Provenance metadata generation guidelines
Internal Report

Version 3.0

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1 Introduction

The provenance metadata generation is based on the following rdf schemata:

- **The official CIDOC-CRM schema CIDOC-CRM v5.0.4:**

  http://www.cidoc-crm.org/cidoc-crm/

- **The extension of CIDOC-CRM for provenance metadata CRMdig v3.0:**

  http://www.ics.forth.gr/isl/CRMext/CRMdig.rdfs

- **The extension of CIDOC-CRM for specific reasoning requirements CRMext v3.0:**

  http://www.ics.forth.gr/isl/CRMext/CRMext.rdfs

- **The extension of CIDOC-CRM for actor roles CRMroles v1.0:**

  http://www.ics.forth.gr/isl/CRMext/CRMroles.rdfs

In the rdf files the following namespaces should be defined:

- **xmlns:crm= "http://www.cidoc-crm.org/cidoc-crm/"**
- **xmlns:crmdig="http://www.ics.forth.gr/isl/CRMdig/"**

Since RDF does not allow to instantiate properties beginning from a range value, every property is represented as two RDFS properties.

For instance "*L1 digitized (was digitized by)*" is represented as "*L1_digitized*" for the domain to range direction and "*L1i_was_digitized_by*" for the range to domain direction.

```
<rdf:Property rdf:about="L1_digitized">
<rdfs:comment>This property associates an instance of D2 Digitization Process with an instance of E18 Physical Thing which is a material thing.  This property is a specialisation of P39 measured (was measured by).
</rdfs:comment>
<rdfs:domain rdf:resource="D2_Digitization_Process"/>
<rdfs:range rdf:resource="http://www.cidoc-crm.org/cidoc-crm/E18_Physical_Thing"/>
<rdfs:subPropertyOf rdf:resource="http://www.cidoc-crm.org/cidoc-crm/P39_measured"/>
</rdf:Property>
<rdf:Property rdf:about="L1i_was_digitized_by">
<rdfs:domain rdf:resource="http://www.cidoc-crm.org/cidoc-crm/E18_Physical_Thing"/>
<rdfs:range rdf:resource="D2_Digitization_Process"/>
<rdfs:subPropertyOf rdf:resource="http://www.cidoc-crm.org/cidoc-crm/P39i_was_measured_by"/>
</rdf:Property>
```

In this document we present the minimal set of data that we need to describe different metadata entities in our model. As a general principle we allow and we recommend redundancy of information since it helps resolve co-references and prevents mixing up entities. In the metadata files we add information on anything we want to query the MR afterwards.

In RDF the instance of a class is described with a URI. We need to be able to provide other identifiers (not unique) too. Identifiers that are not in URI form should be described by rdfs:label or specializations of it.

All instances should have **at least one** label. For instances that are created in a controlled way (through the ingestion tool) we do not need to repeat the label when we refer to them.

In order to obtain a good URI we apply the following rules:

1. Use available URI from 3rd party authorities whenever possible.

2. Construct a good URI as derivative from another good URI or URL using rules that will increase the probability that someone will name the same thing with the same URI independently.
   Whenever we construct a URI from a name or physical ID (which is not a URI on its own) we also assign the name to a label too.
   When an object belongs to or has been created by an organization that has a main web site we construct the URI of the object by concatenating the web site and the Object ID.

3. In all other cases we use a UUID and put the non-URI identifiers or title in the label **L53 is not uniquely identified by** and one preferred identifier in the label **L4 has preferred label**. The preferred label is the one that will be used by the User Interface to display the first level information about the object.

In all cases that we have more than one URI, assign the preferred URI to the Thing itself and refer to all others via the CIDOC-CRM Property **P1 is identified by (identifies).**

