

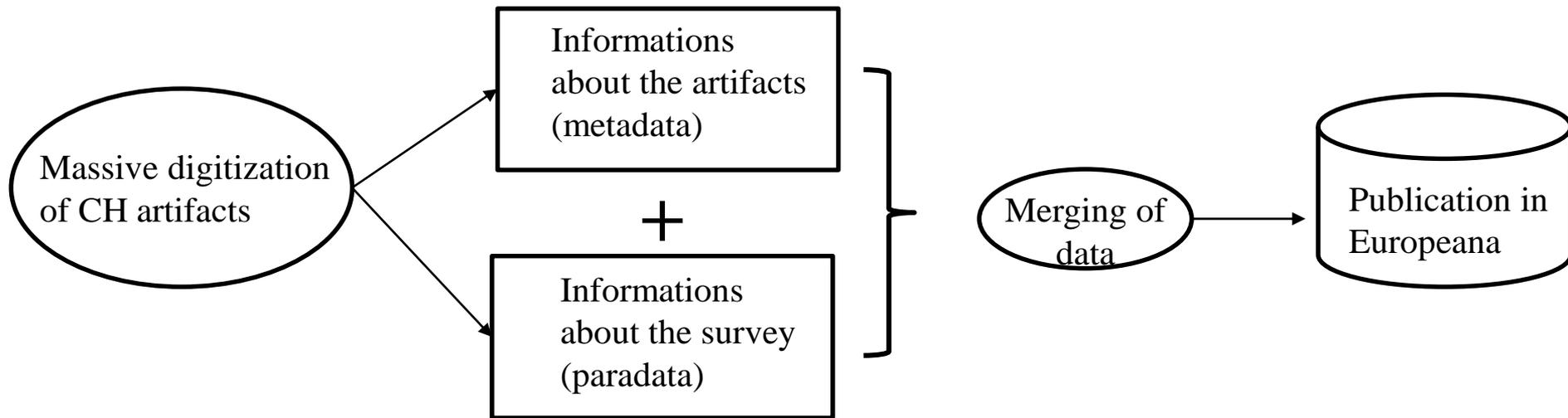


## The last mile of 3DIcons: making available 3D contents and their metadata through Europeana

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- ❑ **Europeana** is an internet portal that acts as an interface to millions of books, paintings, museum objects and archival records that have been digitized throughout Europe;
- ❑ The **main goal** of 3D Icons is to make available on Europeana a significant amount of accurate **digital models** and developing a **metadata schema** able to capture all the semantic present in the digitations process (provenance) and in understanding and interpretation of digital objects (**paradata**).





## Metadata and paradata

- ❑ The Metadata is "data about data". The main purpose of metadata is to facilitate in the discovery of relevant information about one or more aspects of the data such as:
  - description of the object;
  - date of creation;
  - material;
  - measures;
- ❑ The Paradata are related to the survey and are about the process by which the survey data were collected, such as:
  - type of technique (image based or range based);
  - type of equipment (model of the camera, lenses used, triangulation or ToF laser scanner, etc.).

Metadata describes the physical object while paradata the way the physical object was surveyed.



# Repository of Archaeological Icons

**The Archaeological Museum** in Milan is settled upon a complex historical stratification of archeological ruins (post 291 AD), tangible sign of the ancient role of Milan as Capital of the Western Roman Empire (286 – 402 AD).

The Museum contains a relevant collection of **more than 1000 archaeological** epigraphs, statues, mosaics, furniture and potteries, related to Greek, Etruscan, Roman and Medieval historical periods.



**Most of the metadata are already existing**

For the acquisition of the artefacts and the architecture were used:

Imaged-based  
technique (most  
used)



**Small – Medium scale**

Sheet of light-based system



ToF system



**Architecture scale**

**Collection of paradata**



## Metadata collection

- ❑ Most of the Museum content was previously catalogued according to a standard defined by the Cultural Heritage Information System of the Lombardia Region (SIRBeC);
- ❑ Other data are instead stored in an Access DB;
- ❑ All the information are written in Italian, so we had to use our native language to produce the metadata for Europeana;
- ❑ The export of the data stored in the two different database was done in xml format, one of the format needed to map our collected data and prepare them for the publication in Europeana;
- ❑ The data within the two xml file are differently organized.



