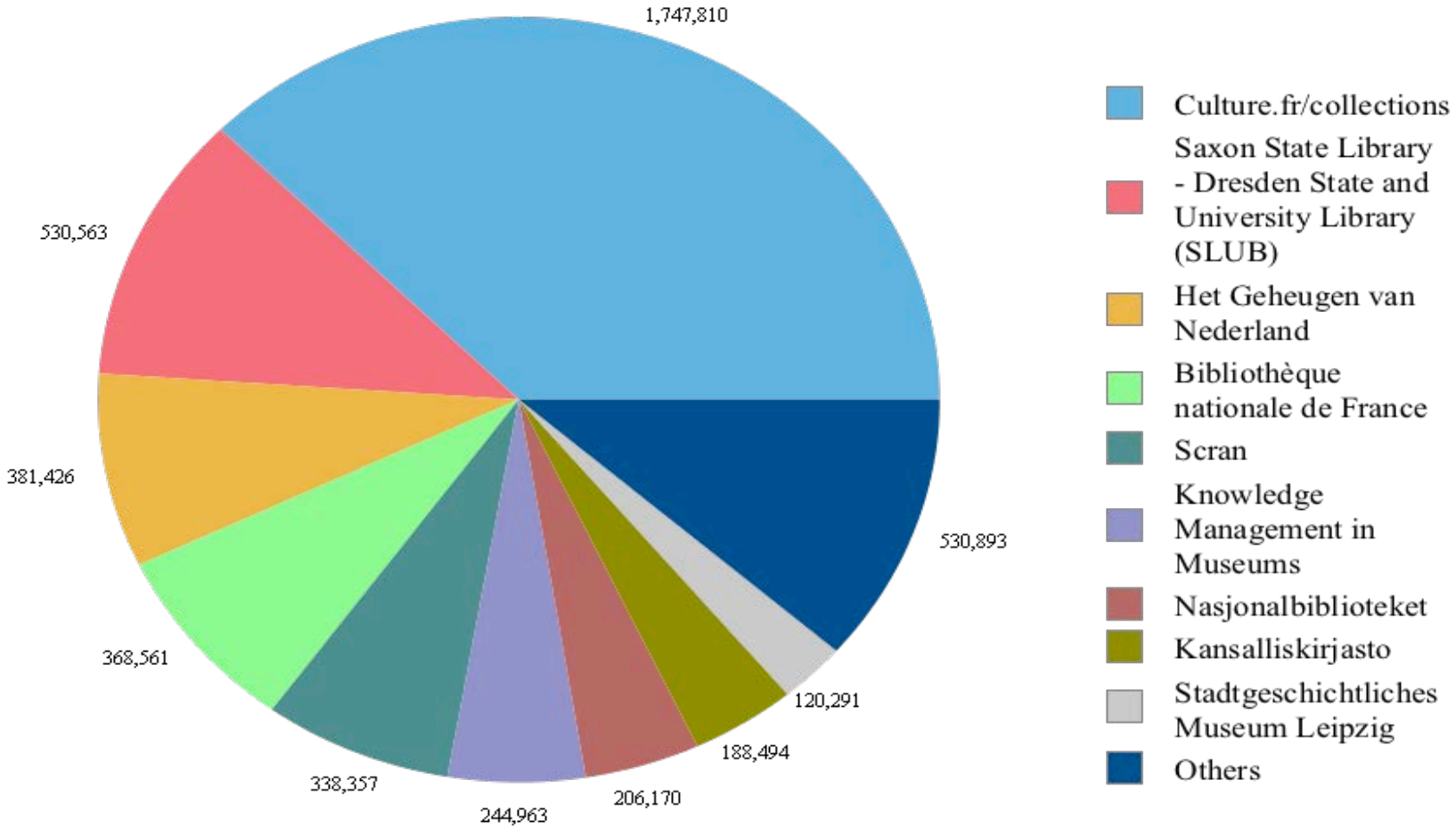
# Heterogeneity: records by countries



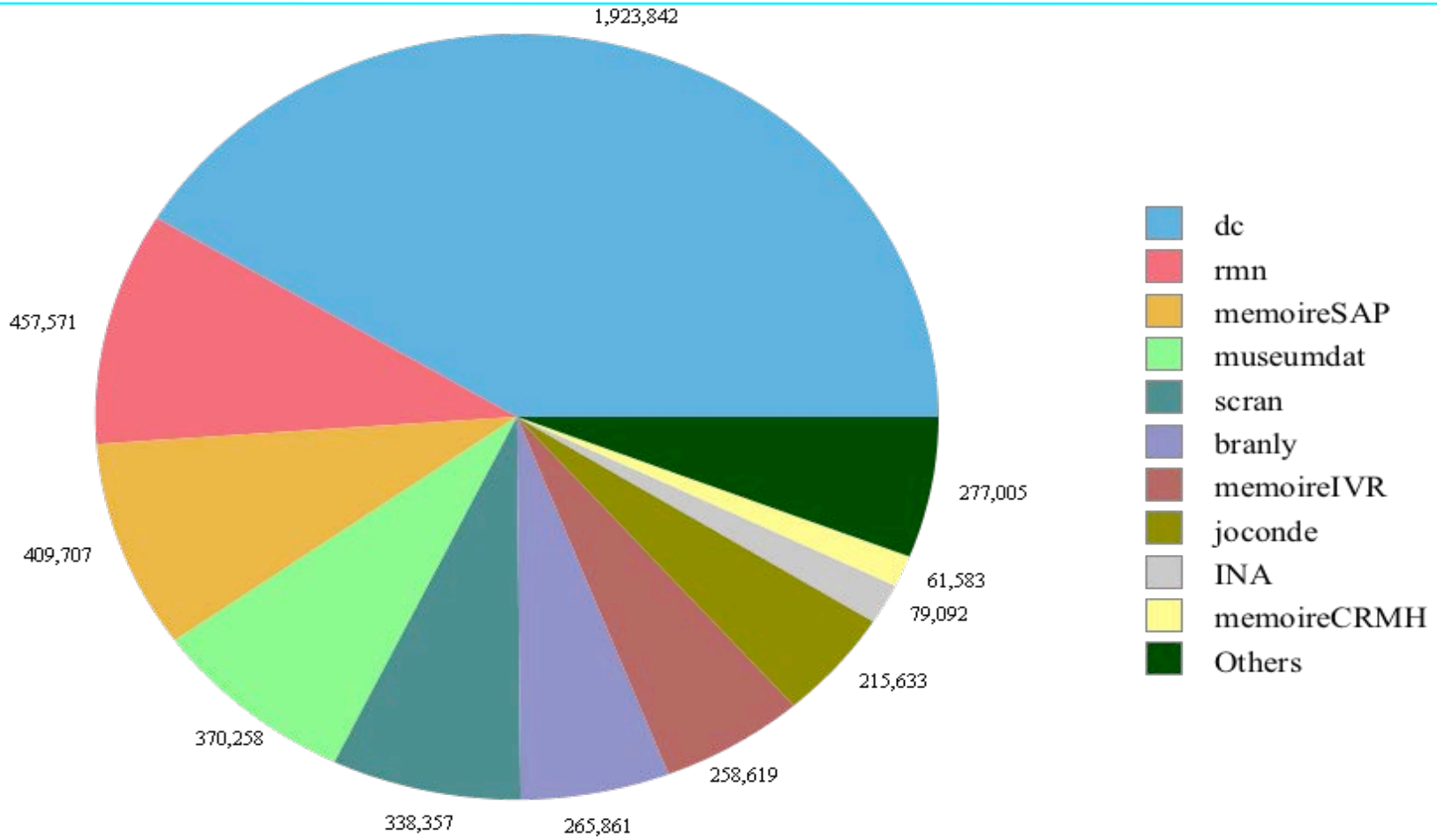
# Heterogeneity: records by languages



# Heterogeneity: records by data providers



# Heterogeneity: records grouped by metadata format



# Source collection snippet: DC

```
<ListRecords>
    <record>
      <dc:title>Από τα γλυκοχαράματα της ζωής μου: Σαλαμίς</dc:title>
      <dc:creator>K. N. Κωνσταντινίδης</dc:creator>
      <dc:subject/>
      <dc:description/>
      <dc:publisher>Νέα Ζωή</dc:publisher>
      <dc:contributor/>
      <dc:date>1970-01-01</dc:date>
      <dc:type>Articles</dc:type>
      <dc:format>image/jpeg</dc:format>
      <dc:identifier>http://xantho.lis.upatras.gr/kosmopolis/index.php/nea_zoi/article/view/
      313 <dc:identifier>
      <dc:source>Νέα Ζωή; Vol 1, No 1 (1904); σελ. 07-08</dc:source>
      <dc:language>gr</dc:language>
      <dc:coverage/>
      <dc:rights/>
    </record>
```