We defined in CRMdig the properties **L4 has preferred label, L53 is not uniquely identified by**, **L55 has inventory no** and **L59 has serial number** as specializations of rdf:label

```
<rdf:Property rdf:about="L4_has_preferred_label">
<rdfs:comment>This property associates an instance of E1 Entity with an instance of resource used as a preferred lexical label. This property is a specialisation of rdf schema label.
</rdfs:comment>
<rdfs:domain rdf:resource="http://www.cidoc-crm.org/cidoc-crm/E1_CRM_Entity"/>
<rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
<rdfs:subPropertyOf rdf:resource="http://www.w3.org/2000/01/rdf-schema#label"/>
</rdf:Property>

<rdf:Property rdf:about="L53_is_not_uniquely_identified_by">
<rdfs:comment>This property describes a non unique identification applied to E1 CRM Entity.
```

```
</rdfs:comment>
<rdfs:domain rdf:resource="http://www.cidoc-crm.org/cidoc-crm/E1_CRM_Entity"/>
<rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
<rdfs:subPropertyOf rdf:resource="http://www.w3.org/2000/01/rdf-schema#label"/>
</rdf:Property>

<rdf:Property rdf:about="L55_has_inventory_no">
<rdfs:comment>This property records the inventory number that was used to identify an instance of E1 CRM Entity at the time this property was record. This property is a specialisation of L53F is not uniquely identified by.
</rdfs:comment>
<rdfs:domain rdf:resource="http://www.cidoc-crm.org/cidoc-crm/E1_CRM_Entity"/>
<rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
<rdfs:subPropertyOf rdf:resource="L53_is_not_uniquely_identified_by"/>
</rdf:Property>

<rdf:Property rdf:about="L59_has_serial_number">
<rdfs:comment>This property records the serial number that was assigned to identify an instance of E22 Man Made Object. This property is a specialisation of L53 is not uniquely identified by.
</rdfs:comment>
<rdfs:domain rdf:resource="http://www.cidoc-crm.org/cidoc-crm/E22_Man-Made_Object"/>
<rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
<rdfs:subPropertyOf rdf:resource="L53_is_not_uniquely_identified_by"/>
</rdf:Property>
```

1.1 Events

The metadata we create are event-centric; this means that the main element is an event, or must be linked to an event.

Example:

```
<crmdig:D2_Digitization_Process rdf:about="uuid:2f7d22d0-1d89-11e0-ac64-0800200c9a66">.
        <crmdig:L1_digitized>
                <crm:E22_Man-Made_Object rdf:about="uuid:2f7d22d1-1d89-11e0-ac64-0800200c9a66"/>
        </crmdig:L1_digitized>
</crmdig:D2_Digitization_Process>
```

OR

```
<crm:D1_Digital_Object rdf:about=" uuid:07f05f40-b415-11de-9d48-0002a5d0001b">
        <crm:L22i_was_derivative_created_by>
                <crm:D3_Formal_Derivation rdf:about="uuid:354c91e0-b3fa-11de-98c6-0002a5d5c50c"/>
        </crm:L22i_was_derivative_created_by>
</crm:D1_Digital_Object>
```

We describe events with:

- a UUID
- a preferred event label
- type
- link to superevent
- who
- when
- where
- what

- If some information in a superevent remains the same in its subevents, then it is inherited from the superevent and there is no need of re-writing it. For example, if the same camera was used for 3 photo shootings, the info of the camera will be written once in the superevent and will not be replicated in the subevents.
- Every digital object must have its own metadata file describing the event that produced it and containing a link to its superevent.
- In the acquisition events we usually have:
    - A data acquisition event (superevent)
    - One or more object acquisition events (subevents of data acquisition) (depending on how many are the objects we acquire)
    - One or more capture events (sub-events of object acquisition) (depending on how many are the images created)
- we write metadata files and ingest files and metadata files in a **historical order**. So for example we cannot mention in an object acquisition superevent, all the generated photos, since they have not yet been ingested in the Repository. Typically the process of metadata writing should follow the process of object generation.

Recommended Preferred Event Label:

When, Event Type, What, Where

We avoid mentioning non significant information.

Example:

<crmdig:D2_Digitization_Process rdf:about="uuid:2f7d22d0-1d89-11e0-ac64-0800200c9a66">

```
        <crmdig:L4_has_preferred_label>2010 Minidome acquisition Ivory Panel A.15-1955 V&amp;amp;A museum
        </crmdig:L4_has_preferred_label>
        <crm:P2_has_type>
                <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/EventType/Minidome_acquisition"/>
        </crm:P2_has_type>
        <crm:P2_has_type>
                <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/EventType/object_acquisition"/>
        </crm:P2_has_type>

        <!-- WHO -->
        <crmdig:L29_has_responsible_organization>
                <crm:E40_Legal_Body rdf:about="http://www.vam.ac.uk/"/>
        </crmdig:L29_has_responsible_organization>

        <!-- WHO -->
        <crmdig:L30_has_operator>
                <crm:E21_Person rdf:about="uuid:2f7d22d3-1d89-11e0-ac64-0800200c9a66"/>
        </crmdig:L30_has_operator>

        <!-- WHEN -->
        <crmdig:L31_has_starting_date-time rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">
                        2010-10-26T08:00:00Z
        </crmdig:L31_has_starting_date-time>
        <crmdig:L32_has_ending_date-time rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">
                        2010-10-26T10:00:00Z
        </crmdig:L32_has_ending_date-time>

        <!-- WHERE -->
        <crm:P7_took_place_at>
                <crmdig:D23_Room
                rdf:about="http://www.vam.ac.uk/Place/V&amp;amp;AMuseum/ConservationLaboratory"/>
        </crm:P7_took_place_at>

        <!-- WHAT -->
        <crmdig:L1_digitized>
                <crm:E22_Man-Made_Object rdf:about="uuid:2f7d22d1-1d89-11e0-ac64-0800200c9a66"/>
        </crmdig:L1_digitized>

</crmdig:D2_Digitization_Process>
```

1.2 Physical Objects

We describe a museum physical object (mobile object) with:

- an ID (a good URI or a UUID),
- a preferred object label,
- other labels (optionally other non-URI identifiers or title),
- an inventory number,
- a type,
- a note and
- a current keeper

In all cases that we have more than one URI, assign the preferred URI to the Object itself and refer to all others via the CIDOC-CRM Property **P1 is identified by (identifies).**

Recommended Preferred Object Label:

[optional Title], type, inventory number

Example:

```
<crm:E22_Man-Made_Object rdf:about="uuid:e4761f00-0ce7-11e0-81e0-0800200c9a66"> <!-- URI or UUID -->
    <crm:P1_is_identified_by> <!-- all other “known” URIs -->
            <crm:E42_Identifier rdf:about="http://www.mcw.gov.cy/mcw/DA/DA.nsf/Objects/249.377"/>
    </crm:P1_is_identified_by>

    <crmdig:L4_has_preferred_label>Kazafani Boat, vase, 249.377</crmdig:L4_has_preferred_label>
    <crmdig:L53_is_not_uniquely_identified_by>Kazafani Boat</crmdig:L53_is_not_uniquely_identified_by>
    <crmdig:L53_is_not_uniquely_identified_by>Bronze Age model of a boat
    </crmdig:L53_is_not_uniquely_identified_by>
    <crmdig:L55_has_inventory_no>249.377</crmdig:L55_has_inventory_no>

    <crm:P2_has_type>
      <!-- vase -->
       <crm:E55_Type rdf:about="http://www.getty.edu/research/tools/vocabularies/aat/300132254"/>
    </crm:P2_has_type>

    <crm:P3_has_note>
        Deep hollow hull with in-curving flat-topped gunwale.
        Rounded bottom, carinated bow and stern.
        A narrow relief ridge runs along either side on the exterior of the sheer.
        About 0.01 below the gunwale made before firing 37 holes on the one-side and
        38 on the other equally spaced in a horizontal line run from stern to stern.
        In the keel which is suggested by a raised ridge inside the hull at the stern
        seven plastic buttons (diam. 0.01)
    </crm:P3_has_note>

    <crm:P50_has_current_keeper>
```

```
        <!-- Archaeological Museum of Nicosia, Nicosia, Cyprus -->
        <crm:E40_Legal_Body rdf:about="uuid:6f2972e6-ad9e-4a72-930d-263f01e75d8c"/>
    </crm:P50_has_current_keeper>
</crm:E22_Man-Made_Object>
```

We describe an archaeological site, monument etc. (immobile physical object) with:

- an ID (a good URI or a UUID),
- a preferred object label,
- other labels (optionally other non-URI identifiers or title),
- a location,
- a type,
- a note and
- a current keeper

In all cases that we have more than one URI, assign the preferred URI to the Object itself and refer to all others via the CIDOC-CRM Property **P1 is identified by (identifies).**

Recommended Preferred Object Label:

[optional Title], type, geonamesID or coordinates

Example of archaeological site:

```
<crm:E27_Site rdf:about="uuid:18430990-078b-11e0-81e0-0800200c9a66"> <!--  URI or UUID -->
    <crmdig:L4_has_preferred_label>Hala Sultan Tekke, archaeological site, 146591
        </crmdig:L4_has_preferred_label>
    <crmdig:L53_is_not_uniquely_identified_by>Mosque of Umm Haram
        </crmdig:L53_is_not_uniquely_identified_by>
    <crm:P53.has_former_or_current_location>
        <crmdig:D25_Archaeological_Site_Registration rdf:about="http://www.geonames.org/146591/">
    <crm:P53.has_former_or_current_location>
    <crm:P2_has_type>
        <!-- archaeological sites -->
        <crm:E55_Type rdf:about="http://www.getty.edu/research/tools/vocabularies/aat/300000810"/>
    </crm:P2_has_type>
    <crm:P3_has_note>
    Hala Sultan Tekke or the Mosque of Umm Haram is a very prominent Muslim shrine near Larnaca, on the
    island of Cyprus.
    </crm:P3_has_note>

    <crm:P50_has_current_keeper>
    <!—Ministry of Communications and Works, Department of Antiquities, Nicosia, Cyprus -->
    <crm:E40_Legal_Body rdf:about=" http://www.mcw.gov.cy/mcw/DA/DA.nsf/">
        <crmdig:L4_has_preferred_label> Ministry of Communications and Works,
            Department of Antiquities, Nicosia, Cyprus </crmdig:L4_has_preferred_label>
        <crm:P74_has_current_or_former_residence>
            <crm:E53_Place rdf:about="http://www.geonames.org/146268/">
```

```
                    <crmdig:L4_has_preferred_label>Nicosia</crmdig:L4_has_preferred_label>
                    <crm:P3_has_note>Cyprus</crm:P3_has_note>
                </crm:E53_Place>
            </crm:P74_has_current_or_former_residence>
        </crm:E40_Legal_Body>
        </crm:P50_has_current_keeper>

</crm:E27_Site>
```

Example of a fountain in a square:

```
<crm:E22_Man-Made_Object rdf:about="uuid: e052a500-9bea-11e0-aa82-0800200c9a66 "> <!--  URI or UUID -->
        <crmdig:L4_has_preferred_label> Fontana Morosini, fountain, long 25.7, lat 35.23
            </crmdig:L4_has_preferred_label>
        <crmdig:L53_is_not_uniquely_identified_by>Lion square fountain
            </crmdig:L53_is_not_uniquely_identified_by>
        <crm:P53.has_former_or_current_location>
            <!-- coordinates of lion square →
            <crm:E53_Place rdf:about=" uuid: 076b2730-8065-11e0-b278-0800200c9a66"/>
        <crm:P53.has_former_or_current_location>
        <crm:P2_has_type>
             <!-- fountain -->
            <crm:E55_Type rdf:about="http://www.getty.edu/research/tools/vocabularies/aat/300006179"/>
        </crm:P2_has_type>
        <crm:P3_has_note>
        The Lions in Heraklion is the square of the Fontana Morosini, the ornate Venetian fountain with four lions
        with water gushing from their mouths.
        </crm:P3_has_note>

        <crm:P50_has_current_keeper>
        <crm:E40_Legal_Body rdf:about=" http://www.heraklion.gr/">
            <crmdig:L4_has_preferred_label>Municipality of Heraklion, Heraklion, Greece
                 </crmdig:L4_has_preferred_label>
            <crm:P74_has_current_or_former_residence>
                <crm:E53_Place rdf:about="http://www.geonames.org/261745/">
                    <crmdig:L4_has_preferred_label>Heraklion</crmdig:L4_has_preferred_label>
                    <crm:P3_has_note>Greece</crm:P3_has_note>
                </crm:E53_Place>
            </crm:P74_has_current_or_former_residence>
        </crm:E40_Legal_Body>
        </crm:P50_has_current_keeper>

</crm:E22_Man-Made_Object>
```

1.3 Digital Objects

- UUID
- a preferred object label,
- other labels (optionally other non-URI identifiers or title)
- type
- optionally dimensions