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<property name="focal_length" value="60"/>
<property name="fixed" value="false"/>
<calibration type="frame" class="adjust"
  <resolution width="5184" height="3456"/>
  <fx>1.5651028725452679e+004</fx>
  <fy>1.5651028725452679e+004</fy>
  <cx>2.6394344508808713e+003</cx>
  <cy>1.7602915596135783e+003</cy>
  <k1>1.5474090910639979e-002</k1>
  <k2>-4.5520069685238402e+000</k2>
  <k3>4.9137696790999698e+001</k3>
</calibration>

```

```

</sensor>
</sensors>
<cameras>

```

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<camera id="0" label="_MG_5163.jpg" sensor_id="0" enabled="true">
  <resolution width="5184" height="3456"/>

```

```

  <frames>

```

```

    <frame>

```

```

      <image path="../../../E_0.9.40014_survey/_MG_5163.jpg"/>

```

```

      <meta>

```

```

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        <property name="Exif/FNumber" value="22"/>
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        <property name="Exif/Software" value="Adobe Photoshop Lightroom 5.0 (Windows)"/>
        <property name="System/FileModifyDate" value="2014:03:14 12:53:02"/>
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```

```

      </meta>

```

```

    </image>

```

```

    <mask path="mask0.png"/>

```

```

    <thumbnail path="thumb0.png"/>

```

```

  </frame>

```

```

<property name="Exif/ApertureValue" value="8.918863"/>
<property name="Exif/DateTime" value="2014:03:14 12:53:01"/>
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<property name="Exif/Make" value="Canon"/>
<property name="Exif/Model" value="Canon EOS 60D"/>
<property name="Exif/ShutterSpeedValue" value="-4.906891"/>

```



## Other data

In our ftp server we stored all the data concerning the model:

- images (survey),
- Agisoft Photoscan projects (processing),
- the two different model (high and low resolution),
- the 3D pdf,
- the thumbnail,
- the paradata (A\_0.9.1075\_doc.xml);
- all the information that will be displayed in the landing page.

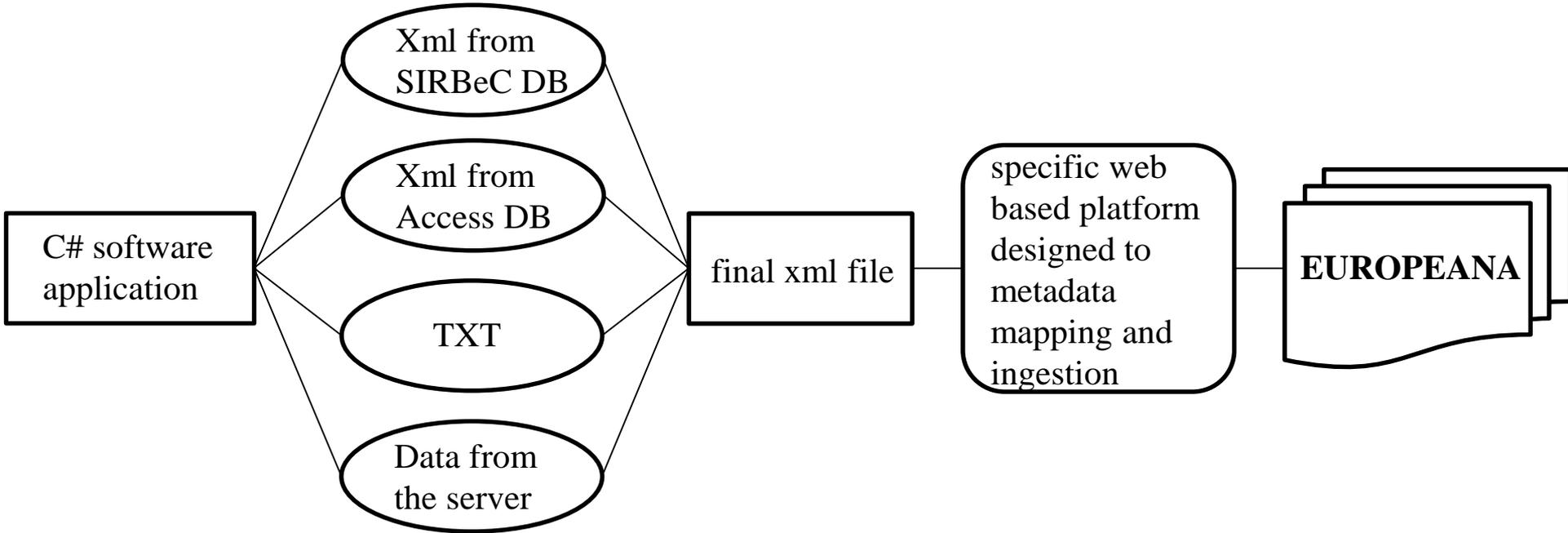
A screenshot of a file explorer window showing a directory listing for 'A\_0.9.1075'. The window has two columns: 'Nome file' and 'Dimensi...'. The files listed are:

Nome file	Dimensi...
..	
A_0.9.1075_model	
A_0.9.1075_model_low	
A_0.9.1075_processing	
A_0.9.1075_survey	
masks	
A_0.9.1075_3d.pdf	68.857.3...
A_0.9.1075_doc.xml	225.604
A_0.9.1075_model.rar	68.380.9...
A_0.9.1075_model_data.txt	193
A_0.9.1075_realimg_01.jpg	358.257
A_0.9.1075_realimg_01_thumbnail.jpg	118.094
A_0.9.1075_realimg_02.jpg	428.542
A_0.9.1075_realimg_02_thumbnail.jpg	130.948
A_0.9.1075_report.pdf	2.746.919
A_0.9.1075_thumbnail.jpg	136.183
RARL_G0230-00076.pdf	43.227

We created a txt file with all the data about the Collection Information and the extra records regarding the Activity.