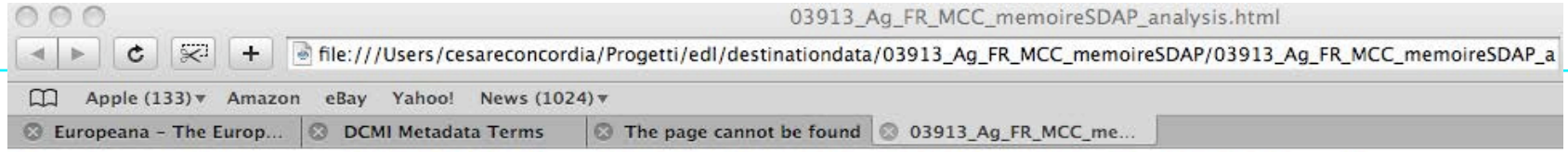
# Example: DC mapping

| Source element | ESE element |
|---|---|
| dc:creator | dc:creator |
| dc:date | dc:date |
| dc:format | dc:format |
| dc:identifier | europeana:isShownAt |
| dc:language | dc:language, europeana:language |
| dc:publisher | dc:publisher |
| dc:source | dc:relation |
| dc:title | dc:title |
| dc:type | dc:type |

# Source collection snippet: MemoireSDAP

```
<BASE>
  <NAME>Mémoire</NAME>
  <DOMAINE>SDAP</DOMAINE>
  <NOTICES>
    <NOTICE ID="AP080050805330033">
        <REF> AP080050805330033 </REF>
        <ADRESSE> rue Petit ; villa "Rosario", ilot A</ADRESSE>
        <AUTP>Richard, Fran√ßoise</AUTP>
        <AUTOR>Delamotte, Patrick (architecte)</AUTOR>
        <COM> Mers-les-Bains </COM>
        <MCL>Secteur sauvegardé</MCL>
        <LEG>cartouche céramique en relief façon "cuir" ; décor briques vernissées.</
  LEG>
        <COULEUR>OUI</COULEUR>
        <LIB>Epoque 19ème</LIB>
        <PAYS>France</PAYS>
        <INSEE>80533</INSEE>
        <TYPEIMG>JPG ; oui</TYPEIMG>
        <TYPSUPP>DS1</TYPSUPP>
        <REFIM>AP080_050805330033NUCA_P.JPG,DS1,,</REFIM>
        <VIDEO>/Wave/image/memoire/1047/ap080_050805330033nuca_p.jpg;/Wave/
  image/memoire/1047/ap080_050805330033nuca_v.jpg</VIDEO>
        ...
    </NOTICE>
    ....
```

# Analysis file of the MemoireSDAP collection




## Europeana.eu analysis file for 03913_Ag_FR_MCC_memoireSDAP.xml

**This is the list of properties. Click on it to see the top 100 values of each property. Click here to sh**

**/BASE/DOMAINE**, total values: 1, All Unique

**/BASE/NAME**, total values: 1, All Unique

**/BASE/NOTICES/NOTICE/ADRESSE**, total values: 642

**/BASE/NOTICES/NOTICE/AUTOR**, total values: 148

| Description | Value |
|---|---|
| Xpath: | /BASE/NOTICES/NOTICE/AUTOR |
| QName path: | BASE;NOTICES;NOTICE;AUTOR |

| Value | Occurances of this value | Coverage records, % |
|---|---|---|
| Clémence | 113 | 76 |
| Patrick, Delamotte (Architecte) | 30 | 20 |
| Patrick, Delamotte (architecte) | 4 | 2 |
| Delamotte, Patrick (architecte) | 1 | 0 |