Example:

```
<crmdig:D9_Data_Object rdf:about="uuid:36bbd160-0207-11e0-a976-0800200c9a66">

    <crmdig:L4_has_preferred_label>DSC_0005.JPG</crmdig:L4_has_preferred_label>
    <crm:P2_has_type>
        <!-- pictures (two-dimensional representations) -->
        <crm:E55_Type rdf:about="http://www.getty.edu/research/tools/vocabularies/aat/300264388"/>
        <crm:E55_Type rdf:about="http://www.iana.org/assignments/media-types/image/jpeg"/>
    </crm:P2_has_type>
    <crm:P43_has_dimension>
        <crm:E54_Dimension>
        <crm:P2_has_type>
            <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DimensionType/pixel_width"/>
        </crm:P2_has_type>
        <crm:P90_has_value rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">
            4288
        </crm:P90_has_value>
        <crm:P91_has_unit>
        <crm:E58_Measurement_Unit rdf:about="http://www.ics.forth.gr/isl/UnitType/pixels"/>
        </crm:P91_has_unit>
        </crm:E54_Dimension>

        <crm:E54_Dimension>
        <crm:P2_has_type>
            <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DimensionType/pixel_height"/>
        </crm:P2_has_type>
        <crm:P90_has_value rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">
            2848
        </crm:P90_has_value>
        <crm:P91_has_unit>
            <crm:E58_Measurement_Unit rdf:about="http://www.ics.forth.gr/isl/UnitType/pixels"/>
        </crm:P91_has_unit>
        </crm:E54_Dimension>

        <crm:E54_Dimension>
        <crm:P2_has_type>
            <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DimensionType/resolution"/>
        </crm:P2_has_type>
        <crm:P90_has_value rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">
            300
```

```
            </crm:P90_has_value>
            <crm:P91_has_unit>
                <crm:E58_Measurement_Unit rdf:about="http://www.ics.forth.gr/isl/UnitType/dpi"/>
            </crm:P91_has_unit>
            </crm:E54_Dimension>

            <crm:E54_Dimension>
            <crm:P2_has_type>
                <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DimensionType/data_size"/>
            </crm:P2_has_type>
            <crm:P90_has_value rdf:datatype="http://www.w3.org/2001/XMLSchema#decimal">
                3.71
            </crm:P90_has_value>
            <crm:P91_has_unit>
                <crm:E58_Measurement_Unit rdf:about="http://www.ics.forth.gr/isl/UnitType/Mb"/>
            </crm:P91_has_unit>
            </crm:E54_Dimension>

        </crm:P43_has_dimension>


</crmdig:D9_Data_Object>
```

1.4 Digital Devices

We describe a Digital Device with their:

- Serial #
- Manufacturer
- Model (as a Type).

All the information regarding the internal state of a device (e.g. dates of firmware updates, damages and repairs of device components etc.) should be documented either in a comment together with the device description or in an independent document which refers to the device.

In complex device configurations (e.g. Multiviewdome) we keep in a note the configuration state.

Example:

```
<crmdig:D8_Digital_Device
rdf:about="http://www.nextengine.com/Device/NextEngineDesktop3Dscanner/E4035623490">
        <crmdig:L59_has_serial_number>E4035623490</crmdig:L59_has_serial_number>
        <crmdig:L4_has_preferred_label>Next Engine Desktop 3D scanner</crmdig:L4_has_preferred_label>
        <crm:P2_has_type>
                <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DeviceType/laser_scanner"/>
        </crm:P2_has_type>
        <crm:P2_has_type>
                <crm:E55_Type rdf:about="http://www.nextengine.com/Model/Desktop3Dscanner"/>
        </crm:P2_has_type>
        <crmdig:L33_has_maker>
                <crm:E39_Actor rdf:about="http://www.nextengine.com/">
                        <crmdig:L4_has_preferred_label>Next Engine</crmdig:L4_has_preferred_label>
                </crm:E39_Actor>
        </crmdig:L33_has_maker>
        <crm:P3_has_note>
                LS_Model: Next Engine Desktop 3D scanner, Technology: Multi stripe laser triangulation (MTL),
                Points_sec: 50.000 p/s, Time_acquisition: 17 min each scan, Acquisition_range: Macro,
                Accuracy: 0.127 mm, Integrated_camera: Y, Camera_resolution: 3.0 Mpx, Integrated_GPS: N,
                Physical_characteristics: 22x28x9 cm - 3 Kg, Number_of_operators: 1, Software: Scan Studio
        </crm:P3_has_note>
        <!-- Software used by the Laser Scanner          -->
        <crmdig:L23_used_software_or_firmware>
                <crmdig:D14_Software rdf:about="http://www.nextengine.com/DeviceSoftware/Scan_Studio">
                        <crm:P2_has_type>
                <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/SoftwareType/acquisition_software"/>
                        </crm:P2_has_type>
                                        </crmdig:D14_Software>
        </crmdig:L23_used_software_or_firmware>
</crmdig:D8_Digital_Device>
```