```
collezione_MAM.txt - Blocco note
File Modifica Formato Visualizza ?
gruppo_lavoro Politecnico di Milano - Laboratorio di Reverse Engineering
nome_contatto Gabriele Guidi
ruolo_contatto Responsabile Scientifico
nome_organizzazione_contatto Politecnico di Milano - Dipartimento di Meccanica
indirizzo_edificio PPG
indirizzo_Ncivico 2
indirizzo_via Via La Masa
indirizzo_città Milano
indirizzo_cap 20156
indirizzo_stato Italia
telefono_contatto "+390223997183"
email_contatto gabriele.guidi@polimi.it
diritti_collezione_digitale "La proprietà dei diritti è: Oggetto fisico: Comune di Milano; Oggetto digitale: Politecnico di Milano; Metadati: Comune di Milano (rilasciati con licenza CC0)"
statement_1 This collection holds a selection of objects of the Archaeological Museum of Milan digitized by the Reverse Engineering 3D LaB of Polytechnic of Milan.
statement_2 Questa collezione contiene una selezione di oggetti del Museo Archeologico di Milano digitalizzati in 3D dal laboratorio di Reverse Engineering del Politecnico di Milano
data_creazione_collezione_digitale 01/02/2012
keywords_1 Archaeology
keywords_2 Roman (ancient) Problema: come facciamo a distinguere le varie sezioni? Se generassimo un TXT con le due colonne INVN e Sezione dal nostro drive?
diritti_metadati_comune I metadati sono proprietà del Comune di Milano
right_CC0 CC0 - Universal Public Domain Dedication
tipo_HA_eng Archaeological artifact
tipo_HA_it Reperto archeologico
tipo_misura_1 larghezza
tipo_misura_2 altezza
tipo_misura_3 profondità
DR_1_descrizione Texturized 3D PDF
DR_1_ruolo_gruppo_lavoro Autore del PDF 3D
DR_1_tipo_modello PDF 3D
DR_1_formato_modello pdf
right_limitato Limitato
DR_2_descrizione texturized 3D model
DR_2_ruolo_gruppo_lavoro Autore del modello texturizzato 3D
DR_2_tipo_modello 3D model
DR_2_formato_modello_1 obj
DR_2_formato_modello_2 mtl
DR_2_formato_modello_3 jpg
attività_descrizione rilievo tramite immagini
attività_scopo ricostruzione tramite fotogrammetria/SfM
attività_tipo_evento acquisizione del bene
attività_ruolo_gruppo_lavoro gruppo di ricerca
attività_medodo_attività rilievo tramite immagini
attività_tecnica fotogrammetria
attività_materiale fotocamera digitale
```

# Merging heterogeneous data





# Export of the data

Paradata

Data from the xml exported from the SIRBeC DB

Data from the xml exported from the Access DB

The screenshot shows a window titled 'Form1' with a tabbed interface. The 'XMLData' tab is active, displaying a table with the following columns: ID, date, model, flength, pdf\_date, pdf\_size, obj\_date, obj\_size, 3D\_CAPT, HIGH\_RE, HIGH\_RE, LOW\_RE, and TEXTURI. The table contains 12 rows of data. On the left side of the window, there are three buttons: 'Ftp', 'Compile XML', and 'Compile XML2'. Red boxes highlight these buttons, and red arrows point from the text labels above to them.

ID	date	model	flength	pdf_date	pdf_size	obj_date	obj_size	3D_CAPT	HIGH_RE	HIGH_RE	LOW_RE	TEXTURI
A_0.9.115	2014-02...	Canon ...	50	2014-05...	11 MB	2014-05...	206 MB	Photogr...	2.000.000	0,33 mm	203.499	4096 x 4...
A_0.9.116	2014-02...	Canon ...	50	2014-05...	1 MB	2014-05...	109 MB	Photogr...	1.072.516	0,29 mm	25.156	4096 x 4...
A_0.9.119	2014-02...	Canon ...	50	2014-05...	3 MB	2014-05...	155 MB	Photogr...	1.508.536	0,27 mm	42.286	4096 x 4...
E_0.9.4...	2014-03...	Canon ...	20	2014-05...	3 MB	2014-05...	190 MB	Photogr...	1.852.460	1,1 mm	79.374	4096 x 4...
E_0.9.4...	2014-03...	Canon ...	50	2014-05...	4 MB	2014-05...	219 MB	Photogr...	2.124.484	0,34 mm	77.038	4096 x 4...
E_0.9.4...	2014-02...	Canon ...	60	2014-05...	3 MB	2014-05...	205 MB	Photogr...	2.124.484	0,21 mm	62.384	4096 x 4...
E_0.9.4...	2014-03...	Canon ...	50	2014-05...	4 MB	2014-05...	204 MB	Photogr...	1.990.097	0,31 mm	82.021	4096 x 4...
A_0.9.1...	2013-09...	Canon ...	20	2014-05...	5 MB	2014-05...	206 MB	Photogr...	2.008.670	0,4 mm	103.256	4096 x 4...
A_0.9.4...	2013-03...	NEX-5N	18	2014-05...	6 MB	2014-05...	205 MB	Photogr...	2.000.000	0,33 mm	135.228	4096 x 4...

GUI of the C# software application

