



→ EDM profile for Sound

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1. Introduction

This report, EDM profile for Sound, is delivered as part of the task 1.3 EDM profile. It describes a set of recommendations for the adaptation of the current Europeana Data Model (EDM) for audio and audio-related objects. It has been decided to undertake the work of task 1.3 within a Europeana Network Task Force to which the EuropeanaTech¹ members were invited to. The EuropeanaTech community brings together the researchers, developers and experts from the Europeana Network. The creation of the Task Force allowed experts in EDM and experts from the audiovisual community to contribute to work of the Europeana Sounds project. The deliverable, EDM profile for Sound is therefore the Task Force report.

This report refers to other reports on EDM that have been produced as part of other EuropeanaTech Task Forces. Some participants of this task group have participated in other EuropeanaTech Task Forces² in the past, enabling connections with other task forces and projects.

The audio and audio-related materials aggregated by the Europeana Sounds project are of various types including music scores and recordings which may include detailed descriptions of audio carriers. This report does not focus on any specific type of material but instead addresses requirements that are common to these various material types.

The list of EDM classes and properties to be used by data providers is given as an Annex at the end of this report. It summarises all the current EDM classes and properties (as described in the EDM schema) and the new classes and properties proposed by the Task Force.

The profile will be reviewed as soon as data providers will start mapping their data to it. The mapping exercise will highlight missing or redundant properties.

2. Methodology

The Task Force began by collecting examples to get a better idea of the diversity of audio materials the EDM profile will have to cover. The examples were also used to identify key requirements for describing audio and audio-related materials. Each case study is associated with a data sample which provides more insight on specific modelling requirements.

The collection of the examples and data samples was motivated by the fact that the aggregation of metadata in Europeana by the Europeana Sounds project does not begin before month 9 (October 2014). The examples can be categorised as following:

¹ <http://pro.europeana.eu/web/network/europeana-tech>

² <http://pro.europeana.eu/network/task-forces/overview>

Examples (available at http://pro.europeana.eu/documents/468623/4e59e10d-5ace-4f2f-a996-bd8c4156c46b)	Description of the general examples	Contributors
Descriptions of audio carriers	These examples highlight the difference between the carriers and the sounds recordings recorded on those carriers. A set of metadata is therefore used to describe the carrier. Carriers can be shellac discs, wax cylinders, vinyl, CDs	<ul style="list-style-type: none"> -Netherlands Institute for Sound and Vision (NISV) -Rundfunk Berlin-Brandenburg-DISMARC (RBB) - Deutsche Nationalbibliothek (DNB) -National Library of Latvia (NLL) -Statsbiblioteket, Denmark (SB) -Central Institute for sound and audiovisual heritage (ICBSA)
Sounds recordings (carrier with sound recorded on it)	As opposed to the previous examples on carriers, the following cases focus on the descriptions of specific sound recordings.	
Oral History	These examples describe audio recordings capturing oral histories and interviews.	<ul style="list-style-type: none"> -Netherlands Institute for Sounds and Vision (NISV) -Lithuanian Academy of Music and Theater (DIZI) - The Language Archive at MPI-PL (TLA) -Central Institute for sound and audiovisual heritage (ICBSA)
Folk Music	These examples describe audio recordings capturing folk music.	<ul style="list-style-type: none"> -Lithuanian Academy of Music and Theater (DIZI)
Ethnographical recordings	These examples are about documentation or field recordings of various forms of human expression: traditional/ethnic musical styles, religious events, rituals and ceremonies, etc	<ul style="list-style-type: none"> - Digital Curation Unit (DCU) -Centre national de la recherche scientifique CREM (CNRS-CREM/CNRS-MMSH) - The Language Archive at MPI-PL (TLA)
Wildlife recordings	Nature and environmental sounds	<ul style="list-style-type: none"> - British Library (BL)
Radio news and news reports	Radio broadcasts such as news, interviews, programmes	<ul style="list-style-type: none"> -Österreichische Mediathek (OeM) -Netherlands Institute for Sounds and Vision (NISV)
Commercial records	These examples described sound recording meant to be released commercially.	<ul style="list-style-type: none"> -Netherlands Institute for Sounds and Vision (NISV) -Rundfunk Berlin-Brandenburg-DISMARC (RBB)
Musical works	Recordings of classical works (live	<ul style="list-style-type: none"> - Deutsche Nationalbibliothek

	or studio performances)	(DNB) - British Library (BL) - Bibliothèque nationale de France (BnF) -Central Institute for sound and audiovisual heritage (ICBSA)
Music scores	Music scores from various works.	- Deutsche Nationalbibliothek (DNB) - British Library (BL) - Bibliothèque nationale de France (BnF)
Documentation associated to sound recordings	These examples capture also additional documents such as notes, programme notes that are essential to understand the context of some sound recordings.	- The Language Archive at MPI-PL (TLA) - Digital Curation Unit (DCU) -Centre national de la recherche scientifique CREM (CNRS-CREM/CNRS-MMSH) - The Language Archive at MPI-PL (TLA)

3. Describe sound objects in EDM

EDM (Europeana, 2013) allows the articulation of metadata description around three main types of resources:

- The Provided Cultural Heritage Objects or CHOs (*edm:ProvidedCHO*) which describe the original objects—either physical (painting, book, etc.) or born-digital (3D model), which are the focus of description and search in Europeana.
- Web Resources (*edm:WebResource*) are a digital representation of the provided cultural heritage object (CHO), published on the web.
- Aggregation (*ore:Aggregation*) groups the Provided CHO and the Web Resource(s) into one bundle, and information on the aggregation process is also recorded (e.g., the provider of the metadata) as shown in Figure 1.

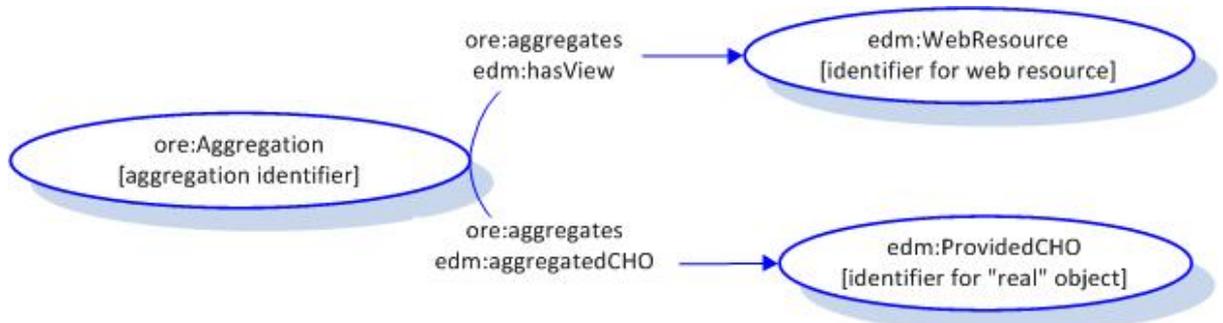


Figure 1. EDM core classes for data providers

Europeana allows the data provider to decide on the level of granularity of description chosen for the ProvidedCHO (on condition that the CHO always has a digital object attached to it).

The Task Force has identified various types of objects that could be defined either as CHO or WebResource as allowed by EDM.

Analogue or born-digital object

The Task Force makes the distinction between analogue objects and born-digital objects. In the context of EDM both can be considered as potential CHOs associated with one to many digital representations or WebResources

A analogue object can be digitised and then represented by many WebResources varying in terms of formats, quality...

A born-digital object can also be derived into many WebResources with individual characteristics.

Analogue object vs its digital representations

The examples collected by the Task Force have highlighted the distinction between the description of an analogue object and its digital representation(s). Data providers usually have metadata descriptions for both. For sounds object the distinction between analogue object and digital object can be refined into:

- The distinction between a “bare” carrier (disc, vinyl, shellac...with physical characteristics like size) and the sound recording (a carrier with sound recorded on it-tracks, with attributes like duration) itself.
- The distinction between a musical work and the multiple performances of this work (an event, with attributes like a date or a place) and the recordings (physical)..
- The distinction between a specific recording and the sound itself (abstract, conceptual)

Further distinction can be made if we consider all the related resources that could be associated with the objects mentioned above such as images, music scores, programme notes...

All the resources described above must have a digital representation to be considered as a CHO in Europeana. Further distinction could therefore be made between:

- The distinction between an analogue object and its digital representations and a born-digital object.
- The distinction between a carrier (disc, vinyl, shellac)and between its digital representations (images) and the sound recording itself and its digital instances (recordings of diverse quality, formats)

CHO or WebResource

Europeana allows analogue objects, born-digital objects or digital objects to be represented as CHO as long as they have a sufficient amount of metadata and a digital representation attached to it.

Taking for instance, a description of a shellac (a carrier) and the description of the sound recorded on it. In principle both objects (the carrier and the sound recorded on it) are worth

describing as CHO if the richness of the metadata allows it. In this case the relation between both CHOs could be made using the EDM properties described in section 8. :

In absence of a different set of metadata for the shellac and the sound recording, one could opt for representing the sound recording as the digital representation of the shellac. The shellac would become the CHO and the sound recording a WebResource. It would avoid creating in Europeana duplicates CHO from a metadata point of view.

Other cases will be made available within the Europeana Sounds project through the work done on music notation extraction from music scores. In this case a data provider may want to describe three CHOs: the music score, its scanned image and the object resulting from the extraction of music notation.

4. Representing digital representations of a sound CHO in EDM

4.1. Multiple digital representations per analogue or born-digital CHO³

The Task Force has identified cases where:

- A sound CHO can have multiple audio digital representations (recordings in different file formats or a recording with sound files in different formats or quality levels.). Note that the multiple digital file formats and/or sampling rates are usually derived from one “master” digital file. This master file may be described as the original CHO or as the “first” digitisation of the CHO (which is represented then as a WebResource in EDM).
- A sound CHO can have multiple digital representations that are of different types (e.g. a recorded concert that has a sound file and a video file. Or a recording with a transcription)

This requirement doesn't take into account the situations where several records would describe the same object (or similar objects such as different releases).

EDM already has a solution for the representation of multiple digital representations per cultural heritage object (CHO) via the class *edm:WebResource*. For each digital representation of the CHO an individual WebResource can be created and characterised by a set of metadata. The Figure 2 below a CHO describing a carrier with a sound recorded on it with two WebResources: one pointing to an image and the other to a MP3 file (produced as the result of the audio digitisation).

³ This requirement is represented by the following examples: CNRS-MMSH, CNRS-CREM, TLA, DCU

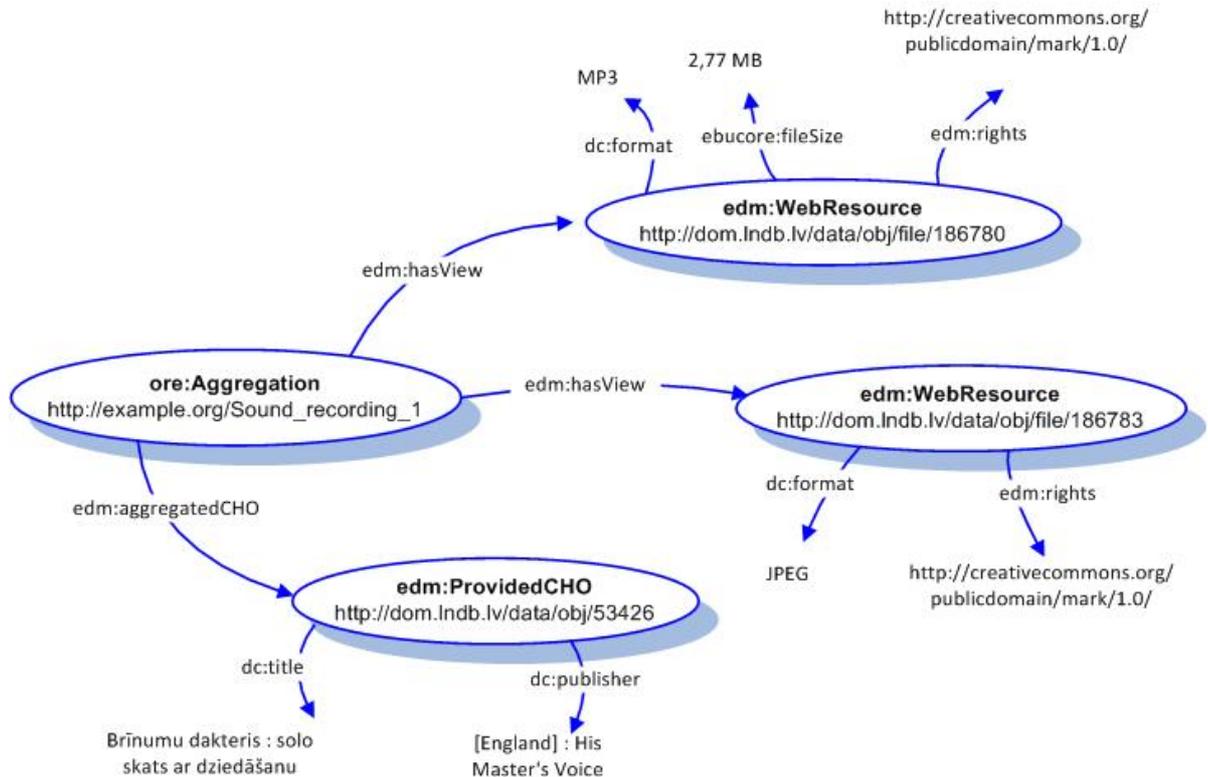


Figure 2: Representation of multiple WebResources for a given CHO.

Reminder: the distinction between the CHO and its digital representations may require choices based on the metadata available for the different resources. Refer to section 3 for further details.

4.2. Distinction of the master version among the digital representations available for a CHO⁴

In cases where several digital representations are available for a sound CHO, we might want to identify which one is the master version. The master version is not necessarily the version of the best quality but it is a version that has a significant importance in the life of the object. For instance the first recording of a concert might have more historical importance than the different mixes of the same recording done later.