1.5 Persons ("operators")

- UUID
- Preferred name (label)
- First Name (label)
- Last Name (label)
- Organization they belong to (Legal Body) and role (specialized link)

We created two subproperties of label for the first and last name

```
<rdf:Property rdf:about="L51_has_first_name">
        <rdfs:comment>This property defines a personal name used to identify a person.</rdfs:comment>
        <rdfs:domain rdf:resource="D21_Person_Name"/>
        <rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
        <rdfs:subPropertyOf rdf:resource="http://www.w3.org/2000/01/rdf-schema#label"/>
</rdf:Property>

<rdf:Property rdf:about="L52_has_last_name">
        <rdfs:comment>This property defines the last name used to identify a person.
                This property is a specialisation of L4 has preferred label.</rdfs:comment>
        <rdfs:domain rdf:resource="D21_Person_Name"/>
        <rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
        <rdfs:subPropertyOf rdf:resource="L4_has_preferred_label"/>
</rdf:Property>
```

Example:

```
<crm:E21_Person rdf:about="uuid:95115676-f61a-4ef8-a97f-3f8c585dd162">
<crmdig:L4_has_preferred_label>Theodoridou, Maria</crmdig:L4_has_preferred_label>
        <crm:P131_is_identified_by>
                <crmdig:D21_Person_Name>
                        <crmdig:L51_has_first_name>Maria</crmdig:L51_has_first_name>
                        <crmdig:L52_has_last_name>Theodoridou</crmdig:L52_has_last_name>
                </crmdig:D21_Person_Name>
        </crm:P131_is_identified_by>
        <crm:P107i_1_is_current_or_former_researcher_of>
                        <crm:E40_Legal_Body rdf:about="http://www.ics.forth.gr/"/>
        </crm: P107i_1_is_current_or_former_researcher_of >
</crm:E21_Person>
```

1.6 Legal Bodies (museums, vendors, h/w providers, service providers)

- URI
- Name of Legal Body (preferred label)
- <member of organisation> optionally
- Location of Legal Body

Recommended preferred Legal Bodies' label:

Legal Body's Name, Office location (e.g. V&A Museum, London, UK)

Example:

```
<crm:E40_Legal_Body rdf:about="http://www.vam.ac.uk/">
    <crmdig:L4_has_preferred_label>V&amp;amp;A Museum, London, UK</crmdig:L4_has_preferred_label>
    <crm:P74_has_current_or_former_residence>
        <crm:E53_Place rdf:about="http://www.geonames.org/2643743/">
            <crmdig:L4_has_preferred_label>London</crmdig:L4_has_preferred_label>
            <crm:P3_has_note>United Kingdom</crm:P3_has_note>
        </crm:E53_Place>
    </crm:P74_has_current_or_former_residence>
</crm:E40_Legal_Body>
```

Regarding the address of the Legal Body we can have different levels of detail according to the needs of the application. In the example above only the city and the country are modeled. Other possibilities:

1. For the address of the Legal Body we can model the exact address and the city where it is located e.g.

```
<crm:E40_Legal_Body rdf:about="http://starc.cyi.ac.cy/">
    <crmdig:L4_has_preferred_label>STARC, Nicosia, Cyprus</crmdig:L4_has_preferred_label>
    <crm:P74_has_current_or_former_residence>
        <crm:E53_Place rdf:about="UUID for the address">
            <crmdig:L4_has_preferred_label>15 Kypranoros Street</crmdig:L4_has_preferred_label>
            <crm:P89_falls_within>
                <crm:E53_Place rdf:about="http://www.geonames.org/146268/">
                    <crmdig:L4_has_preferred_label>Nicosia</crmdig:L4_has_preferred_label>
                    <crm:P3_has_note>Cyprus</crm:P3_has_note></crm:E53_Place>
            </crm:P89_falls_within>
        <crm:P3_has_note>15 Kypranoros Street, Nicosia 1061, Cyprus</crm:P3_has_note>
    </crm:P74_has_current_or_former_residence>
</crm:E40_Legal_Body>
```