```

<accessRights>CC0 - Uni
</metadataRights>
</recordInformation>
<appellation>
  <name>statuetta</name>
  <id>A_997.01.356</id>
</appellation>
<description_1>Argilla depu
Eros fanciullo seduto su un cigno,
sulle spalle ed il capo coperto da
poggia su una base.</description_1>
<description_2>Priva delle
</description_2>
<description_3>Delivering m
</description_3>
<generalType>Reperto archeo
<provenance>il proprietario
<characters>
  <heritageAssetType_1>Arch
  <heritageAssetType-1>
    <lang>EN</lang>
  </heritageAssetType-1>
  <heritageAssetType_2>Repe
  <heritageAssetType-2>
    <lang>IT</lang>
  </heritageAssetType-2>
  <materials>argilla depura
<temporal>
  <periodName>sec. III a.
  <displayDate>sec. III a
</temporal>
<dimensions>
  <measurementType_1>larg
  <measurementType_2>alte
  <measurementType_3>prof
  <units>cm</units>
  <value_1>5</value_1>
  <value_2>15,2</value_2>
  <value_3>5</value_3>
</dimensions>

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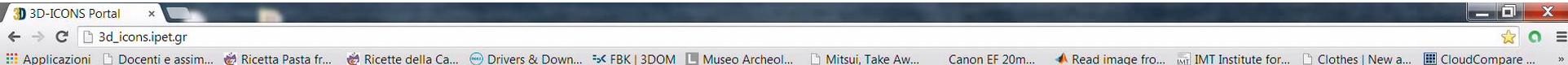
```

</metadataRights>
</recordInformation>
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  <name>digitalizzazione di A 997.01.385</name>
  <id>A_997.01.385_ACT</id>
</appellation>
<description>rilievo tramite immagini<lang>IT</lang></description>
<hasGeneralPurpose>Photogrammetric reconstruction. Delivering models for different users:
a)High resolution models for researchers; b)Low resolution for general public.</hasGeneralPurpose>
<eventType>acquisizione del bene</eventType>
<actors>
  <name>POLIMI</name>
  <roles>gruppo di ricerca</roles>
</actors>
<consistsOf>
  <hadSpecificPurpose>no data</hadSpecificPurpose>
  <startDate>2013-09-30</startDate>
  <endDate>2014-05-11</endDate>
  <methods>rilievo tramite immagini</methods>
  <techniques>fotogrammetria/SfM</techniques>
  <materials>fotocamera digitale</materials>
  <equipment_01>50</equipment_01>
  <equipment_02>Canon EOS 5D Mark II</equipment_02>