**/BASE/NOTICES/NOTICE/AUTP**, total values: 645

# Example: MemoireSDAP mapping

| Source element | ESE Element | Comment |
|---|---|---|
| ADRESSE | europeana:unstored | |
| AUTOR | dc:creator | |
| AUTP | dc:contributor | |
| DENO | dc:subject | |
| DIFF | dc:rights | |
| DOM | europeana:unstored | |
| IDPROD | dc:source | |
| LEG | dc:description | |
| LIB | europeana:unstored | |
| LOCA | dc:description | |
| REF | europeana:isShownAt | Prefix the value with http://www.culture.gouv.fr/public/mistral/memoire_fr?ACTION=CHERCHER& |
| VIDEO | europeana:object_&&_ europeana:isShownBy | take the first value before the ";" and prefix it with 'http://www.culture.gouv.fr' |

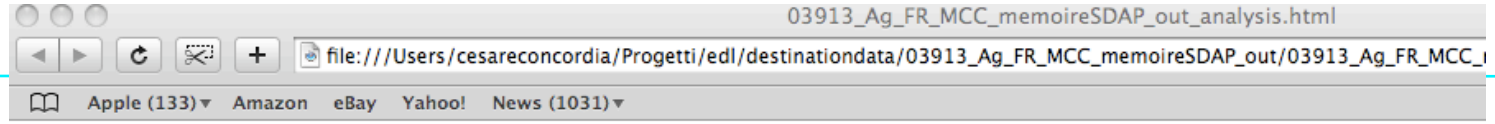
# XSLT snippet

```
…
<xsl:template match="BASE">
  <metadata>
    <xsl:comment>europeana:type has 'image' value </xsl:comment>
    <xsl:apply-templates select="NOTICES/NOTICE"/>
  </metadata>
</xsl:template>
<xsl:template match="NOTICES/NOTICE">
  <record>
    <xsl:apply-templates select="DENO"/>
    <xsl:apply-templates select="IDPROD"/>
    <xsl:apply-templates select="ADRESSE"/>
    <xsl:apply-templates select="AUTOR"/>
    <xsl:apply-templates select="AUTTI"/>
    <xsl:apply-templates select="COM"/>
    <xsl:apply-templates select=”VIDEO"/>
    …
```

# XSLT Snippet

```
<xsl:template match="VIDEO">
  <europeana:isShownBy >
    <xsl:text>http://www.culture.gouv.fr</xsl:text><xsl:value-of select="substring-
  before(.,';')"/>
</europeana:isShownBy>
<europeana:object >
    <xsl:text>http://www.culture.gouv.fr</xsl:text><xsl:value-of select="substring-
  before(.,';')"/>
</europeana:object>
</xsl:template>
```

# Analysis file of the mapped ESE collection




**Europeana.eu analysis file for 03913_Ag_FR_MCC_memoireSDAP_out.xml**

**This is the list of properties. Click on it to see the top 100 values of each property. Click he**

**/metadata/record/dc:contributor**, total values: 645

**/metadata/record/dc:creator**, total values: 148

| Description | Value |
|---|---|
| Xpath: | /metadata/record/dc:creator |
| QName path: | metadata;record;{http://purl.org/dc/elements/1.1/}creator |

| Value | Occurances of this value | Coverage records, % |
|---|---|---|
| Clémence | 113 | 76 |
| Patrick, Delamotte (Architecte) | 30 | 20 |
| Patrick, Delamotte (architecte) | 4 | 2 |
| Delamotte, Patrick (architecte) | 1 | 0 |