EDM currently has no properties to represent this information at the level of the *edm:WebResource*. The Task Force is therefore suggesting to create a new property to capture this information.

EDM currently has the property *edm:isDerivativeOf* at the level of the *edm:ProvidedCHO* to describe associated resources that are a derivation of the other. The Task Force suggests adding this property also at the level of the *WebResource* in order to indicate which is the digital representation from which other digital representations are derived.

⁴ This requirement is represented by the following examples: TLA, RBB, NISV

Property	Value type	Domain	Cardinality	EDM Sound Note
edm:isDerivativeOf	reference	edm:WebResource or edm:ProvidedCHO	Min 0, max unbounded	The identifier of a WebResource or a ProvidedCHO from which another resource has been derived

Additional properties are also available in other namespaces.

The Music Ontology⁵ offers the property *mo:remaster_of* which allows the identification of the master version by identifying the remastered version.

Property	Value type	Domain	Subproperty Of	Cardinality	EDM Sound Note
mo:remaster_of	literal or reference	edm:ProvidedCHO or edm:WebResource	edm:isDerivativeOf	Min 0, max 1	Used to point a remastered version to the master version.

In addition to *mo:remaster_of*, Schema.org⁶ and the BBC Programme ontology⁷ offers the more generic properties *schema:version* and *po:version* which can accommodate other cases of versioning. These properties can have a default literal value “master” which will identify the master version amongst other versions.

Property	Value type	Domain	Subproperty Of	Cardinality	EDM Sound Note
schema:version or po:version	literal	edm:ProvidedCHO or edm:WebResource	edm:isDerivativeOf	max 1, min 0	Use to indicate which version is the master version. The default value for this property should be “master”

⁵ <http://musicontology.com/>

⁶ <http://schema.org/>

⁷ <http://www.bbc.co.uk/ontologies/po>

5. Controlled rights information for digital representations

Rights information is key for the re-use of audio-visual materials by Europeana' users. This information needs to be clearly identified within the metadata provided for each sound object. Europeana Rights Framework applies to media file as provided on Internet, at certain location (URLs)⁸.

Controlled rights information are therefore represented in EDM at the level of the Aggregation (*ore:Aggregation*) through the property *edm:rights*. This property also applies when digital sound files are described as CHOs rather than WebResource.

For indicating rights of every digital representation, EDM also allows the representation of multiple WebResources per CHO (as described section 4.1) and the specification of one rights statement per WebResource via the property *edm:rights* as shown in Figure 2.

Property	Value type	Domain	Cardinality	EDM Sound Note
edm:rights	reference(URI)	edm:WebResource or ore:Aggregation	min 0, max 1	The value in this element will indicate the usage and access rights that apply to this digital representation. The value in this element is a URI taken from the set of those defined for use in Europeana. A list of these can be found at http://pro.europeana.eu/web/available-rights-statements

In a hierarchy, rights information might propagate from the parent to the children objects. Detailed solutions for data propagation should be explored. For further details on data propagation refer to the section 14.

6. Technical metadata⁹ for sound objects represented as CHOs or WebResources

6.1. Duration in sounds CHOs and WebResources

When describing sound recordings, duration is an important feature to be captured. Note that duration can be captured at the ProvidedCHO level or at the WebResource level depending on the focus of the metadata description.

⁸ More information about the Europeana Rights Framework can be found at <http://pro.europeana.eu/available-rights-statements>

⁹ This requirement is represented by the following examples: RBB, ICCU, SB in particular otherwise applicable to all examples.

EDM currently uses the general Dublin Core *dcterms:extent* property to qualify either the size or the duration of a resource. It seems therefore useful to refine this definition by creating a sub-property of *dcterms:extent* to specifically capture duration information.

The Task Force suggests using *ebucore:duration* from EBUCore¹⁰ model.

Property	Value type	Domain	Subproperty of	Cardinality	EDM Sound Note
ebucore:duration	literal	edm:ProvidedCHO or edm:WebResource	dcterms:extent	Min 0, max 1	duration

Note that using this property might not be needed if data providers or Europeana have means to extract this information directly from the media files. The duration information is usually present in the header of a static file but might be available for streamed audio.

6.2. Track information for sound CHOs and WebResources

Metadata descriptions for audio recordings and audio-related materials often contain information related to tracks that compose them.

The Task Force recommends the use of more detailed properties in addition to the generic *dcterms:extent* or *dc:description* that would be used according to the current EDM schema. The following properties are suggested to be added to the *edm:ProvidedCHO* and *edm:WebResource* classes.

Property	Value type	Domain	Subproperty of	Cardinality	EDM Sound Note
mo:record_side	literal	edm:ProvidedCHO or edm:WebResource	dcterms:extent	Min 0, max unbounded	Associates the side on a carrier (i.e. vinyl, shellac) record, where a track is located, e.g. A, B. This property can then also be used in conjunction with <i>mo:track_number</i> , so that one can infer e.g. "A1", that means, track number 1 on side A.
mo:track_number	literal	edm:ProvidedCHO or edm:WebResource	dcterms:extent	Min 0, max unbounded	Indicates the position of a track on a record medium (a CD, etc.).

¹⁰ <https://tech.ebu.ch/MetadataEbuCore>

mo:track_count	literal	edm:ProvidedCHO or edm:WebResource	dcterms:extent	Min 0, max unbounded	The total amount of tracks.
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6.3. Other technical metadata

The Task Force has selected a list of additional technical metadata which could be either provided by data providers in the data or fetched automatically by Europeana. For other technical properties, like format, we rely on properties that have been already included in EDM, like dc:format as shown in Figure 2.

Property	Value type	Domain	Subproperty of	Cardinality	EDM Sound Note
ebucore:hasAudioEncodingFormat	literal	edm:ProvidedCHO or edm:WebResource	dc:format	Min 0, max unbounded	To define the audio compression format of the resource e.g. AAC for an audio channel.
ebucore:bitRate	literal	edm:ProvidedCHO or edm:WebResource	dc:format	Min 0, max unbounded	the audio bit rate in bits per second
ebucore:audioTrackConfiguration	literal	edm:ProvidedCHO or edm:WebResource	dc:format	Min 0, max unbounded	To define the audio track configuration. Used to express the arrangement or audio tracks e.g. 'stereo', '2+1', 'surround', 'surround (7+1)'
ebucore:audioChannelNumber	literal	edm:ProvidedCHO or edm:WebResource	dcterms:extent	Min 0, max unbounded	The total number of audio channels.
ebucore:hasMimeType	literal or reference	edm:ProvidedCHO or edm:WebResource	dc:format	Min 0, max unbounded	Define the main MIME type as defined by IANA: e.g. audio, video, text, application, or a container MIME type
ebucore:fileSize	literal	edm:ProvidedCHO or edm:WebResource	dc:format	Min 0, max unbounded	To indicate the storage requirements or file size of a digital resource. The file size is expressed in bytes.

ebucore:sampleRate	literal	edm:ProvidedCHO or edm:WebResource	dcterms:extent	Min 0, max unbounded	The frequency at which audio is sampled per second. Also called sampling rate.
ebucore:sampleSize	literal	edm:ProvidedCHO or edm:WebResource	dc:format	Min 0, max unbounded	To provide the audio encoding bit depth. Also called bit depth

7. Different types of dates for sound CHOs or WebResources

The collected examples have raised the need of managing different types of dates in EDM. A lot of time can pass between the creation of a musical work, its recording, the digitisation of this recording and its publication. It is therefore important to capture all these different dates.

Capturing different dates would allow representing situations during which the access rights applicable to an object have changed. For instance the CNRS distinguishes in its database sound recording that have been commercially published some time ago from sound recordings that not commercially published which are in the public domain or for which researchers have given the authorisation to make them public¹¹.

These recordings are therefore more “unique”. Capturing the date of the first recording and the date of publication would show the time that passes between the two dates.

The Task Force has identified the following dates as relevant for the EDM profile:

- Date of creation: It can be used to describe a date of composition (for a given work), a date of recording (for a performance of a given work)
- Date of publication
- Date of digitisation
- Date of copyright
- Date of modification

The dates can be expressed in EDM using the following properties

Property	Value type	Domain	Subproperty of	Cardinality	EDM Sound Note
dcterms:created	literal or reference (to a edm:TimeSpan)	edm:ProvidedCHO or edm:WebResource	dc:date	min 0, max 1	The date of creation of the CHO or the WebResource. It can be used for the date of composition (of a work

¹¹ Note that the dates could also provide additional information in terms of rights management. For instance, the French Intellectual Property Law states that recordings of traditional music (without known authors or composers) can be freely accessible after 50 years from the first year of publication for published recordings; and from the first year of recording for unpublished recordings. The dates could help researchers to know more about the access conditions of some materials

)or the date of recording (performance of the work)
dcterms:issued	literal or reference (to a edm:TimeSpan	edm:Provid edCHO or edm:WebR esource	dc:date	min 0, max 1	Date of the first formal issuance or publication of the CHO or the WebResource
ebucore:dateDigi tised	literal or reference (to a edm:TimeSpan	edm:WebR esource	dc:date	min 0, max 1	The date when the resource was digitised
dcterms:dateCop yrighted	literal or reference (to a edm:TimeSpan	edm:Provid edCHO or edm:WebR esource	dc:date	min 0, max 1	The date when the resource was copyrighted
dcterms:modified	literal or reference (to a edm:TimeSpan	edm:Provid edCHO or edm:WebR esource	dc:date	min 0, max 1	The date when the resource was last modified

8. Relationships between sound CHOs¹²

Europeana has collected and will collect multiple representations of related sound CHOs. Rich metadata is required to describe the relationships between these related sound CHOs in order to provide the full context of those resources. Providing a richer context also helps to answer end-users' requests on the Europeana portal. As opposed to the section 4, the relationships described in this section are made between CHOs and not between a CHO and its WebResource.

The Task Force has identified a set of relationships relevant to the end-users. Note that this requirement doesn't deal with hierarchical and membership relationships as they are covered in sections 11 and 12

- Relationships between a musical work and all its recordings (where these are represented as CHOs)
- Relation between all the resources (music scores, notes, programme, images...) about a particular performance

¹² The properties described below may be also added to the edm:WebResource at a later stage to support a general versioning. mechanism.

- Relation between different resources (music scores, digitised music scores, images) having as subject the same musical work

EDM provides a set of properties that can be used to describe relationships between CHOs. Note that the most general relation is described using `dc:relation`. The other properties characterise more specific relationships.

Property	Value type	Cardinality	EDM Sound Note
<code>dc:relation</code>	literal or reference	min 0, max unbounded	The name or identifier of a related resource, generally used for other related CHOs. Cf <code>edm:isRelatedTo</code> .
<code>dcterms:hasFormat</code> or <code>dcterms:isFormatOf</code> ¹³	literal or reference	min 0, max unbounded	A resource related to the CHO that is substantially the same as the CHO but in another format.
<code>dcterms:hasPart</code> or <code>dcterms:isPartOf</code>	literal or reference	min 0, max unbounded	A resource that is included either physically or logically in the CHO. Cf section 11 on hierarchical relationships
<code>dcterms:hasVersion</code> or <code>dcterms:isVersionOf</code>	literal or reference	min 0, max unbounded	Another, later resource that is a version, edition or adaptation of the CHO demonstrating substantive changes in content rather than format.
<code>dcterms:isReferencedBy</code> or <code>dcterms:references</code>	literal or reference	min 0, max unbounded	Another resource that references, cites or otherwise points to the CHO.
<code>dcterms:isReplacedBy</code>	literal or reference	min 0, max unbounded	Another resource that supplants, displaces, or supersedes the CHO.
<code>edm:incorporates</code>	reference	min 0, max unbounded	The identifier of another resource that is incorporated in the described CHO.
<code>edm:isDerivativeOf</code>	reference	min 0, max unbounded	The identifier of another resource from which the described CHO has been derived. For instance a recording of a work to the work it is derived from.
<code>edm:isNextInSequence</code>	reference	min 0, max unbounded	The identifier of the preceding object where both objects are part of the same overall resource. Cf section on hierarchical relationships

¹³ Note that for this pair of properties and the following ones either direction is possible. The semantics of the relationship expressed by the pair is the same.

edm:isRelatedTo	literal or reference	min 0, max unbounded	The identifier or name of a concept or other resource to which the described CHO is related.
edm:isRepresentationOf	reference	min 0, max unbounded	The identifier of another object of which the described CHO is a representation.
edm:isSimilarTo	reference	min 0, max unbounded	The identifier of another resource to which the described CHO is similar.
edm:isSuccessorOf	reference	min 0, max unbounded	The identifier of a resource to which the described CHO is a successor. E.g. "The Two Towers" is a successor of "Fellowship of the Ring". <code><edm:isSuccessorOf rdf:resource="http://dbpedia.org/resource/The_Fellowship_of_the_Ring"/></code>

8.1. Translate FRBR hierarchies into EDM¹⁴

The examples have shown that some data providers describes their data according to the FRBR model (work, expression, manifestation, item). The Task Force has not worked in details on these requirements as some work has already been done by the Task Force on EDM-FRBoo application profile (Doerr, M., Gradmann, S., LeBoeuf, P., Aalberg, T., Bailly, R. & Olensky, M, 2013). Mappings from FRBRoo to EDM have been created in the context of this work and a set of FRBRoo classes and properties have been identified as potential EDM extensions.

The Task Force on FRBRoo provides two more detailed sound examples that are relevant for the EDM Sound profile¹⁵.

- The first example focuses on the organization by the "Cité de la Musique" in Paris of a concert containing the 1st Symphony by J.Brahms: a performance of this work and the programme note were both digitised and provided to Europeana.
- The second example illustrates the specific issue of the description of a notated music manuscript of the work Rite of Spring by Igor Stravinsky.

These two examples show that the links between different items are not always direct and are sometimes represented with different classes in EDM.