</consistsOf>
  <occurredAt>no data</occurredAt>
  <happenedAt>no data</happenedAt>
  <wasPresentAt>no data</wasPresentAt>
  <hasPart>no data</hasPart>
  <isPartOf>no data</isPartOf>
  <hasCreated>no data</hasCreated>
  <dcRelation>no data</dcRelation>
</ACT>
<EXTRA>
  <_x0033_D_CAPTUREING_TECHNIQUE>Photogrammetry</_x0033_D_CAPTUREING_TECHNIQUE>
  <HIGH_RESOLUTION_MODEL_Polygons>2.529.032</HIGH_RESOLUTION_MODEL_Polygons>
  <HIGH_RESOLUTION_MODEL_Resolution>0,07 mm</HIGH_RESOLUTION_MODEL_Resolution>
  <LOW_RESOLUTION_MODEL_Poligons>123.010</LOW_RESOLUTION_MODEL_Poligons>
  <TEXTURE_SIZE>4096 x 4096 pixels</TEXTURE_SIZE>
</EXTRA>

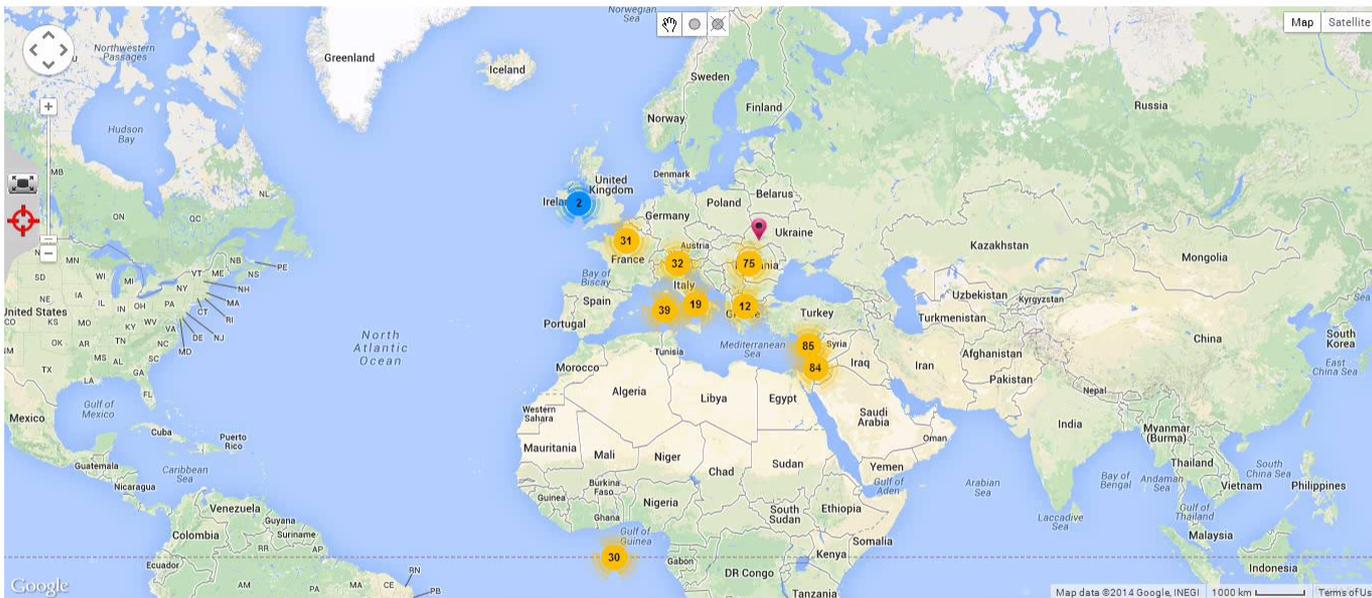
```



# Making available 3D contents in Europeana



Home 3D Europeana 3D ICONS



Search by keywords

Country  
ITALY

Town  
MILAN

Province  
MILAN

Type  
Size  
Date

Search  
Reset search

Last Updated: 19/06/2014 - 16:15 EEST

Total HA: 416 (Roots: 410, Related: 6)

Total DR: 536 (3D: 94, Images: 299, Videos: 5, Other: 138)

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## Conclusions

- ❑ A preliminary cataloguing workflow of Cultural Heritage assets was fundamental to know the data on tap;
- ❑ Even if most of the descriptive data should have been available from the museum, the actual data were organized in a non uniform way;
- ❑ In addition to the pre-existing data, we needed to create new data sets for the objects not yet described by the museum personnel, through a simplified excel table;
- ❑ A custom piece of software was then needed for dealing with all these different formats and for merging descriptive data (metadata) with technical data (paradata), and producing the final XML file suitable for Europeana ingestion;
- ❑ The process initially described as straightforward was not so obvious and much more time consuming than expected.



THANK YOU!

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