**/metadata/record/dc:description**, total values: 645

**/metadata/record/dc:rights**, total values: 645

**/metadata/record/dc:subject**, total values: 1290

**/metadata/record/dcterms:spatial**, total values: 1935

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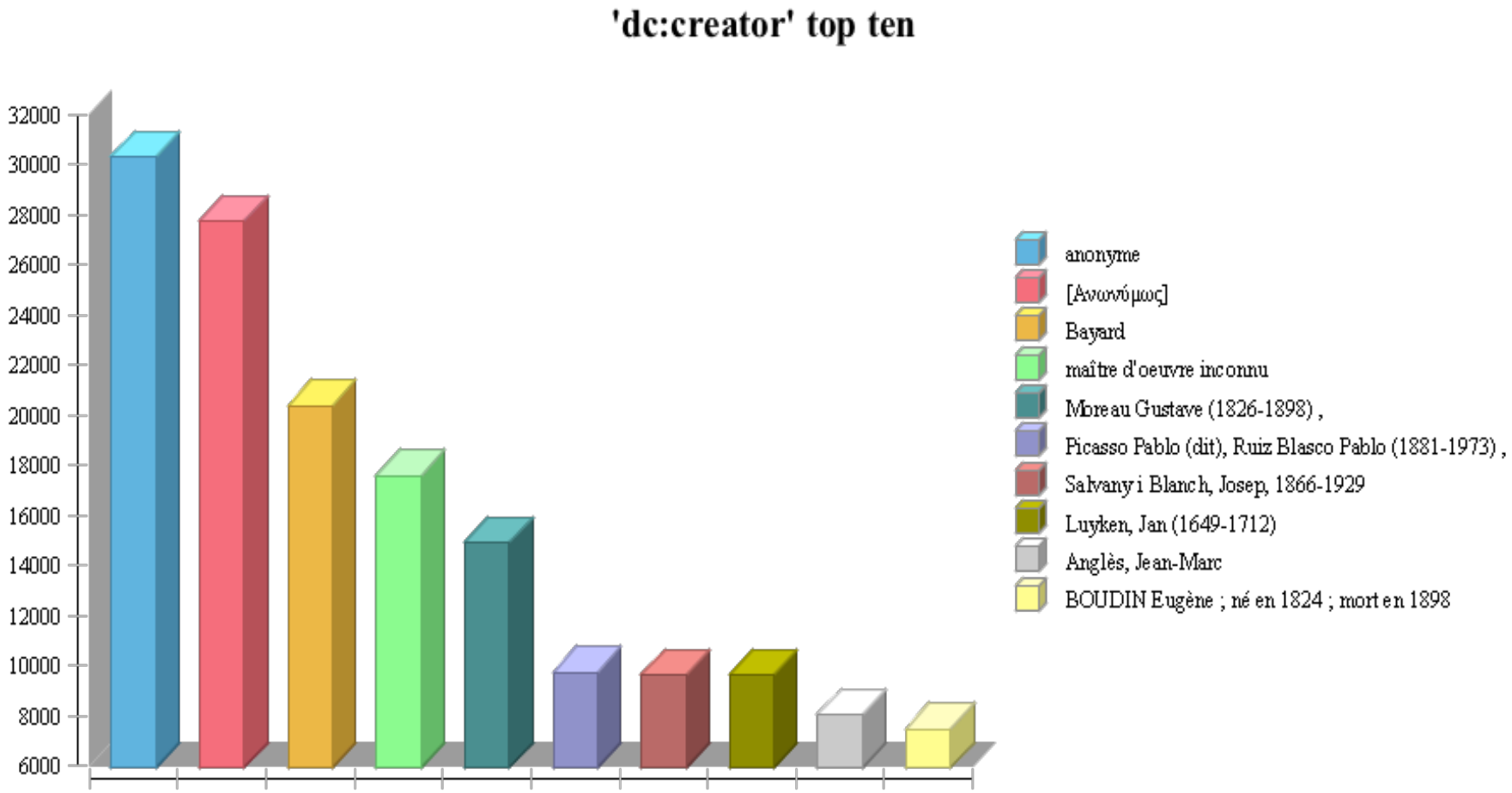
# Theory and Practice

- Lot of *manual* work for writing the mapping rules and implement them
- Often mapping files cannot be reused
  - Same metadata element have different kind of values for different collections
- It is difficult distinguish metadata records describing DR, DP or RP objects
- Many content providers provide minimal metadata records, it is difficult to build significant DSOs
- Few relationships among digital objects in the metadata