8.2. Abstract Works for contextualising sound recordings

The FRBR hierarchy involves the representation of the work level. The representation of the work level is interesting for Europeana as it could improve the searchability of musical works and their

¹⁴ This requirement is represented by the following examples: BL, DNB, BnF, NISV

¹⁵ See the musical work examples available at <http://pro.europeana.eu/web/network/europeana-tech/-/wiki/Main/Task+Force+EDM+FRBRoo>

various manifestations in the Europeana portal. For instance it would allow regrouping a variety of resources “representing”, “derived from” from the same work at the interface level. This mechanism would provide Europeana with richer results in terms of relevancy and context.

The work level is more difficult to represent in Europeana as it usually has no digital representation. It has however essential metadata such as author (composer, etc.), title, date(s), place...Data providers can attach these work-level properties to ProvidedCHOs but the Task Force recommends to describe works as a separate entity. It is very important for cases where one work is embodied by several ProvidedCHO in Europeana.

The solution proposed by the Task Force is to represent the work level as a contextual resource for a given sound CHO using the class *skos:Concept*.

Data providers could then provide metadata such as the name, the uniform title of the musical work and identifiers from controlled authorities. Note that standard identifiers created by international registration authorities such as ISAN¹⁶, ISRC¹⁷ or ISWC¹⁸ could be also provided in the metadata.

Having work level metadata would be an asset for Europeana, however one challenge might be the fact that one work will get multiple descriptions across institutions. It could then impact the searchability in a more negative way than the expected effect. That is the reason why this Task Force would strongly recommend data providers to refer to standard unique work identifiers (ISWC, ISAN,...) in their metadata descriptions for works. N It would allow Europeana to identify multiple representations of the same work and create clusters to avoid duplicates.

When describing the work as a *skos:Concept*, the property *skos:exactMatch* can be used to add a reference to the work in another system.

Property	Value type	Cardinality	EDM Sound Note
skos:exactMatch	reference	min 0, max unbounded	The identifier of exactly matching work

9. Context information for sound CHOs

Sounds recordings are encompassed in a process involving the creation of various resources and metadata relevant to the understanding of the audio and audio-related materials. The challenge is to ensure that contextual information related to specific agents, places, time, concept or event (event, places, agents) is correctly modelled and linked to the objects it refers to.

¹⁶ <http://www.isan.org/>

¹⁷ <https://www.usisrc.org/>

¹⁸ <http://www.iswc.org/>

9.1. Context of creation of a CHO

Data providers might have additional information related to the context of creation of audio materials such as the type of performance, whether the recording was made in a studio or on the field. This type of information is particularly relevant for traditional music which is defined based on the type of context surrounding the creation of the recording. If structured metadata is available, then this contextual information should be expressed using one of the EDM contextual resources as described in section 9.2. If only a textual description is available, the Task Force recommends to refine the *dc:coverage* property with the sub-property *skos:note* property to capture context information.

Note that the overview of the properties applicable to the *edm:ProvidedCHO* are listed in the Annex.

9.2. Agents, Places, Times, Concepts involved in the context of Sound objects

EDM allows for the representations of these contextual resources through the classes *edm:Agent*, *edm:Place*, *edm:TimeSpan*, *skos:Concept* and *edm:Event*. The Task Force has identified additional properties for the *edm:Agent*. For the rest of the properties, data providers can refer to the EDM Guidelines as described in the Annex for the details on the other classes and properties available to describe agents, places, time, concept and events.

edm:Agent

The Task Force recommends the use of one subclass for *edm:Agent*, following the principle of EDM extension as defined by the DM2E project (DM2E, 2014):

- *mo:MusicalGroup* subclass of *edm:Agent*

The following properties have been added for *mo:MusicalGroup*

Property	Value type	Domain	Subproperty of	Constraints	EDM Sound Note
<i>mo:collaborated_with</i>	reference	<i>edm:Agent</i>	<i>edm:hasMet</i>	min 0, max unbounded	Used to relate two collaborating people on a work
<i>mo:member_of</i>	reference	<i>edm:Agent</i>	<i>edm:hasMet</i>	min 0, max unbounded	Indicates a member of a musical group

9.3. Roles for Agents¹⁹

Disclaimer: The Task Force proposed in this section a theoretical solution to represent the role for Agents. However the practical implementation of the role in EDM is still in discussion. No classes or properties have explicitly chosen so far.

The creation of musical works involves the participation of various agents in a variety of roles. Some requirements need to be taken into account when expressing agents roles in EDM:

- A CHO can have one to many agents.
- We should be able to specify a role per agent.
- An agent can have different roles in different CHOs

EDM allows the description of one to many agents which can be represented using the *edm:Agent* class if more metadata is available for them. But currently it does not support fine-grained representation of roles.

The Task Force has identified two ways to represent roles in EDM:

- Create a new Role property which would be used with literals and attached to the *edm:Agent* class. This solution brings two issues:
 - The first issue raised by this solution is that it might not be appropriate when the roles need to be dynamic. This would be required since an agent can play different roles (from a controlled list for instance) in a collection; and since Data Providers can introduce different (arbitrary) roles to fit the needs of their collections
One solution would be to suggest a small list of roles which would avoid complicating the modelling too much. However as shown in the MARC relator list or the new RDA draft the amount of roles is too important to be sustainable.
 - The second issue lies in the modelling of the data. To which class the Role property would be applied? It could be represented as a relationship between an Agent and a given CHO but again this solution would prevent any dynamic approach as mentioned above.
- Represent the Role as a new EDM class. Additional properties specific to the Role could be created for this class.

EDM relies on the RDF model which is based on binary relations, it is thus difficult to represent situations involving more than one relation between two same resources. This is what happens when representing a CHO, an agent, and the role the agent played in the creation of the CHO (say, creator) – there could be another role (say, performer) that this same agent plays in relation to the same CHO. In practice one can create as many properties as required (Charles & Olensky, 2014).

¹⁹ This requirement is represented by the following examples: RBB, NISV, DNB, MPI

For instance, the MARC record below (Figure 3) represents one relation between the object the record is about, an agent and the role of this agent. The subfield codes (or attributes) are used to represent the relations between those resources.

100 1#SaMorgan, John Pierpont,\$d1837-1913,\$ecollector.

Figure 3 Example²⁰ of a creator name associated with a role in a MARC record

The difficulty here is to represent the role in such a way that each Data Provider can arbitrarily change the type of the role without creating its own, adhoc properties as specialization of EDM. This can be done if the relation's attributes are gathered onto one new resource (this process is called reification²¹) that stands, e.g. for a creation event, as shown in Figure.4.

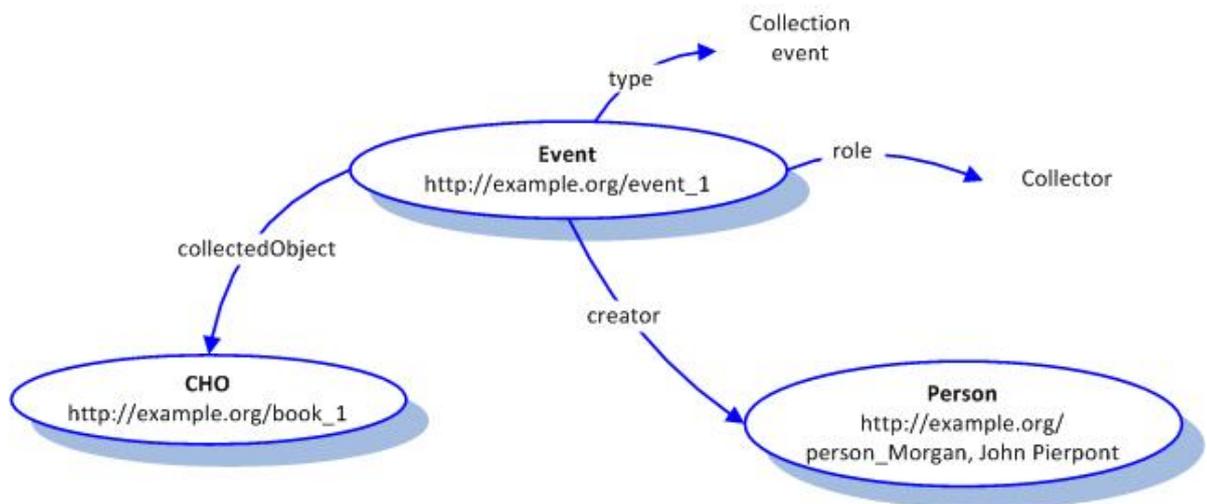


Figure 4 Example of RDF reification of XML or MARC like attributes

Role information could be represented as described in the Figure 5 below. The *edm:ProvidedCHO* and the *edm:Agent* classes would both point to a Role class which would be then characterised by a set of properties. The Task Force didn't have the time to work further on the practical implementation of this solution. The class and properties for the Role class would have to be selected later, possibly in the frame of a new Task Force.

²⁰ Example from <http://www.loc.gov/marc/bibliographic/bd100.html>

²¹ For more details see <http://www.w3.org/TR/swbp-n-aryRelations/>

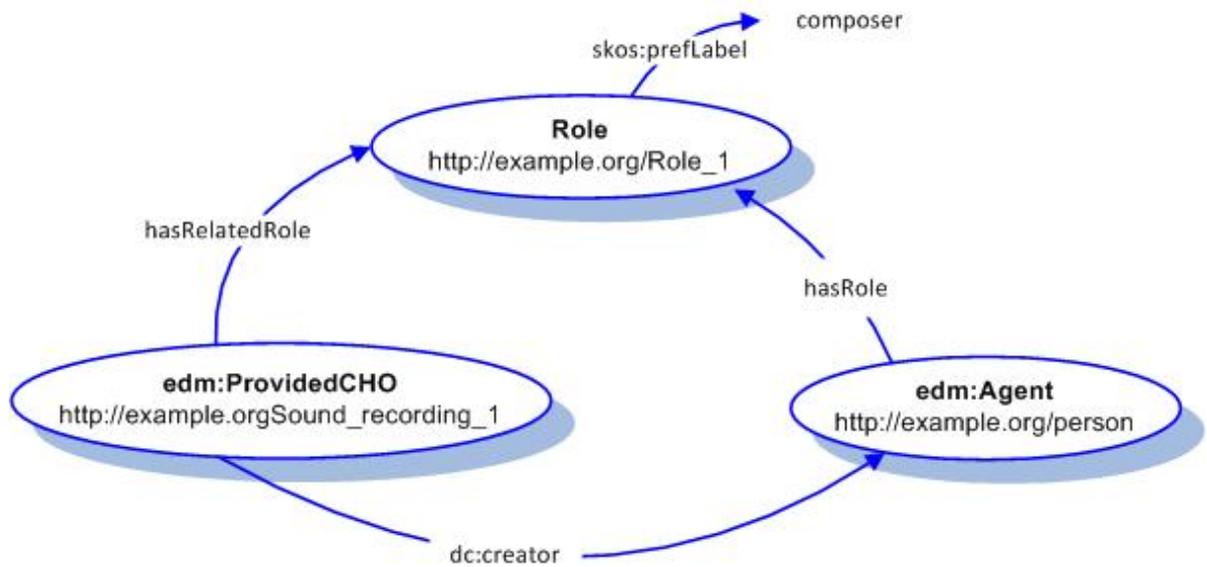


Figure 5 Representation of a role with the EDM extensions

10. Genre for sound CHOs

The Europeana Sounds project in its deliverable *D1.3 Ontologies for Sound*²² recommends the definition of the Genre of a sound object in order to identify the style of a work. The Task Force is therefore adding the property `ebucore:hasGenre` to the `edm:ProvidedCHO` class to capture the Genre. This property should be used with concepts identifiers from controlled vocabularies.

Property	Value type	Domain	Subproperty of	Constraints	EDM Sound Note
<code>ebucore:hasGenre</code>	literal or reference	<code>edm:ProvidedCHO</code>	<code>dc:subject</code>	Min 1, max unbounded	Genre of the Sound CHO. The value should be taken from the following vocabularies: Broad concepts from the following values: <ul style="list-style-type: none"> • Music • Spoken word • Radio • Environment And specific concepts from: <ul style="list-style-type: none"> • <i>Europeana Music Genre/Form Vocabulary</i> • <i>Europeana Non-Music Genre Vocabulary</i> -An established thesaurus, e.g. <ul style="list-style-type: none"> • LC Genre/Form • FAST • EBU

²² <http://pro.europeana.eu/web/europeana-sounds/>

11. Hierarchical structures²³

The analysis of the examples shows that lot of data requires hierarchical structures. As described by the report *Recommendations for the representation of hierarchical objects in Europeana* (Charles, V. et al, 2013), we defined as hierarchies structures that are characterised by vertical (whole/part relationships) and horizontal (sibling) relationships.

In the context of sounds objects we have identified two types of hierarchies:

- hierarchies of sound CHOs (could be a hierarchy of sound recordings on the carriers, a hierarchy of performances of a work i.e. opera in three acts... Refer to section 3 for more details) : these hierarchies could be expressed at the level of the cultural heritage object (i.e express a front-back relationship) or at the level of the digital representations (i.e a recording split in three files)
- hierarchical structures found in Archives which typically reflect the administrative structure and/or functions of the organisation which generated the archival material. In these the amount of information for an object may depend on its position in the structure of the archives. Some information can be available in only one of the constituents parts.

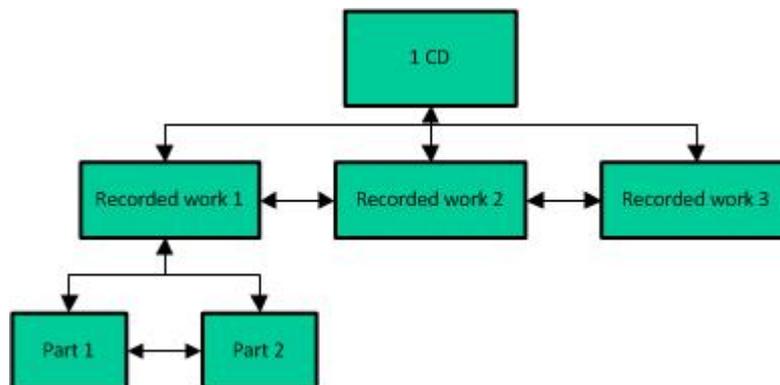


Figure 6 Hierarchical representation for a CD and the works recorded on it²⁴.