2. or we can model just the address without details for city e.g.

```
<crm:E40_Legal_Body rdf:about="http://starc.cyi.ac.cy/">
    <crmdig:L4_has_preferred_label>STARC, Nicosia, Cyprus</crmdig:L4_has_preferred_label>
    <crm:P74_has_current_or_former_residence>
        <crm:E53_Place rdf:about="UUID for the address">
            <crmdig:L4_has_preferred_label>15 Kypranoros Street </crmdig:L4_has_preferred_label>
            <crm:P3_has_note>The 15 Kypranoros Street, Nicosia 1061, Cyprus</crm:P3_has_note>
        </crm:E53_Place>
    </crm:P74_has_current_or_former_residence>
</crm:E40_Legal_Body>
```

1.7 Places

We propose to use the GeoNames geographical database which is available for download free of charge under a creative commons attribution license. It contains over 10 million geographical names and consists of 7.5 million unique features whereof 2.8 million populated places and 5.5 million alternate names. The data is accessible free of charge through a number of webservices and a daily database export. GeoNames is already serving up to over 20 million web service requests per day. GeoNames is integrating geographical data such as names of places in various languages, elevation, population and others from various sources. All lat/long coordinates are in WGS84 (World Geodetic System 1984). Users may manually edit, correct and add new names using a user friendly wiki interface. http://www.geonames.org/ontology/documentation.html

The GeoNames Ontology makes it possible to add geospatial semantic information to the Word Wide Web. All over 6.2 million geonames toponyms now have a unique URL with a corresponding RDF web service. Other services describe the relation between toponyms.
The Ontology for GeoNames is available in OWL :
http://www.geonames.org/ontology/ontology_v2.2.1.rdf

GeoNames is using *303 (See Other) redirection* to distinguish the **Concept** (thing as is) from the **Document** about it.
For the town *Athens* in Greece we have these two URIs :
[1] http://sws.geonames.org/264371/
[2] http://sws.geonames.org/264371/about.rdf

To find the geonameId of a place you can issue the following query, substituting PLACE with the place-name you are looking for (e.g. Athens) :

http://ws.geonames.org/search?q=PLACE&maxRows=10&type=rdf

So, in our rdf files we describe a Place with:

- ID (in the form http://sws.geonames.org/geonameId/)
- name (label), typically settlement level
- a comment where we can provide extra information regarding province-country or in general the broader area.

We will make E27 Site and E40 Legal Body (such as Museums) instances of E53 Place in order to be able to use them as the location of a Physical Object.
The GeoNames Feature Codes will be used as Place types and we will investigate the geonames webservices in order to explore the feature codes and get the “falls within” information.
We should check if we can get automatically the broader area of a Place.
We could provide an off line service that traverses all the repository, collects all Places and finds the broader Places.

Example:

```
<crm:E53_Place rdf:about="http://www.geonames.org/2643743/">
    <crmdig:L4_has_preferred_label>London</crmdig:L4_has_preferred_label>
    <crm:P3_has_note>United Kingdom</crm:P3_has_note>
</crm:E53_Place>
```

1.8 Buildings & exhibition spaces (where current activities take place., premises of an organisation)

- URI (Representative URL from the organization, typically www....)
- preferred label
- city (jurisdictional unit) where it falls within
- optionally address as one string

Example:

```
<crmdig:D23_Room rdf:about="http://starc.cyi.ac.cy/Place/STARC/DigitalVisualizationLab">
    <crmdig:L4_has_preferred_label>STARC Digital Visualization Lab</crmdig:L4_has_preferred_label>
    <crm:P89_falls_within>
        <crm:E53_Place rdf:about="http://www.geonames.org/146268/">
            <crmdig:L4_has_preferred_label>Nicosia</crmdig:L4_has_preferred_label>
            <crm:P3_has_note>Cyprus</crm:P3_has_note>
        </crm:E53_Place>
    </crm:P89_falls_within>
    <crm:P3_has_note>15 Kypranoros Street, Nicosia 1061, Cyprus</crm:P3_has_note>
</crmdig:D23_Room>
```

1.9 Coordinates

- UUID
- preferred label
- city (jurisdictional unit) where it falls within
- optionally address as one string