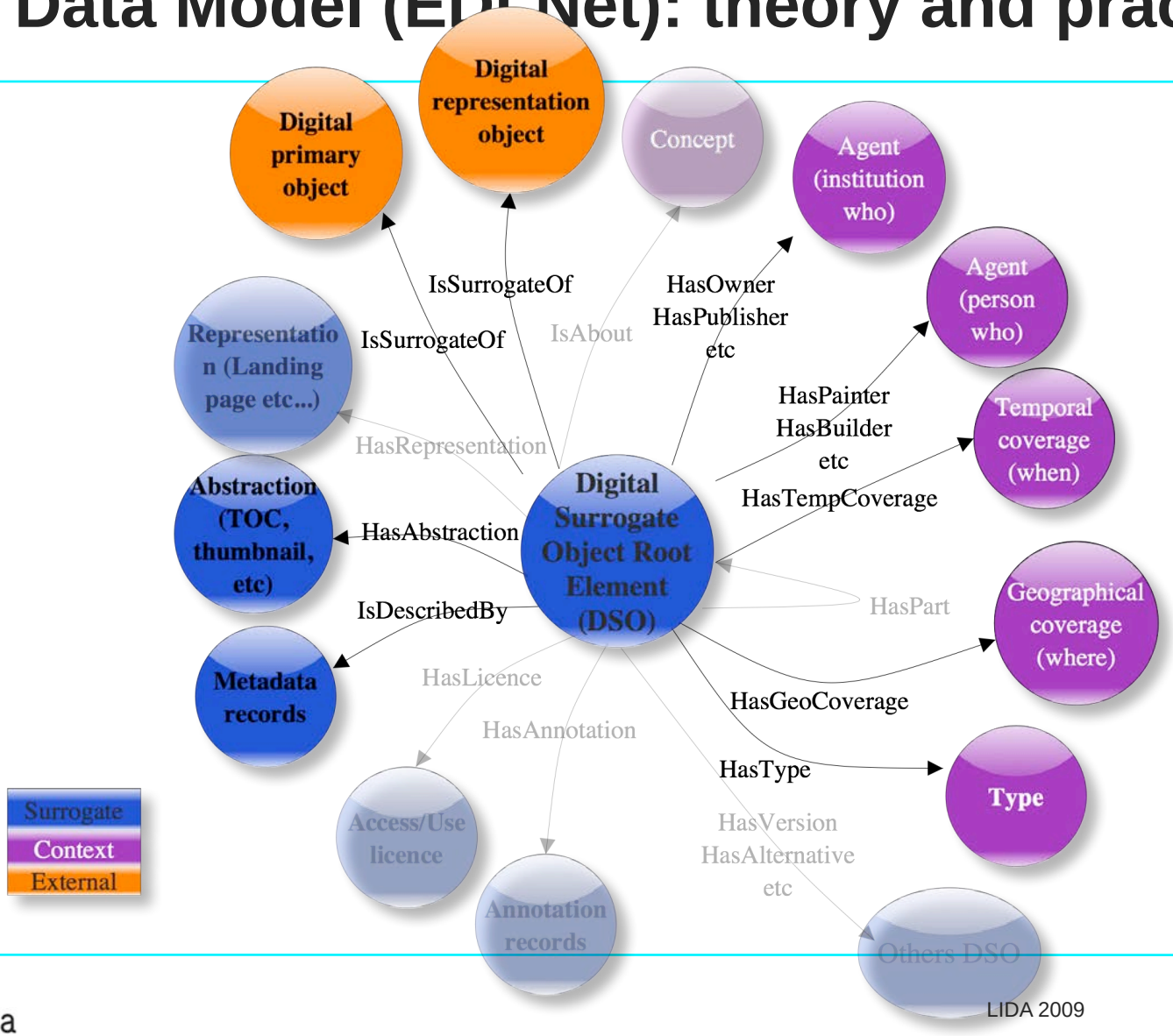
# Theory and Practice

- Surrogates contextualization is a complex task
  - Implicit contextualization i.e. matching elements and attributes values with (few) classification schemes and/or authority files has been applied to several collections
  - Explicit contextualization i.e. using elements values directly linking to semantic resources (ex. IsAbout)  has been in practice never applied
- Need to adopt authority files

# Data normalization problem: example



# DSO Data Model (EDL Net): theory and practice



# Ingestion: from EDLNet to Europeana

- The DSO data model is currently being reviewed, it should move from DC to CIDOC-CRM
  - Extracting and adding snippets (research)
  - Provenance
  - Events
  - Model adopted for Europeana will be released in September 09
- More involvement of content providers in the ingestion workflow (EuropeanaConnect)
- Extracting knowledge from the data space to contextualize and create relationships among DSOs (research)
- Try to make the mapping a semi-automatic process (research)
- Going open source
  - Europeana Labs

# Acknowledgements


- The Digital Surrogate Object model has been defined by WP leaders of EDLNet Work Package 2: Makx Dekkers, Stefan Gradmann and Carlo Meghini and reviewed by EDLNet members
- The ESE model has been defined by Go Sugimoto (EDL Office) EDLNet Interoperability Manager and reviewed by EDLNet members.
- The xml-analyzer program has been developed by Gerald de Jong and Sjoerd Siebinga (EDL Office).

- Thanks