The Task Force distinguishes hierarchical structures as described above from collections described in section 12.

²³ This requirement is represented by the following examples: CNRS-MMSH, CNRS-CREM, NISV, (DNB if they change their export format), OeM

²⁴ A corresponding real example can be found at <http://d-nb.info/1000273466/about/html>

11.1. Hierarchies of sound CHOs²⁵

In EDM, the first type of entity which can be included in a hierarchy is the Cultural Heritage Object (CHO), described using the class *edm:ProvidedCHO*. In this case, the hierarchy focuses on the description of the semantic structure of the object. This level is likely to be the one for which there is the most descriptive metadata. For sound objects, the CHO can be of different types depending on the original metadata:

- An analogue carrier
- A sound recording
- the sound itself

EDM allows for the representation of the horizontal and vertical relationships between the different levels constituting an object.

Vertical relationships between a whole *ProvidedCHO* and its parts can be expressed with two specific properties:

- The has-part relation (*dcterms:hasPart* property) which represents a top-down relation
- The is-part-of relation (*dcterms:isPartOf* property) which represents a bottom-up relation.

These types of relationships allow the navigation from a “whole” to a specific part.

Property	Value type	Cardinality	EDM Sound Note
<i>dcterms:isPartOf</i>	reference	min 0, max unbounded	A resource in which the CHO is physically or logically included. For that purpose it will be necessary to supply an identifier as the value
<i>dcterms:hasPart</i>	reference	min 0, max unbounded	A resource that is included either physically or logically in the CHO.

The horizontal relationships between the parts of a resource can be expressed with the is-next-in-sequence-to property (*edm:isNextInSequence*).

Property	Value type	Cardinality	EDM Sound Note
<i>edm:isNextInSequence</i>	reference	min 0, max unbounded	The identifier of the preceding object where both objects are part of the same overall resource. Note that EDM guarantees the uniqueness of the <i>edm:isNextInSequence</i> property.

edm:isNextInSequence can be used for expressing the relationship of type front-back or side A-side B. For most of the shellacs collection, each side of the shellac has its own metadata.

²⁵ This requirement is represented by the following examples: DNB, NISV, NLL, SB

11.2. Hierarchies of digital representations of CHOs²⁶

Each CHO (born-digital object or analogue object) can give rise to one or many digital representations. In some cases one CHO is represented across multiple digital carriers that need to be organised hierarchically in order to keep the meaning of the CHO.

EDM also enables representing hierarchies of the digitised representations of a ProvidedCHO using the class *edm:WebResource*.

In some situations it is possible to model a hierarchy of digital objects using a hierarchy of ProvidedCHO combined with WebResources. If a hierarchy of provided objects having digital representations exists then these WebResources are de facto themselves hierarchically ordered by association with the CHOs. However when the CHO has been digitised in multiple parts (one recording spread in more than one file) , the hierarchy need to be built only at the level of the WebResource. The following properties are currently available for representing *edm:WebResource* hierarchies:

Property	Value type	Cardinality	EDM Sound Note
dcterms:isPartOf	reference	min 0, max unbounded	A resource in which the Web resource is physically or logically included. For that purpose it will be necessary to supply an identifier as the value.
dcterms:hasPart	reference	min 0, max unbounded	A resource that is included either physically or logically in the web resource.
edm:isNextInSequence	reference	min 0, max unbounded	Where one web resource has several parts, shown by multiple instances of the edm:hasView property on the ore:Aggregation, then this property can be used to show the sequence of the objects.

11.3. Hierarchies of CHO with levels missing digital representations²⁷

Hierarchies from our examples show that in some cases a particular ProvidedCHO may not have a dedicated digital representation (represented in EDM using *edm:WebResource*). This situation can result from archiving practices or publication restrictions. Since Europeana doesn't allow for CHOs without a digital representation, a solution is needed for keeping the relevant information from all levels.

If the resource to be removed from the CHO hierarchy is a leaf of the tree, the potentialProvidedCHO may safely be discarded.

But if the missing ProvidedCHO is an inner node (i.e. it has children which link themselves to

²⁶ This requirement is represented by the following examples: CNRS-CREM, NISV, RBB. The hierarchies might not be exported in the case of NISV and DNB.

²⁷ This requirement is represented by the following examples: CNRS-MMSH, CNRS-CREM

digital content) it is more difficult to discard it. “True” CHOs down the hierarchy may then lack crucial context data.

The Task Force suggests two options to solve the issue:

-provide a ProvidedCHO with an “artificial” representation (e.g. a landing page using *edm:isShownAt*) that still allows it to be ingested in Europeana;

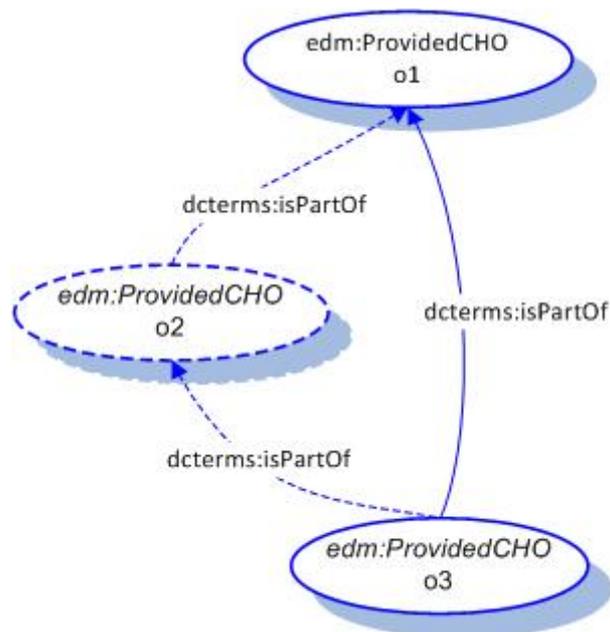


Figure 7. the missing ProvidedCHO either not represented or represented with an “artificial” representation.

-supply the resource to Europeana as a contextual resource, using one of the available EDM classes that match the corresponding CHO.

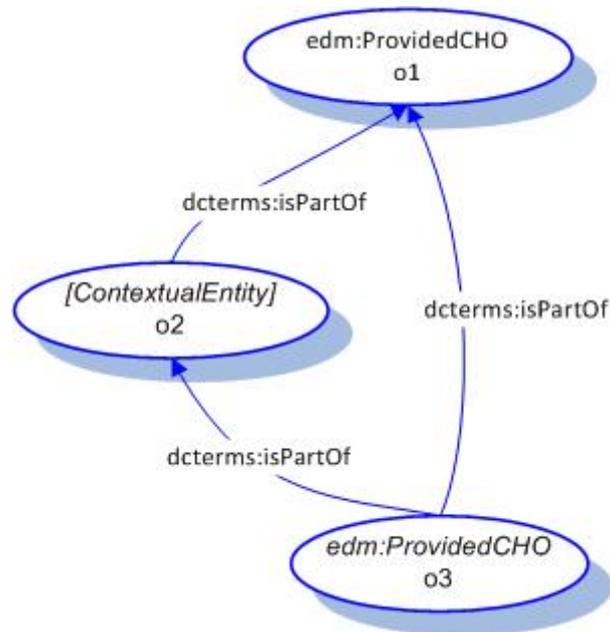


Figure 8. The missing ProvidedCHO is represented as a contextual entity.

Both solutions imply that that relation between the CHO1 and the CHO3 needs to be explicitly stated to avoid the hierarchy to be broken.

In some cases, the missing levels might not impact the hierarchy in itself but the sequence in which the CHOs are ordered. For instance a concert might have been recorded in three parts but one is missing (i.e. for copyright reason). In this case the sequence will be broken. The solution is to link as suggested in figure 9 the CHO4 to the CHO2 using *edm:isNextInSequence*. This solution however may be judged a borderline usage (semantically speaking) of *edm:isNextInSequence*.

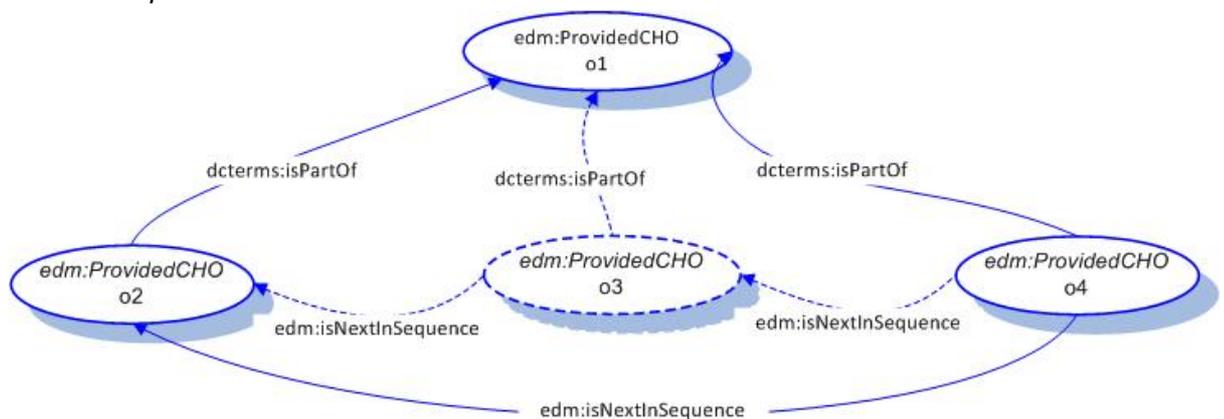


Figure 9. Representation of a sequence between two non-consecutive CHO when one is missing.

12. Collection level metadata - Unique metadata record for all the items in a collection.²⁸

Next to hierarchical structure the Task Force has identified the need for representing collection level metadata. A collection gathers different items of similar importance which relate to the main collection entity as its *members*. The member relationship functions differently from the (sub) part-whole relationship presented in in the section 11 on hierarchies.

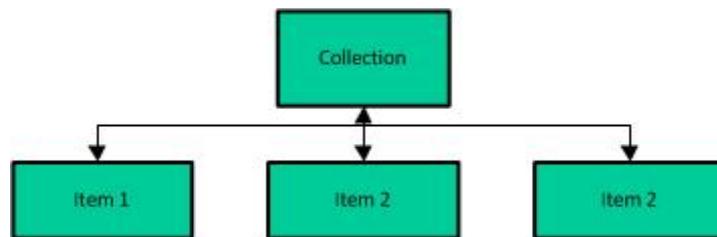


Figure 10 Typical structure of a collection

In the collected examples we have identified situations for which:

- A collection level description already exists and needs to be kept as it contains unique and key metadata
- A unique metadata record exists for a group of items. This unique metadata record could act as a collection level.
- The sound recording(s) is captured in a specific context that could be expressed through a collection level description

A *edm:Collection* class has been introduced with the following properties to represent collection level metadata. It is based on the proposal made by Europeana (Wickett, K.M., Isaac, A., Fenlon, K., Doerr, M., Meghini, C., Palmer, C.L & Jett, J. 2013).

²⁸ This requirement is represented by the following examples: CNRS-MMSH, CNRS-CREM, TLA

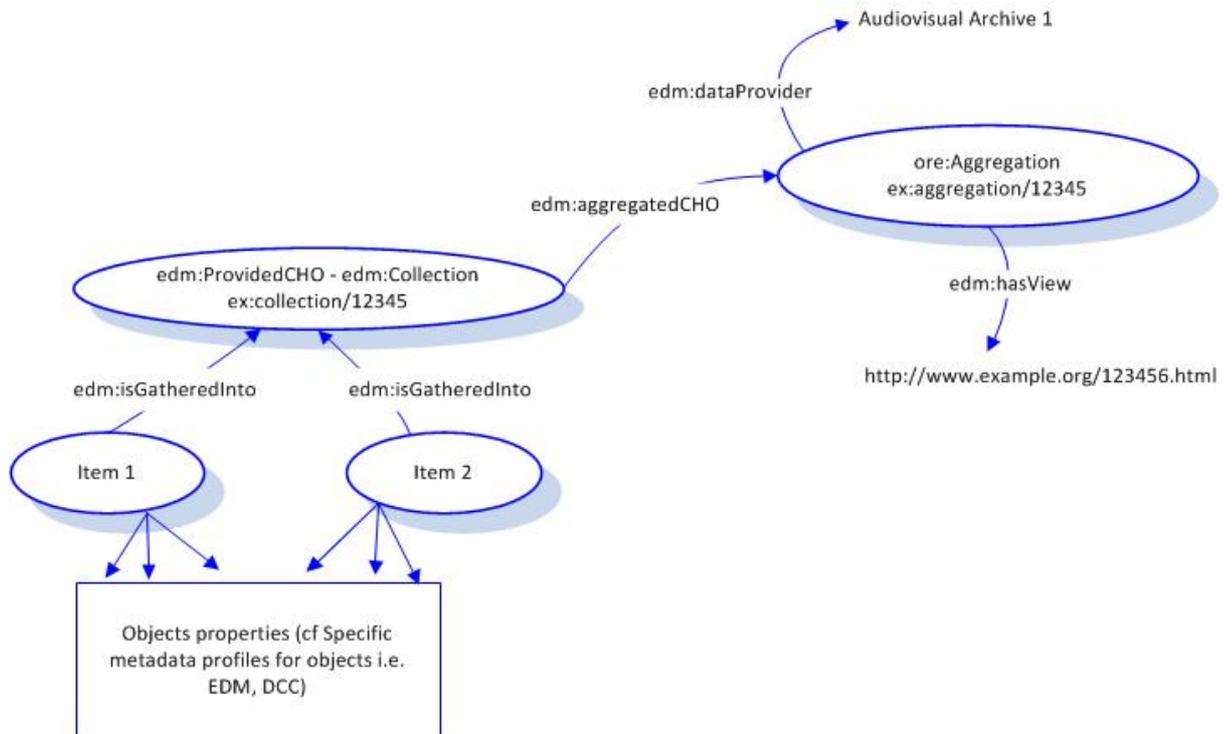


Figure 11. Representation of the edm:Collection class in EDM

Property	Value type	Cardinality	EDM Sound Note
dc:creator	literal or reference	min 0, max unbounded	Entity that gathers objects together following implicit or explicit criteria or accrual policy
dc:identifier	literal	min 0, max unbounded	Unique key for collection
dc:language	literal	min 0, max unbounded	If text, the language(s) of the items in the collection
dc:relation	literal or reference	min 0, max unbounded	This is the most general relationship property and can be used to indicate any other collection(s) associated with or that complement the current collection. It can also be used for additional materials included alongside the collection that explain, incorporate, or otherwise make use of the collection: for example, finding aids, or material that describes a collection. For these examples and similar materials, consider the more specialised properties of edm:isRelatedTo, dcterms:isReferencedBy and edm:isSimilarTo.

