DOCUMENTING CULTURAL HERITAGE IN SMALL MUSEUMS

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Abstract

This paper describes requirements for documentation of collections in small museums and presents a CIDOC CRM-based IT solution. This solution has been elaborated by the Centre for Cultural Informatics in ICS-FORTH in close collaboration with a series of small museums and cultural institutions in Greece. A detailed, but generic XML Schema fully compatible with the CIDOC CRM model for museum object documentation and a light-weighted database solution called "Synthesis", which can easily be adapted to special requirements, has been developed.

In this paper we present the analysis of the generic schema employed, the system design and functions, and the experience from parallel development of the system for three fairly different clients.

Introduction

Whereas large museums are quite visible magnets for the public, much of our knowledge about the past is kept in small museums. There are characteristic differences in organization and procedures to their larger counterparts, which is also reflected in their documentation requirements. Typical small museums may be one–object museums, such as a ship museum, a museum about a famous person, a house museum, a local history museum etc., or be based on the donation of a private collector. Most of them have also an archive and a small library

directly related to their subject. Compared to their larger counterparts, small museums tend to have a smaller budget, but significantly less objects per curator and very low administrational overhead. Therefore they can afford more detailed documentation of their objects, but frequently, their objects are highly heterogeneous with a lot of contextual cross-correlations between them, which makes documentation more demanding. In any case, small museums are closer to their communities and are seen as less intimidating than their larger counterparts. This enables smaller museums to be more responsive to community needs; to be more flexible, more focused and more able to develop a shared vision amongst their staff.

Ontology is the science of what is, of kinds and structures of objects, properties, events, processes and relations in every area of reality [1]. Ontology seeks to provide a definitive and exhaustive classification of the entities and their possible relationships of a part of world under investigation. Formal ontologies provide models of possible states of affairs in some "universe of discourse". More and more, the employment of ontologies is regarded beneficial for designing a suitable data structure for documenting museum objects or material cultural heritage in general.

The question is which ontology to use and what method to follow for transforming the ontology to a data structure.

In this paper, we present our approach for small museums, based on CIDOC CRM, which other implementers may like to follow.

From Ontology to data model

The CIDOC CRM [2] reference ontology is the most appropriate for being used for the documentation of cultural entities since it defines and is restricted to the underlying semantics of database schemata and document structures used in cultural heritage and museum documentation in terms of a formal ontology. It does not define any of the terminology typically appearing as data in the respective data structures; however it foresees the characteristic relationships for its use. It does not aim at proposing new things about what cultural institutions should document. Rather it explains the logic of what they actually use to document, and thereby intends to enable enables semantic interoperability.

The CIDOC CRM is intended to facilitate the integration, mediation and interchange of heterogeneous cultural heritage information and is the culmination of more than a decade of standards development work by the International Committee for Documentation (CIDOC) of the International Council of Museums (ICOM).

When transferring ontology into a data model, epistemological issues appear such as: in which form and units is the knowledge provided, used and managed? What are its sources? What are the units, and boundaries of documentation, and how to represent alternatives? Also the processes of creation and dissemination of knowledge about cultural entities has to be addressed. In the following, we try to illustrate the impact of these questions on the data structure design.

Usually in small museums the administrational actions needs no workflow control and can be dealt with simple registration on a per object base. This has the advantage that the sum of information about a museum object can be packed into one document. The data organization of this "one" document is an epistemological issue: the definitions of its parts are based on functional units, so that the user has an easy orientation where to find information for a particular task. Therefore we distinguish the following parts [3]:

- Object and document identification,
- description of present state
- historical description,
- administration data
- references.

Whereas these parts do not correspond to entities in the ontology, the data elements that constitute the parts are mapped directly or indirectly to the chosen ontology. By "mapping" we mean a set of equivalence statements between data structure parts and paths in the ontology which allows for defining a deterministic data transformation algorithm from the data structure into an instance of the ontology, e.g., in RDF encoding. The nature of the RDF representation is that of a network. RDF propositions "thrown" into one pool of data integrate automatically via URLs into one large network of knowledge.

One may regard data elements that are mapped directly to the CIDOC CRM to be of ontological nature: They deal with the relationships of things, people, events, time and place. Other data elements serve more the recognition and identification of objects by characteristics than their historical relevance, such as *color* and *basic material*. We regard the latter as epistemological and map them to the properties "P3 has note" (E1 CRM Entity.P3 has note:

E62 String) and the "P2 has type" (E1 CRM Entity.P2 has type (is type of): E55 Type) of the CIDOC CRM.