Example:

```
<crm:E53_Place rdf:about=" uuid: 076b2730-8065-11e0-b278-0800200c9a66">
    <crmdig:L4_has_preferred_label>Lion Square,  long 25,7  lat 35,23</crmdig:L4_has_preferred_label>
    <crm:P87_is_identified_by>
        <crm:E47_Spatial_Coordinates>
        <crmdig:L4_has_preferred_label>long 25,7 lat 35,23</crmdig:L4_has_preferred_label>
        <crm:P39i_was_measured_by>
        <crm:E16_Measurement>
            <crm:P40_observed_dimension>
            <crm:E54_Dimension>
            <crm:P2_has_type>
            <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DimensionType/longitute"/>
            </crm:P2_has_type>
            <crm:P91_has_unit>
            <crm:E58_Measurement_Unit rdf:about="http://www.ics.forth.gr/isl/UnitType/degrees"/>
            </crm:P91_has_unit>
            <crm:P90_has_value rdf:datatype="http://www.w3.org/2001/XMLSchema#decimal">
            25,7</crm:P90_has_value>
            </crm:E54_Dimension>
```

```
                    <crm:E54_Dimension>
                    <crm:P2_has_type>
                    <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/DimensionType/latitude"/>
                    </crm:P2_has_type>
                    <crm:P91_has_unit>
                    <crm:E58_Measurement_Unit rdf:about="http://www.ics.forth.gr/isl/UnitType/degrees"/>
                    </crm:P91_has_unit>
                    <crm:P90_has_value rdf:datatype="http://www.w3.org/2001/XMLSchema#decimal">
                    35,23</crm:P90_has_value>
                    </crm:E54_Dimension>
                    </crm:P40_observed_dimension>
            </crm:E16_Measurement>
            </crm:P39i_was_measured_by>
            </crm:E47_Spatial_Coordinates>
        </crm:P87.is_identified_by>
        <crm:P89_falls_within>
            <crm:E53_Place rdf:about="http://www.geonames.org/261745/">
                <crmdig:L4_has_preferred_label>Heraklion</crmdig:L4_has_preferred_label>
                <crm:P3_has_note>Greece</crm:P3_has_note>
            </crm:E53_Place>
        </crm:P89_falls_within>
        <crm:P3_has_note> Lion Square, Heraklion, Greece</crm:P3_has_note>
</crm:E53_Place>
```

1.10 Historical Persons

- First Name
- Last Name
- Birth
- Death

If it exists in VIAF we use the URI otherwise we produce a UUID

1.11 Time (Processing)

We describe Time with:

- XSD time

Example for an interval:

```
<crmdig:L31_has_starting_date-time rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">
                2010-05-28T08:00:00Z
</crmdig:L31_has_starting_date-time>
<crmdig:L32_has_ending_date-time rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">
                2010-06-02T18:00:00Z
</crmdig:L32_has_ending_date-time>
```

Example for an instance:

```
<crmdig:L61_was_ongoing_at rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">
                2010-05-28T08:00:00Z
</crmdig:L61_was_ongoing_at>
```

1.12 Time (Historical)

1.13 Historical-prehistorical Events

1.14 Geological periods/ events

1.15 Software

- URI (URL/LoD of the manufacturer)
- preferred label
- generic software (as type)
- type
- maker

Recommended preferred Software's label:

Manufacturer, Software's Name, Version (e.g. KULeuven PSI VISICS, ARC3D, Version_1.0.0)

Example:

```
<crmdig:D14_Software rdf:about="uuid:1114d496-1169-4d0e-b423-84cc1e3136eb">
    <crmdig:L4_has_preferred_label> Adobe Photoshop CS5
        </crmdig:L4_has_preferred_label>
    <crmdig:L53_is_not_uniquely_identified_by>Photoshop CS5
        </crmdig:L53_is_not_uniquely_identified_by>
    <crm:P2_has_type>
        <crm:E55_Type rdf:about="http://www.ics.forth.gr/isl/SoftwareType/image_editing_software"/>
        <!-- Generic Software -->
        <crm:E55_Type rdf:about="http://www.photoshop.com/products/photoshop"/>
    </crm:P2_has_type>
    <crmdig:L33_has_maker>
        <crm:E40_Legal_Body rdf: about="http://www.adobe.com/"/>
    </crmdig:L33_has_maker>
    <crm:P3_has_note> software note</crm:P3F.has_note>
    </crmdig:D14_Software>
```

Generic Software (used as type):

```
<crm:E55_Type rdf:about="http://www.photoshop.com/products/photoshop"/>
    <skos:prefLabel>Photoshop</skos:prefLabel>
    <skos:inScheme rdf:resource="http://www.ics.forth.gr/isl/SoftwareVersionTypes"/>
</crm:E55_Type>
```