dc:rights	literal or reference	min 0, max unbounded	Information about rights held in and over the collection which cannot be captured by the edm:rights property.
dc:subject	literal or reference	min 0, max unbounded	Terms that describe the overall topical content of the objects in the collection.
dc:title	literal	min 0, max unbounded	Name of collection. Note that either dc:title or dc:description is mandatory.
dcterms:accrualPeriodicity	literal	min 0, max unbounded	A statement of how often the collection is updated. Note that it can be used to indicate the general publication periodicity of the collection (i.e radio program)
dcterms:alternative	literal	min 0, max unbounded	Alternative name of collection
dcterms:audience	literal	min 0, max unbounded	The primary audience(s) of the collection
dcterms:description	literal	min 0, max unbounded	A summary of the content and topics of the collection.
dcterms:extent	literal	min 0, max unbounded	The number of objects within the collection at the provider level (as opposed to the dataset provided to Europeana)
dcterms:hasPart	literal or reference	min 0, max unbounded	Any other collection(s) contained within the current collection
dcterms:isPartOf	literal or reference	min 0, max unbounded	Any other collection(s) that contain the current collection
dcterms:isReferencedBy	literal or reference	min 0, max unbounded	Additional materials included alongside the collection that explain, incorporate, or otherwise make use of the collection. For example, may be used for finding aids, or material that describes a collection.
dcterms:provenance	literal	min 0, max unbounded	A statement of any changes in ownership and custody of the resource since its creation that are significant for its authenticity, integrity and interpretation

dcterms:spatial	literal or reference	min 0, max unbounded	A place(s) or area(s) associated with most or all of the objects in the collection.
dcterms:temporal	literal or reference	min 0, max unbounded	A time period(s) associated with most or all of the objects in the collection.
edm:highlight	reference	min 0, max unbounded	A 'key object' from the collection be it a masterpiece, or a good exemplar. (This is a sub-property of the inverse of the <i>isGatheredInto</i> collection membership property)
edm:isRelatedTo	literal or reference	min 0, max unbounded	Additional materials included alongside the collection that explain, incorporate, or otherwise make use of the collection. For example, may be used for finding aids, or material that describes a collection.
edm:itemGenre	literal or reference	min 1, max unbounded	<p>Genre of objects or resources in the collection e.g. classical music</p> <p>The value should be taken from the following vocabularies:</p> <p>Broad concepts from the following values:</p> <ul style="list-style-type: none"> • Music • Spoken word • Radio • Environment <p>And specific concepts from:</p> <ul style="list-style-type: none"> • <i>Europeana Music Genre/Form Vocabulary</i> • <i>Europeana Non-Music Genre Vocabulary</i> <p>-An established thesaurus, e.g.</p> <ul style="list-style-type: none"> • LC Genre/Form • FAST • EBU
cld:dateItemsCreated	literal or reference	min 0, max unbounded	A range of dates over which the individual objects within the collection were created
cld:itemFormat	literal or reference	min 0, max unbounded	The format (media type, physical or digital) of the objects in the original collection. This may be information about a physical thing (for physical objects) or a digital media type (for born-digital objects). This property refers to the ProvidedCHO, not a web representation
cld:itemType	literal or	min 0, max unbounded	Type or nature of objects or resources in the

	reference		collection e.g. audio recordings
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An aggregation class (ore:Aggregation is also required for the edm:Collection class).

EDM Property	Value type	Cardinality	EDM Sound Note
edm:aggregatedCHO	reference	min 1, max 1	The identifier of the source object e.g. the Mona Lisa itself. This could be a full linked open data URI or an internal identifier.
edm:isShownAt	reference	min 1, max 1	Collection URL (home page)
edm:rights	reference	min 1, max 1	Information about usage and access rights of the digital objects attached to the Aggregation.
edm:dataProvider	literal or reference	min 1, max 1	The name or identifier of the organisation who contributes data indirectly via an aggregation service.
edm:provider	literal or reference	min 1, max 1	The name or identifier of the organisation who delivers data directly to an aggregation service (e.g. Europeana)
dc:rights	literal	min 0, max unbounded	A statement of any access restrictions which cannot be captured by the edm:rights property.

13. Data propagation- inheritance

Data propagation is important when considering hierarchies. Metadata applicable at one level of the hierarchy might also be applicable for the other levels even if not repeated in the corresponding metadata records. For example, the description of an ethnographic archival fonds may extend to the levels beneath it such as the sounds recorded during a mission. The same mechanism can be applied to collection where all the members of a collection share a certain amount of metadata such as rights information, creator name.

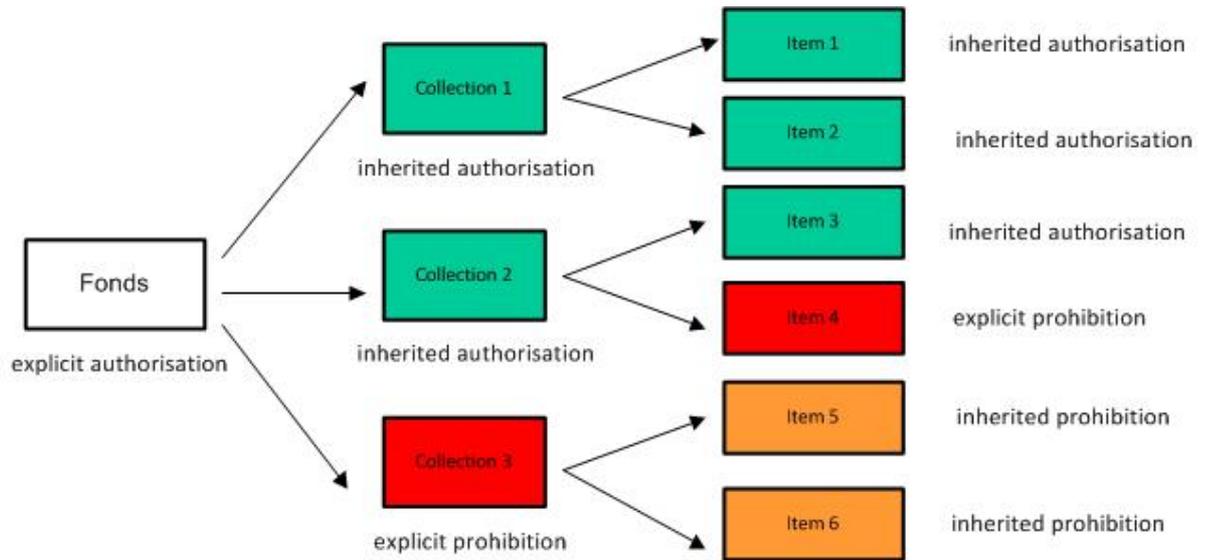


Figure 12. Inheritance of access rights in a hierarchy

The Task Force didn't investigate this issue as it can have dependencies with certain application choices. Metadata propagation can be solved in other ways than copying metadata fields such as augmenting a search index or display solutions.

As of now we have to consider this issue as a data conversion issue rather than a data modelling issue. When converting their data to EDM, Data Providers should decide whether they want to propagate data from higher level to the lower levels, according to any strategy that is relevant in their situation.

14. Conclusion

We have identified various requirements for representing sound objects. These requirements are based on real situations and data samples collected from various institutions holding sound objects. For each requirement, the Task Force has proposed data representation solutions using the Europeana Data Model (EDM). When requirements couldn't be addressed by the current EDM, extensions of the model were proposed based on other standards.

We hope that these recommendations will help Data providers to provide richer data descriptions for their sound objects.

The further mapping of data to this EDM profile will help to confirm whether these extensions are required or whether new ones so far not identified are needed. A new iteration of the Task Force could issue a new version of this profile depending on the findings.

The Task Force has highlighted recommendations to extend EDM for Sounds objects. These recommendations are addressed to Data Providers wishing to deliver rich metadata for their sound objects, but also to Europeana for implementation:

- 1. Granularity of sounds description:** The Task Force assumes that the Data Provider makes the initial choice on the granularity of the description of sounds objects (analogue object, born-digital object).

2. **EDM properties for WebResource:** The Task Force recommends the implementation of edm:isDerivativeOf to allow the representation of cases of derivation.
3. **EDM properties for ProvidedCHO and WebResource:** The Task Force recommends the implementation of
 - a. mo:remaster_of to distinguish the master version among different WebResource for a given CHO.
 - b. schema:version or po:version to capture different cases of versions.
 - c. properties to capture information specific to audio recordings:
 - i. ebucore:duration to capture a duration.
 - ii. mo:record_side, mo:track_number and mo:track_count for tracks information.
 - iii. ebucore:hasAudioEncodingFormat, ebucore:bitrate, ebucore:audioTrackConfiguration, ebucore:audioChannelNumber, ebucore:hasMimeType, ebucore:fileSize, ebucore:sampleRate, ebucore:sampleSize for technical metadata.
 - iv. ebucore:dateDigitised and dcterms:dateCopyrighted, dcterms:modified for specific dates.
4. **EDM property for ProvidedCHO:** We recommend the addition of skos:note as a sub-property of dc:coverage to capture context information.
5. **EDM subclasses and properties for Agent:** We recommend the implementation of
 - a. The class mo:MusicalGroup for more granular information about the agent.
 - b. The properties mo:collaborated_with, mo:member_of
6. **Representation of role:** The Task Force had not the time to work further on the representation of role but would recommend pursuing the effort.
7. **EDM property for ProvidedCHO:** The Task Force recommends the addition of ebucore:hasGenre to capture the genre of a resource.
8. **EDM collection and its properties:** The Task Force recommends the addition of the subclass edm:Collection and additional properties to EDM. The creation of a collection class implies the addition of the property edm:isGatheredInto in the edm:ProvidedCHO. Refer to the document for the full list.

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Annex 1: EDM classes and properties used in the EDM profile for Sounds.

1. edm:ProvidedCHO

(as described in the report a CHO can be a musical work, a sound recording, a born-digital object or any audio-related material)

Property	Value type	Cardinality	EDM Sound Note
dc:contributor	literal or reference	min 0, max unbounded	Use for contributors to the CHO. If possible supply the identifier of the contributor from an authority source. <dc:contributor>Maria Callas</dc:contributor> or create a reference to an instance of the Agent class <dc:contributor rdf:resource="http://www.example.com/MariaCallas"/>
dc:coverage	literal or reference	min 0, max unbounded	The spatial or temporal topic of the CHO. Use the more precise dcterms:spatial or dcterms:temporal properties if the data will support it. One of dc:coverage or dc:subject or dc:type or dcterms:spatial must be provided. <dc:coverage>1995-1996</dc:coverage> or <dc:coverage>Berlin</dc:coverage> or create a reference to an instance of a contextual class, for example, a Place class <dc:coverage rdf:resource="http://sws.geonames.org/2950159"/>
dc:creator	literal or reference	min 0, max unbounded	For the creator of the CHO. If possible supply the identifier of the creator from an authority source. Repeat for multiple creators.
dc:date	literal or reference	min 0, max unbounded	Use for a significant date in the life of the CHO. Consider using the sub-properties of dcterms:created or dcterms:issued. <dc:date>Early 20th century</dc:date> or <dc:date>1919</dc:date> or create a reference to an instance of the TimeSpan class <dc:date rdf:resource="http://semium.org/time/19xx_1_third"/>
dc:description	literal or	min 0, max	A description of the CHO. Either dc:description or dc:title must be provided.

	reference	unbounded	<p><dc:description> Dubbing of brown wax cylinder recording made in the late 1890s or early 1900s. The first cylinder of Paganini's Violin Concerto No. 1 is missing, but the remaining four contain the first movement of this work with piano accompaniment, played perhaps in D major.</dc:description></p>
dc:format	literal or reference	min 0, max unbounded	<p>Use for the terms generally applied to indicate the format of the cultural heritage object or the file format of a born digital object. Use the value "3D-PDF" if appropriate.</p> <p><dc:format>vinyl</dc:format></p>
dc:identifier	literal	min 0, max unbounded	<p>An identifier of the original CHO.</p> <p><dc:identifier>urn:isbn:9780387097466</dc:identifier></p>
dc:language	literal	min 0, max unbounded	<p>The language of text CHOs and also for other types of CHO if there is a language aspect. Mandatory for TEXT objects, strongly recommended for other object types with a language element. Best practice is to use ISO 639 two- or three-letter primary language tags³. Repeat for multiple languages.</p> <p><dc:language>it</dc:language></p>
dc:publisher	literal or reference	min 0, max unbounded	<p>The name of the publisher of the CHO. If possible supply the identifier of the publisher from an authority source.</p> <p><dc:publisher>Oxford University Press</dc:publisher> or create a reference to an instance of the Agent class <dc:publisher rdf:resource="http://www.oup.com/"></p>
dc:relation	literal or reference	min 0, max unbounded	<p>The name or identifier of a related resource, generally used for other related CHOs. Cf edm:isRelatedTo.</p> <p><dc:relation>maps.crace.1/33</dc:relation> (Shelf mark)</p> <p>Or to provide a link to another object:</p> <p><dc:relation rdf:resource="http://www.identifier/relatedObject"/></p>
dc:rights	literal or reference	min 0, max unbounded	<p>Use to give the name of the rights holder of the CHO if possible or for more general rights information. (Note that the controlled edm:rights property relates to the digital objects and applies to the edm:WebResource and/or edm:Aggregation).</p> <p><dc:rights>Copyright © British Library Board</dc:rights></p>
dc:source	literal or reference	min 0, max unbounded	<p>A related resource from which the described resource is derived in whole or in part i.e. the source of the original CHO. (Not the name of the content holder: for this see edm:dataProvider .)</p> <p><dc:source>Security Magazine pp 3-12</dc:source></p>

dc:subject	literal or reference	min 0, max unbounded	<p>The subject of the CHO. One of dc:subject or dc:coverage or dc:type or dcterms:spatial must be provided</p> <p><dc:subject>trombone</dc:subject></p> <p>or create a reference to an instance of the Concept class</p> <p><dc :subject rdf:resource="http://id.loc.gov/authorities/subjects/sh85137992"/>. It is recommended to use reference from the following vocabularies:</p> <p>LCSH²⁹</p> <p>FAST³⁰</p> <p>RAMEAU³¹</p>
dc:title	literal	min 0, max unbounded	<p>The title of the CHO. Either dc:title or dc:description must be provided. Exact translations of the title can be provided using appropriate xml language attributes</p> <p><dc:title xml:lang="en">Concerto for Violin and Orchestra, no.1, op.6 / Paganini</dc:title></p>
dc:type	literal or reference	min 0, max unbounded	<p>The nature of the CHO. Ideally the term(s) will be taken from a controlled vocabulary. One of dc:type or dc:subject or dc:coverage or dcterms:spatial must be provided.</p> <p><dc:type>Book</dc:type> or <dc:type>trombone</dc:type></p> <p>or create a reference to an instance of the Concept class</p> <p><dc:type rdf:about="http://www.mimo-db.eu/HornbostelAndSachs/356/"></p>
dcterms:alternative	literal	min 0, max unbounded	<p>Any alternative title of the CHO including abbreviations or translations that may not be exact.</p>
dcterms:conformsTo	literal or reference	min 0, max unbounded	<p>An established standard to which the CHO conforms.</p> <p><dcterms:conformsTo>W3C WCAG 2.0</dcterms:conformsTo> (conforms to web content accessibility guidelines).</p> <p>Or link to the resource</p> <p><dcterms:conformsTo rdf:resource="http://www.w3.org/TR/WCAG/"></p>
dcterms:created	literal or reference	min 0, max unbounded	<p>The date of creation of the CHO.</p> <p><dcterms:created>Mid 16th century</dcterms:created> or <dcterms:created>1584</dcterms:created></p> <p>or create a reference to an instance of the TimeSpan class</p>

²⁹ <http://id.loc.gov/authorities/subjects.html>

³⁰ <http://fast.oclc.org/searchfast/>

³¹ http://catalogue.bnf.fr/jsp/recherchemots_simple.jsp?nouvelleRecherche=O&nouveaute=O&host=catalogue

			<dcterms:created rdf:resource="http://semium.org/time/15xx_3_third"/>
dcterms:dateCopyrighted	literal or reference	min 0, max unbounded	The date when the resource was copyrighted
dcterms:extent	literal or reference	min 0, max unbounded	The size or duration of the CHO. <dcterms:extent>13 cm</dcterms:extent> (the width of an original object). <dcterms:extent>00:02:44</dcterms:extent> (the duration of an audio file). . For indicating a duration refer to the properties mo:duration or po:duration or ebucore:duration
dcterms:hasFormat or dcterms:isFormatOf	literal or reference	min 0, max unbounded	A resource related to the CHO that is substantially the same as the CHO but in another format. <dcterms:hasFormat>http://upload.wikimedia.org/wikipedia/en/f/f3/Europeana_logo.png</dcterms:hasFormat> for a png image file of the described tiff resource Or as a link to a resource <dcterms:hasFormat rdf:resource="http://upload.wikimedia.org/wikipedia/en/f/f3/Europeana_logo.png"/>
dcterms:hasPart or dcterms:isPartOf	literal or reference	min 0, max unbounded	A resource that is included either physically or logically in the CHO. <dcterms:hasPart>Vol.2. Issue 1</dcterms:hasPart>. Note that the subproperty <i>edm:isGatheredInto</i> should be used to express a Collection membership.
dcterms:hasVersion or dcterms:isVersionOf	literal or reference	min 0, max unbounded	Another, later resource that is a version, edition or adaptation of the CHO demonstrating substantive changes in content rather than format. <dcterms:hasVersion>The Sorcerer's Apprentice (translation by Edwin Zeydel,
dcterms:isReferencedBy or dcterms:references	literal or reference	min 0, max unbounded	Another resource that references, cites or otherwise points to the CHO. <dcterms:isReferencedBy>Till, Nicholas (1994) Mozart and the Enlightenment: Truth, Virtue and Beauty in Mozart's Operas, W. W. Norton & Company </dcterms:isReferencedBy>
dcterms:isReplacedBy or dcterms:replaces	literal or reference	min 0, max unbounded	Another resource that supplants , displaces, or supersedes the CHO. <dcterms:isReplacedBy>http://dublincore.org/about/2009/01/05/bylaws/</dcterms:isReplacedBy> where the resource described is an older version (http://dublincore.org/about/2006/01/01/bylaws/) or link <dcterms:isReplacedBy rdf:resource="http://dublincore.org/about/2009/01/05/bylaws"/>
dcterms:isRequiredBy or	literal or reference	min 0, max unbounded	Another related resource that requires the CHO to support its function, delivery or coherence <isRequiredBy>http://www.myslides.com/myshow.ppt</isRequiredBy> where the image being described

dcterms:requires			is required for an online slideshow.
dcterms:issued	literal or reference	min 0, max unbounded	Date of formal issuance or publication of the CHO. <dcterms:issued>1993</dcterms:issued> or create a reference to an instance of the TimeSpan class <dcterms:issued rdf:resource="http://semium.org/time/17xx_3_third"/> (late 18th century)
dcterms:modified	literal or reference (to a edm:TimeSpan)	min 0, max unbounded	The date when the resource was last modified
dcterms:medium	literal or reference	min 0, max unbounded	The material or physical carrier of the CHO. <dcterms:medium>metal</dcterms:medium>. It is recommended to use reference from the following vocabularies: <i>Europeana Carriers Vocabulary</i> or from an established thesaurus, e.g. RDA Carrier Types ³² LC Carriers Scheme ³³
dcterms:provenance	literal or reference	min 0, max unbounded	A statement of changes in ownership and custody of the CHO since its creation. Significant for authenticity, integrity and interpretation. <dcterms:provenance>Donated to The National Library in 1965</dcterms:provenance>
dcterms:spatial	literal or reference	min 0, max unbounded	Spatial characteristics of the CHO. i.e. what the CHO represents or depicts in terms of space (e.g. a location, co-ordinate or place). Either dcterms:spatial or dc:type or dc:subject or dc:coverage must be provided. <dcterms:spatial>Portugal</dcterms:spatial> or create a reference to an instance of the Place class <dcterms:spatial rdf:resource="http://sws.geonames.org/2264397"/>
dcterms:tableOfContents	literal or reference	min 0, max unbounded	A list of sub-units of the CHO. <dcterms:tableOfContents>Chapter 1. Introduction, Chapter 2. History </dcterms:tableOfContents>
dcterms:temporal	literal or	min 0, max	Temporal characteristics of the CHO. i.e. what the CHO is about or depicts in terms of time (e.g. a period, date)

³² <http://metadataregistry.org/vocabulary/show/id/46.html>

³³ <http://id.loc.gov/vocabulary/carriers.html>

	reference	unbounded	or date range.) <dcterms:temporal>Roman Empire</dcterms:temporal> or create a reference to an instance of the TimeSpan class <dcterms:temporal rdf:resource="http://semium.org/time/roman_empire"/>
edm:currentLocation	reference	min 0, max unbounded	The geographic location whose boundaries presently include the CHO. If the name of a repository, building, site, or other entity is used then it should include an indication of its geographic location. ref 0....119/46 <edm:currentLocation rdf:resource="http://sws.geonames.org/2950159"/> (Identifier for Berlin)
edm:hasMet	reference	min 0, max unbounded	The identifier of an agent, a place, a time period or any other identifiable entity that the CHO may have "met" in its life. <edm:hasMet rdf:resource="http://viaf.org/viaf/96994048"/> (Identifier for William Shakespeare) <edm:hasMet rdf:resource="http://sws.geonames.org/6620265"/>(location identifier for Shakespeare's Globe theatre.)
edm:hasType	reference or literal	min 0, max unbounded	The identifier of a concept, or a word or phrase from a controlled vocabulary (thesaurus etc) giving the type of the CHO. <edm:hasType>Sound</edm:hasType>
edm:incorporates	reference	min 0, max unbounded	The identifier of another resource that is incorporated in the described CHO. E.g. the movie "A Clockwork Orange" incorporates Rossini's La Gazza Ladra" in its soundtrack. <edm:incorporates rdf:resource="http://www.identifier/IncorporatedResource"/>
edm:isDerivativeOf	reference	min 0, max unbounded	The identifier of another resource from which the described CHO has been derived. E.g. the identifier of Moby Dick when the Italian translation is the described CHO. <edm:isDerivativeOf rdf:resource="http://www.identifier/SourceResource"/>
edm:isGatheredInto	reference	min 0, max unbounded	The identifier of the Collection, the CHO is member of. <edm:isGatheredInto rdf:resource="http://www.identifier/CollectionResource"/>
edm:isNextInSequence	reference	min 0, max unbounded	The identifier of the preceding object where both objects are part of the same overall resource. Use this for objects that are part of a hierarchy or sequence to ensure correct display in the portal. <edm:isNextInSequence rdf:resource="http://www.identifier/PrecedingResource"/>
edm:isRelatedTo	reference or literal	min 0, max unbounded	The identifier or name of a concept or other resource to which the described CHO is related. E.g. Moby Dick is related to XIX Century literature. Cf dc:relation. <edm:isRelatedTo>Literature</edm:isRelatedTo > Or link to resource

			<edm:isRelatedTo rdf:resource="http://www.eionet.europa.eu/gemet/concept?cp=4850"/>
edm:isRepresentationOf	reference	min 0, max unbounded	The identifier of another object of which the described CHO is a representation. E.g. the identifier of the music score when the CHO being described is a sound recording of the same work. <edm:isRepresentativeOf rdf:resource="http://www.identifier/RepresentedResource"/>
edm:isSimilarTo	reference	min 0, max unbounded	The identifier of another resource to which the described CHO is similar. <edm:isSimilarTo rdf:resource="http://www.identifier/SimilarResource"/>
edm:isSuccessorOf	reference	min 0, max unbounded	The identifier of a resource to which the described CHO is a successor. E.g. "The Two Towers" is a successor of "Fellowship of the Ring". <edm:isSuccessorOf rdf:resource="http://dbpedia.org/resource/The_Fellowship_of_the_Ring"/>
edm:realizes	reference	min 0, max unbounded	If the CHO described is of type edm:PhysicalThing it may realize an information object. E.g. a copy of the Gutenberg publication realizes the Bible. <edm:realizes rdf:resource="http://www.identifier/PhysicalThing"/>
edm:type	literal (TEXT-VIDEO-SOUND-IMAGE-3D)	min 0, max unbounded	The value must be one of the types accepted by Europeana as it will support portal functionality : TEXT, VIDEO, SOUND, IMAGE, 3D. (For 3D, when applicable, use the value "3D-PDF" in dc:format) <edm:type>IMAGE</edm:type> (upper-case) <edm:type>3D</edm:type> (upper-case)
skos:note	literal	Min 0, max unbounded	To be used as a refinement of dc:coverage to capture context information.
mo:remaster_of	literal or reference	Min 0, max 1	Used to point a remastered version to the master version.
mo:record_side	literal	Min 0, max unbounded	Associates the side on a vinyl record, where a track is located, e.g. A, B, C, etc. This property can then also be used in conjunction with mo:track_number, so that one can infer e.g. "A1", that means, track number 1 on side A.
mo:track_number	literal	Min 0, max unbounded	Indicates the position of a track on a record medium (a CD, etc.).
mo:track_count	literal	Min 0, max unbounded	The total amount of tracks.
ebucore:hasGenre	literal or reference	Min 1, max unbounded	Genre of the Sound CHO. The value should be taken from the following vocabularies: Broad concepts from the following values: <ul style="list-style-type: none"> • Music

			<ul style="list-style-type: none"> • Spoken word • -Radio • Environment And specific concepts from: <ul style="list-style-type: none"> • <i>Europeana Music Genre/Form Vocabulary</i> • <i>Europeana Non-Music Genre Vocabulary</i> -An established thesaurus, e.g. <ul style="list-style-type: none"> • LC Genre/Form • FAST • EBU
ebucore:dateDigitised	literal or reference (to a edm:TimeSpan)	Min 0, max unbounded	The date when the resource was digitised
ebucore:duration	literal	min 0, max unbounded	The duration of the resource or part of a resource. The duration should be provided in the syntax recommended by ISO 8601: hh:mm:ss
ebucore:audioChannelNumber	literal	Min 0, max unbounded	The total number of audio channels.
ebucore:audioTrackConfiguration	literal	Min 0, max unbounded	To define the audio track configuration. Used to express the arrangement or audio tracks e.g. 'stereo', '2+1', 'surround', 'surround (7+1)'
ebucore:bitRate	literal	Min 0, max unbounded	the audio bit rate in bits per second
ebucore:fileSize	literal	Min 0, max unbounded	To indicate the storage requirements or file size of a digital resource. The file size is expressed in bytes.
ebucore:hasAudioEncodingFormat	literal	Min 0, max unbounded	To define the audio compression format of the resource e.g. AAC for an audio channel.
ebucore:hasMimeType	literal	Min 0, max unbounded	Define the main MIME type as defined by IANA: e.g. audio, video, text, application, or a container MIME type

ebucore:sampleRate	literal	Min 0, max unbounded	The frequency at which audio is sampled per second. Also called sampling rate.
ebucore:sampleSize	literal	Min 0, max unbounded	To provide the audio encoding bit depth. Also called bit depth
schema:version or po:version	literal	Min 0, max 1	Use to indicate which version is the master version. The default value for this property should be “master”
owl:sameAs	reference	min 0, max unbounded	Use to point to your own (linked data) representation of the object, if you have already minted a URI identifier for it. It is also possible to provide URIs minted by third-parties for the object. ⁵ <owl:sameAs rdf:resource=“http://www.identifier/SameResourceElsewhere”/>
rdf:type	reference		

1.1. edm:Collection

Property	Value type	Cardinality	EDM Sound Note
dc:creator	literal or reference	min 0, max unbounded	Entity that gathers objects together following implicit or explicit criteria or accrual policy
dc:identifier	literal	min 0, max unbounded	Unique key for collection
dc:language	literal	min 0, max unbounded	If text, the language(s) of the items in the collection
dc:relation	literal or reference	min 0, max unbounded	This is the most general relationship property and can be used to indicate any other collection(s) associated with or that complement the current collection. It can also be used for additional materials included alongside the collection that explain, incorporate, or otherwise make use of the collection: for example, finding aids, or material that describes a collection. For these examples and similar materials, consider the more specialised properties of edm:isRelatedTo, dcterms:isReferencedBy and edm:isSimilarTo.
dc:rights	literal or	min 0, max unbounded	Information about rights held in and over the collection which cannot be captured by the edm:rights

	reference		property.
dc:subject	literal or reference	min 0, max unbounded	Terms that describe the overall topical content of the objects in the collection.
dc:title	literal	min 0, max unbounded	Name of collection. Note that either dc:title or dc:description is mandatory.
dcterms:accrualPeriodicity	literal	min 0, max unbounded	A statement of how often the collection is updated. Note that it can be used to indicate the general publication periodicity of the collection (i.e radio program)
dcterms:alternative	literal	min 0, max unbounded	Alternative name of collection
dcterms:audience	literal	min 0, max unbounded	The primary audience(s) of the collection
dcterms:description	literal	min 0, max unbounded	A summary of the content and topics of the collection.
dcterms:extent	literal	min 0, max unbounded	The number of objects within the collection at the provider level (as opposed to the dataset provided to Europeana)
dcterms:hasPart	literal or reference	min 0, max unbounded	Any other collection(s) contained within the current collection
dcterms:isPartOf	literal or reference	min 0, max unbounded	Any other collection(s) that contain the current collection
dcterms:isReferenceBy	literal or reference	min 0, max unbounded	Additional materials included alongside the collection that explain, incorporate, or otherwise make use of the collection. For example, may be used for finding aids, or material that describes a collection.
dcterms:provenance	literal	min 0, max unbounded	A statement of any changes in ownership and custody of the resource since its creation that are significant for its authenticity, integrity and interpretation

dcterms:spatial	literal or reference	min 0, max unbounded	A place(s) or area(s) associated with most or all of the objects in the collection.
dcterms:temporal	literal or reference	min 0, max unbounded	A time period(s) associated with most or all of the objects in the collection.
edm:highlight	reference	min 0, max unbounded	A 'key object' from the collection be it a masterpiece, or a good exemplar. (This is a sub-property of the inverse of the <i>isGatheredInto</i> collection membership property)
edm:isRelatedTo	literal or reference	min 0, max unbounded	Additional materials included alongside the collection that explain, incorporate, or otherwise make use of the collection. For example, may be used for finding aids, or material that describes a collection.
edm:itemGenre	literal or reference	min 1, max unbounded	<p>Genre of objects or resources in the collection e.g. classical music The value should be taken from the following vocabularies: Broad concepts from the following values:</p> <ul style="list-style-type: none"> -Music -Spoken word -Radio -Environment <p>And specific concepts from:</p> <ul style="list-style-type: none"> -<i>Europeana Music Genre/Form Vocabulary</i> -<i>Europeana Non-Music Genre Vocabulary</i> -An established thesaurus, e.g. <ul style="list-style-type: none"> o LC Genre/Form o FAST o EBU
cld:dateItemsCreated	literal or reference	min 0, max unbounded	A range of dates over which the individual objects within the collection were created
cld:itemFormat	literal or reference	min 0, max unbounded	The format (media type, physical or digital) of the objects in the original collection. This may be information about a physical thing (for physical objects) or a digital media type (for born-digital objects). This property refers to the ProvidedCHO, not a web representation

cld:itemType	literal or reference	min 0, max unbounded	Type or nature of objects or resources in the collection e.g. audio recordings
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2. edm:WebResource

Property	Value type	Constraints	EDM Sound Note
dc:creator	literal or reference	min 0, max unbounded	For the creator of the WebResource. If possible supply the identifier of the creator from an authority source. Repeat for multiple creators. <dc:creator xml:lang="es">Biblioteca Nacional de España</dc:creator> or create a reference to an instance of the Agent class <dc:creator rdf:resource="http://viaf.org/viaf/147143794/" />
dc:description	literal or reference	min 0, max unbounded	Use for an account or description of this digital representation <dc:description>Performance with Buccin trombone</dc:description>
dc:format	literal or reference	min 0, max unbounded	Use for the format of this digital representation. (Use the value "3D-PDF" if appropriate.) <dc:format>image/jpeg</dc:format> It is recommended to use reference from the following vocabularies: LC format descriptions ³⁴ RDA encoding formats ³⁵
dc:rights	literal or reference	min 0, max unbounded	Use for the name of the rights holder of this digital representation if possible or for more general rights information. Note the difference between this property and the mandatory, controlled edm:rights property below. <dc:rights> Copyright © British Library Board</dc:rights>
dc:source	literal or reference	min 0, max unbounded	A related resource from which the web resource is derived in whole or in part. <dc:source>The name of the source video tape <dc:source>

³⁴ <http://www.digitalpreservation.gov/formats/fdd/descriptions.shtml>

³⁵ http://metadataregistry.org/concept/list/vocabulary_id/87.html

dcterms:conformsTo	literal or reference	min 0, max unbounded	An established standard to which the Web Resource conforms. <dcterms:conformsTo>W3C WCAG 2.0</dcterms:conformsTo> (web content accessibility guidelines).
dcterms:created	literal or reference	min 0, max unbounded	Date of creation of the web resource. <dcterms:created>2010</dcterms:created> or create a reference to an instance of the TimeSpan class <dc:date rdf:resource="http://semium.org/time/2010"/>
dcterms:dateCopyrighted	literal or reference	min 0, max unbounded	The date when the resource was copyrighted
dcterms:extent	literal or reference	min 0, max unbounded	The size or duration of the digital resource. <dcterms:extent>1h 26 min 41 sec</dcterms:extent>
dcterms:hasPart or dcterms:isPartOf	reference	min 0, max unbounded	A resource in which the web resource is physically or logically included. This property can be used for Web resources that are part of a hierarchy. Hierarchies can be represented as hierarchies of ProvidedCHOs or hierarchies of WebResources but not both at the same time. See the Task Force report on representing hierarchical entities. <dcterms:isPartOf rdf:resource="http://data.europeana.eu/item/08701/1B0BACAA44D5A807E43D9B411C9781AAD2F96E65"/>
dcterms:isFormatOf	literal or reference	min 0, max unbounded	Another resource that is substantially the same as the web resource but in another format. <dcterms:isFormatOf>http://upload.wikimedia.org/wikipedia/en/f/f3/Europeana_logo.png</dcterms:isFormatOf> for a png image file of the described tiff web resource. Or as a link to a resource <dcterms:isFormatOf rdf:resource="http://upload.wikimedia.org/wikipedia/en/f/f3/Europeana_logo.png"/>
dcterms:issued	literal or reference	min 0, max unbounded	Date of formal issuance or publication of the WebResource. <dcterms:issued>1999</dcterms:issued> or create a reference to an instance of the TimeSpan class <dcterms:issued rdf:resource="http://semium.org/time/2010"/>
dcterms:modified	literal or reference (to a	min 0, max unbounded	The date when the resource was last modified

	edm:TimeSpan		
edm:isDerivativeOf	reference	min 0, max unbounded	The identifier of a WebResource from which another WebResource has been derived, Used to indicate the master version.
edm:isNextInSequence	reference	min 0, max unbounded	<p>Where one CHO has several web resources, shown by multiple instances of the edm:hasView property on the ore:Aggregation this property can be used to show the sequence of the objects. Each web resource (apart ref 0...n23/46 from the first in the sequence) should use this property to give the URI of the preceding resource in the sequence.</p> <p><edm:isNextInSequence rdf:resource="http://data.europeana.eu/item/2020601/9A3907CB46B651DE91621933ECC31EC1DC52B33C"/>links to the WebResource for page 2 of a digitised diary from the WebResource for page 3.</p>
edm:rights	reference(URI)	min 0, max 1	<p>The value in this element will indicate the usage and access rights that apply to this digital representation. It is strongly recommended that a value is supplied for this property for each instance of a WebResource. The rights statement specified at the level of the web resource will 'override' the statement specified at the level of the aggregation.</p> <p>The value in this element is a URI taken from the set of those defined for use in Europeana. A list of these can be found at http://pro.europeana.eu/web/available-rights-statements</p> <p><edm:rights rdf:resource="http://creativecommons.org/publicdomain/mark/1.0"/> <edm:rights rdf:resource="http://www.europeana.eu/rights/rr-f"/></p>
ebucore:dateDigitised	literal or reference (to a edm:TimeSpan)	min 0, max unbounded	The date when the resource was digitised
ebucore:duration	literal	min 0, max unbounded	<p>The duration of the resource or part of a resource.</p> <p>The duration should be provided in the syntax recommended by ISO 8601: hh:mm:ss</p>
ebucore:audioChannelNumber	literal	min 0, max unbounded	The total number of audio channels.
ebucore:audioTrackConfiguration	literal	min 0, max unbounded	To define the audio track configuration. Used to express the arrangement or audio tracks e.g. 'stereo', '2+1', 'surround', 'surround (7+1)'
ebucore:bitRate	literal	min 0, max unbounded	the audio bit rate in bits per second

ebucore:fileSize	literal	min 0, max unbounded	To indicate the storage requirements or file size of a digital resource. The file size is expressed in bytes.
ebucore:hasAudioEncodingFormat	literal	min 0, max unbounded	To define the audio compression format of the resource e.g. AAC for an audio channel.
ebucore:hasMimeType	literal or reference	min 0, max unbounded	Define the main MIME type as defined by IANA: e.g. audio, video, text, application, or a container MIME type
ebucore:sampleRate	literal	min 0, max unbounded	The frequency at which audio is sampled per second. Also called sampling rate.
ebucore:sampleSize	literal	min 0, max unbounded	To provide the audio encoding bit depth. Also called bit depth
mo:record_side	literal	min 0, max unbounded	Associates the side on a carrier (i.e. vinyl, shellac), where a track is located, e.g. A, B, C, etc. This property can then also be used in conjunction with mo:track_number, so that one can infer e.g. "A1", that means, track number 1 on side A.
mo:remaster_of	literal or reference	min 0, max 1	Used to point a remastered version to the master version.
mo:track_number	literal	min 0, max unbounded	Indicates the position of a track on a record medium (a CD, etc.).
mo:track_count	literal	min 0, max unbounded	The total amount of tracks.
schema:version or po:version	literal	min 0, max 1	Use to indicate which version is the master version. The default value for this property should be "master"
owl:sameAs	reference(URI)	min 0, max unbounded	Use to point to your own (linked data) representation of the object, if you have already minted a URI identifier for it. It is also possible to provide URIs minted by third-parties for the object. ⁵ <owl:sameAs rdf:resource="http://www.identifier/SameResourceElsewhere"/>

3. edm:Aggregation

(edm:Aggregation is required for each edm:ProvidedCHO or edm:Collection)

Property	Value type	Constraints	EDM Sound Note
edm:aggregatedCHO	reference (of the item)	min 1, max 1	The identifier of the source object e.g. the Mona Lisa itself. This could be a full linked open data URI or an internal identifier.

			<edm:aggregatedCHO rdf resource="#UEDIN:214"/>
edm:dataProvider	literal or reference <i>(later, once we have a provider's file)</i>	min 1, max 1	<p>The name or identifier of the data provider of the object (i.e. the organisation providing data to an aggregator). Identifiers will not be available until Europeana has implemented its Organisation profile.</p> <p><edm:dataProvider>Palais des Beaux Arts de Lille</edm:dataProvider></p> <p>Or as a link to a resource</p> <p><edm:dataProvider rdf:resource="http://www.pba-lille.fr"/></p>
edm:hasView	reference	min 0, max unbounded	<p>The URL of a web resource which is a digital representation of the CHO. This may be the source object itself in the case of a born digital cultural heritage object.</p> <p>edm:hasView should only be used where there are several views of the CHO and one (or both) of the mandatory edm:isShownAt or edm:isShownBy properties have already been used. It is for cases where one CHO has several views of the same object. (e.g. a shoe and a detail of the label of the shoe)</p> <p><edm:hasView rdf:resource="http://www.mimo-db.eu/media/UEDIN/VIDEO/0032195v.mpg"/></p> <p><edm:hasView rdf:resource="http://www.mimo-db.eu/media/UEDIN/AUDIO/0032195s.mp3"/></p>
edm:isShownAt	reference	min 0, max 1 -- Either isShownBy OR isShownAt is Mandatory	<p>The URL of a web view of the object in full information context. Either edm:isShownAt or edm:isShownBy is mandatory.</p> <p><edm:isShownAt rdf:resource="http://www.mimo-db.eu/UEDIN/214"/></p>
edm:isShownBy	reference	min 0, max 1 -- Either isShownBy OR isShownAt is Mandatory	<p>The URL of a web view of the object. Either edm:isShownAt or edm:isShownBy is mandatory.</p> <p><edm:isShownBy rdf:resource="http://www.mimo-db.eu/media/UEDIN/IMAGE/0032195c.jpg"/></p>
edm:object	reference	min 0, max 1	<p>The URL of a representation of the CHO which will be used for generating previews for use in the Europeana portal. This may be the same URL as edm:isShownBy. See Europeana Portal Image Guidelines (http://pro.europeana.eu/technical-requirements) for information regarding the specifications of previews.</p> <p><edm:object rdf:resource="http://www.mimo-db.eu/media/UEDIN/IMAGE/0032195c.jpg"/></p>
edm:provider	literal or reference <i>(later, once we have a</i>	min 1, max 1	<p>The name or identifier of the provider of the object (i.e. the organisation providing data directly to Europeana). Identifiers will not be available until Europeana has implemented its Organisation profile.</p>

	<i>provider's file</i>)		<code><edm:provider>Geheugen van Nederland</edm:provider></code> or link to a resource <code><edm:provider rdf:resource="http://www.geheugenvannederland.nl"/></code>
dc:rights	reference or literal	min 0, max unbounded	Ideally this should be applied to the edm:WebResource or the edm:ProvidedCHO.
edm:rights	reference	min 1, max 1	<p>This is a mandatory property and the value given here should be the rights statement that applies to the digital representation as given (for example) in edm:object or edm:isShownAt/By, when these resources are not provided with their own edm:rights (see edm:rights documentation). The value for the rights statement in this element is a URI taken from the set of those defined for use in Europeana at http://pro.europeana.eu/available-rights-statements</p> <p>The rights statement given in this property will also by default apply to the previews used in the portal and will support portal search and display functionality.</p> <p>Where there are several web resources attached to one edm:ProvidedCHO the rights statement given here will be regarded as the "reference" value for all the web resources. Therefore a suitable value should be chosen with care if the rights statements vary between different resources. In fact in such cases Europeana encourages the provision of separate rights statements for each individual web resource. For example, a low-resolution of a JPEG file could be CC-BY, while the high resolution version or a video showing the object would be CC-BY-NC. In such cases the rights statements given for the individual web resources would 'override' the one specified at the ore:Aggregation level. Any other associated web resources would still be governed by the edm:rights of the ore:Aggregation.</p> <p><code><edm:rights rdf:resource="http://creativecommons.org/publicdomain/mark/1.0"/></code> <code><edm:rights rdf:resource="http://www.europeana.eu/rights/rr-f"/></code></p>
edm:ugc	literal (true)	min 0, max 1	<p>This is a mandatory property for objects that are user generated or user created that have been collected by crowdsourcing or project activity. The property is used to identify such content and can only take the value "true" (lower case).</p> <p><code><edm:ugc>>true</edm:ugc></code></p>

4. edm:Agent

Property	Value type	Constraints	EDM Sound Note
skos:prefLabel	literal	min 0, max 1 per lang	The preferred form of the name of the agent. Although the maximum number of occurrences is

		tag	<p>set at 1, it can be interpreted as 1 per language tag.</p> <p><skos:prefLabel xml:lang="fr">Courtois neveu aîné</skos:prefLabel></p> <p><skos:prefLabel xml:lang="en">Courtois'eldest nephew</skos:prefLabel></p>
skos:altLabel skos:hiddenLabel	literal	min 0, max unbounded	<p>Alternative forms of the name of the agent.</p> <p><skos:altLabel xml:lang="en">Courtois</skos:altLabel></p> <p><skos:altLabel xml:lang="fr">Augte. Courtois aîné</skos:altLabel></p>
skos:note (for e.g., biographical notes)	literal	min 0, max unbounded	<p>A note about the agent e.g. biographical notes.</p> <p><skos:note> Courtois neveu aîné started a company of the same name manufacturing brass instruments in Paris in 1803</skos:note></p>
dc:date	literal or reference	min 0, max unbounded	<p>A significant date associated with the Agent.</p> <p><dc:date>1803</dc:date/></p>
dcterms:hasPart	reference	min 0, max unbounded	<p>Reference to an Agent that is part of the Agent being described (e.g. a part of a corporation).</p>
dc:identifier	literal	min 0, max unbounded	<p>An identifier of the agent.</p> <p><dc:creator>http://viaf.org/viaf/96994048</dc:creator></p>
dcterms:isPartOf	reference	min 0, max unbounded	<p>Reference to an agent that the described agent is part of.</p> <p><dcterms:isPartOf rdf:resource="http://identifier/parentCorporation/"></p>
edm:begin	literal	min 0, max 1	<p>The date the agent was born/established.</p> <p><edm:begin>1795</edm:begin></p>
edm:end	literal	min 0, max 1	<p>The date the agent died/terminated.</p> <p><edm:end>1885</edm:end></p>
edm:hasMet	reference	min 0, max unbounded	<p>Reference to another entity which the agent has "met" in a broad sense. For example a reference to a Place class</p> <p><edm:hasMet rdf:resource="http://sws.geonames.org/6620265/"></p>
edm:isRelatedTo (for generic relations to other agents, especially)	reference	min 0, max unbounded	<p>Reference to other entities, particularly other agents, with whom the agent is related in a generic sense.</p> <p><edm:isRelatedTo rdf:resource="http://identifier/relatedAgent/"></p>
foaf:name	literal	min 0, max unbounded	<p>The name of the agent as a simple textual string.</p> <p><foaf:name>Auguste Courtois</foaf:name></p>

rdaGr2:biographicalInformation	literal	min 0, max unbounded	Information pertaining to the life or history of the agent. <rdaGr2:biographicalInformation>Courtois neveu aîné started a company of the same name manufacturing brass instruments in Paris in 1803</rdaGr2:biographicalInformation>
rdaGr2:dateOfBirth	literal	min 0, max 1	The date the agent (person) was born. <rdaGr2:dateOfBirth>1795</rdaGr2:dateOfBirth>
rdaGr2:dateOfDeath	literal	min 0, max 1	The date the agent (person) died. <rdaGr2:dateOfDeath>1895</rdaGr2:dateOfDeath>
rdaGr2:placeOfBirth	literal or reference	min 0, max 1	The town, city, province, state, and/or country in which a person was born. <rdaGr2:placeOfBirth>Lusaka, Northern Rhodesia</rdaGr2:placeOfBirth> <rdaGr2:placeOfBirth rdf:resource="http://sws.geonames.org/909137"/>
rdaGr2:placeOfDeath	literal or reference	min 0, max 1	The town, city, province, state, and/or country in which a person died. <rdaGr2:placeOfDeath>London, United Kingdom</rdaGr2:placeOfDeath> <rdaGr2:placeOfDeath rdf:resource="http://sws.geonames.org/2635167"/>
rdaGr2:dateOfEstablishment	literal	min 0, max 1	The date on which the agent (corporate body) was established or founded. <rdaGr2:dateOfEstablishment>1795</rdaGr2:dateOfEstablishment>
rdaGr2:dateOfTermination	literal	min 0, max 1	The date on which the agent (corporate body) was terminated or dissolved. <rdaGr2:dateOfTermination>1895</rdaGr2:dateOfTermination>
rdaGr2:gender	literal	min 0, max 1	The gender with which the agent identifies. < rdaGr2:gender>Female</rdaGr2:gender>
rdaGr2:professionOrOccupation	literal or reference	min 0, max unbounded	The profession or occupation in which the agent works or has worked. <rdaGr2:professionOrOccupation>Instrument Maker</rdaGr2:professionOrOccupation>
owl:sameAs	reference (of an Agent)	min 0, max unbounded	Another URI of the same agent. <owl:sameAs rdf:resource="http://www.identifier/sameResourceElsewhere"/>

4.1. mo:MusicalGroup

The properties for foaf:Organisation are inherited from edm:Agent with additional properties

Property	Value type	Constraints	EDM Sound Note
mo:collaborated_with	literal or reference	min 0, max unbounded	Used to relate two collaborating people on a work
mo:member_of	literal or reference	min 0, max unbounded	Indicates a member of a musical group

5. edm:Place

Property	Value Type	Constraints	EDM Sound Note
wgs84_pos:lat	floating point	min 0, max 1	The latitude of a spatial thing (decimal degrees). <wgs84_pos:lat>51.5075</wgs84_pos:lat>
wgs84_pos:long	floating point	min 0, max 1	The longitude of a spatial thing (decimal degrees) <wgs84_pos:long>-0.1231</wgs84_pos:long>
wgs84_pos:alt	floating point	min 0, max 1	The altitude of a spatial thing (decimal metres above the reference) <wgs84_pos:alt>21</wgs84_pos:alt>
skos:prefLabel	literal	min 0, max 1 per lang tag	The preferred form of the name of the place. Although the maximum number is stated as 1, this can be interpreted as 1 per language tag. <skos:prefLabel xml:lang="en">London</skos:prefLabel>
skos:altLabel skos:hiddenLabel	literal	min 0, max unbounded	Alternative forms of the name of the place. <skos:altLabel xml:lang="en">Greater London</skos:altLabel>
skos:note	literal	min 0, max unbounded	Information relating to the place. <skos:note xml:lang="en">Pop. 21m</skos:note>

dcterms:hasPart	reference (to a Place)	min 0, max unbounded	Reference to a place that is part of the place being described. <dcterms:hasPart rdf:resource="http://sws.geonames.org/2643741"/> (City of London)
dcterms:isPartOf	reference (to a Place)	min 0, max unbounded	Reference to a place that the described place is part of. <dcterms:isPartOf rdf:resource="http://sws.geonames.org/2635167"/> (United Kingdom)
edm:isNextInSequence	reference (to a Place)	min 0, max unbounded	Can be used to represent a sequence of Place entities over time e.g. the historical layers of the city of Troy. Use this for objects that are part of a hierarchy or sequence to ensure correct display in the portal.
owl:sameAs	reference (to a Place)	min 0, max unbounded	URI of a Place <owl:sameAs rdf:resource="http://sws.geonames.org/2635167"/>(London)

6. edm:TimeSpan

Property	Value type	Constraints	EDM Sound Note
skos:prefLabel	literal	min 0, max 1 per lang tag	The preferred form of the name of the timespan or period. Although the maximum number of occurrences is set at 1, it can be interpreted as 1 per language tag. <skos:prefLabel xml:lang="en">Roman Empire</skos:prefLabel>
skos:altLabel, skos:hiddenLabel	literal	min 0, max unbounded	Alternative forms of the name of the timespan or period. <skos:altLabel xml:lang="fr">Empire romain (27 avant J.-C.-476 après J.-C.)</skos:altLabel >
skos:note	literal	min 0, max unbounded	Information relating to the timespan or period. <skos:note>The Roman Empire (Latin: Imperium Romanum) was the post-Republican period of the ancient Roman civilization, characterised by an autocratic form of government and large territorial holdings around the Mediterranean in Europe, Africa, and Asia.</skos:note>

dcterms:hasPart	reference (to a Time Span)	min 0, max unbounded	Reference to a timespan which is part of the described timespan.
dcterms:isPartOf	reference (to a Time Span)	min 0, max unbounded	Reference to a timespan of which the described timespan is a part.
edm:begin	literal	min 0, max 1	The date the timespan started. <edm:begin>27 BC</edm:begin>
edm:end	literal	min 0, max 1	The date the timespan finished. <edm:end>476 AD</edm:end>
edm:isNextInSequence	reference (to a Time Span)	min 0, max unbounded	Can be used to represent a sequence of Time periods. Use this for objects that are part of a hierarchy or sequence to ensure correct display in the portal. <edm:isNextInSequence rdf:resource="http://semium.org/time/roman_republic"/> (The Roman Empire was preceded by the Roman Republic)
owl:sameAs	reference (to a Time Span)	min 0, max unbounded	owl:sameAs The URI of a timespan <owl:sameAs rdf:resource="http://semium.org/time/roman_empire"/>

7. skos:Concept

(Note that the skos:Concept class can be used to describe a Work as described in the report)

Property	Value type	Constraints	EDM Sound Note
skos:prefLabel	literal	min 0, max 1 per lang tag	The preferred form of the name of the concept. Although the maximum number of occurrences is set at 1, it can be interpreted as 1 per language tag. <skos:prefLabel xml:lang="fr">Buccin</skos:prefLabel> <skos:prefLabel xml:lang="de">Buccin</skos:prefLabel> <skos:prefLabel xml:lang="nl">Buccin</skos:prefLabel>
skos:altLabel, skos:hiddenLabel	literal	min 0, max unbounded	Alternative forms of the name of the concept. <skos:altLabel xml:lang="en">Buccin</skos:altLabel>
skos:broader, skos:narrower,	reference (to a	min 0, max unbounded	The identifier of a broader, narrower or related concept in the same thesaurus or

skos:related	Concept)		controlled vocabulary. <skos:broader rdf:resource="http://www.mimo-db.eu/InstrumentsKeywords/4369_1"/>
skos:broadMatch, skos:narrowMatch, skos:relatedMatch	reference (to a Concept)	min 0, max unbounded	The identifier of a broader, narrower or related matching concepts from other concept schemes. <skos:broadMatch rdf:resource="http://broadMatch.term"/> <skos:narrowMatch rdf:resource="http://narrowMatch.term"/> <skos:relatedMatch rdf:resource="http://relatedMatch.term"/>
skos:exactMatch, skos:closeMatch	reference (to a Concept)	min 0, max unbounded	The identifier of close or exactly matching concepts from other concept schemes. <skos:exactMatch rdf:resource="http://exactMatch.term"/> <skos:closeMatch rdf:resource="http://closeMatch.term"/>
skos:note	literal	min 0, max unbounded	Information relating to the concept. <skos:note>The buccin is a visually distinctive trombone popularized in military bands in France between 1810–1845 which subsequently faded into obscurity.</skos:note>
skos:notation	string (+ rdf:datatype attribute)	min 0, max unbounded	The notation in which the concept is represented. This may not be words in natural language for some knowledge organisation systems e.g. algebra <skos:notation rdf:datatype="http://www.w3.org/2001/XMLSchema#int">123</skos:notation>
skos:inScheme (<i>URI should resolve to something meaningful</i>)	reference (to a ConceptScheme)	min 0, max unbounded	The URI of a concept scheme