In a way, all data may be regarded as epistemological once they appear in a document: They are statements of what has been understood. It is only the subject matter, the meaning of some of the statements that consists of possible states of affairs of the things under investigation, the ontological view. Therefore, there are always two kinds of mapping: One to see the document as a document and as statements how the knowledge was acquired, and another based on its propositions about reality. For information integration, we need the latter. For understanding what to believe, we need the former. In order to turn an ontology into a document format, we have to add the epistemological part. In order to integrate information, we have to get rid of it. An integrated information environment must preserve both views. The epistemological has priority: if it lost, we cannot interpret knowledge. We can reconstruct the ontological view from it, if it is suitably organized.

Most data elements in our format are based on repetitions of a basic event pattern. This pattern is based on the idea that history is represented by things, people and ideas meeting in space and time. CIDOC CRM focuses on event modeling in order to describe cultural materials and scientific observations. The event pattern is a strong mechanism [4], [5] for integrating heterogeneous complementary information and an advantage of its use is that all the data elements following this pattern can directly be mapped to the CIDOC CRM.
The data model, which realizes the event pattern, includes the following basic elements (mapping to the CRM in parentheses):

(i) **event ID** (*CIDOC CRM E5 Event:P1 is identified by :E41 Appellation*),
(ii) **event type** (*CIDOC CRM E5 Event:P2 has type: E55 Type*)
(iii) **event name** (*CIDOC CRM E5 Event:P2 has type: E55 Type*),
(iv) **event date**, (*CIDOC CRM E5 Event: P4 has time-span:E52 Time-Span:P82 at some time within: E61 Time Primitive*)
(v) **event place** (*CIDOC CRM E5 Event:P7 took place at :E53 Place*),
(vi) **participants and their role in the event** (persons, organizations, objects etc) (*CIDOC CRM E5 Event:P12 occurred in the presence of: E39 Actor/ E70 Stuff*),
(vii) **event description** (*CIDOC CRM E5 Event:P3 has note: E62 String*),
(viii) **event scope** (*CIDOC CRM E7 Activity: P21 had general purpose: E55 Type*), (ix) method or technique (*CIDOC CRM E5 Event: P12 occurred in the presence of:*

E77 Persistent Item),

(ix) **relation with other events** (*CIDOC CRM E5 Event: P9 consists of: E5 Event*:)

(x) **Outcome** (*CIDOC CRM E5 Event: P12 occurred in the presence of: E77 Persistent Item*).

The following **table 1** presents the parts and their major subparts of the object document.

Table 1. Data organization of the object document		
part	***subpart***	***Sub-sub parts***
Document / Record Identification	Record Identification, Version number	
Object identification	Current Inventory number, Other numbers, Responsible organization, collection, Object category, Basic material, Basic color, Object composition, Object parts, Subpart of inventory id, representative image, accessories, condition, in house	
Detailed documentation		
	Object description	Object names, Type, Depiction, Mark & Inscriptions, Measurements, Condition check
	Object history	Production, Usage, Field collection, Intervention/Modification, Ownership
	Object relations	
Management	Accession, Other Accessions, Acquisition, Locations, Packaging, Contract, Movement,	

	Loan out, Deaccession	
References	Bibliographic reference, Archival reference, Other classification, Evidences, Texts	

The identification of the document comprises the requirement of recording the metadata about its creation in the document itself. Following the event pattern, the creation of the document is an event and the assigning of an identification number is also an event. The "*Document / Record Identification*" data element in **Table 1** represents the document creation event. The "*Record Identification*" and the "*Version Identification*" data elements represent the associated events of document identification number creation and the document version number creation event respectively. The detailed data elements of this part are presented in the Annex A. Note that these metadata play an epistemological role with respect to the subject matter of the document, but simultaneously, they play an ontological role with respect to the history of documentation itself. The CIDOC CRM models this case, but it does not deal with the details of internal object structure and how to recognize an object.

The data elements that constitute the "*Object identification*" part are all those necessary for tracing an object in the inventory, for following an object in history via tradition of identifiers and for recognizing an object in the case it is missing or stolen.
The "*Current Inventory Number*" data element is used for tracing the object in the Inventory and its structure follows the above event pattern. The "*Other numbers*" data element is used for tracing the object in the history, documenting all the previous assigned identification numbers used for referencing the object in the museum or by other owners. The data element "*basic material*" and "*basic color*", "*Object parts*", "*Representative image*", "*General description*" and "*condition*" are required for object recognition. The detailed data elements of this part are presented in the Annex A.

The "*Detailed documentation*" part consists of three major subparts. The first subpart "*Object description*" supports the documentation of current description of the object as it can be observed and justified by the curators today. The structure of all data elements of this part is based on the event pattern, except the "*Type*" data element which supports the scientific

classification of the object. The second subpart "*Object history*" supports all the information about events at which an object was present and constitutes the known history of the object. This information is found in historical sources and evidences and it is not observable today. The structure of all data elements of this part is event-based and these data elements map either to CIDOC CRM E7 Activity or to specializations of this class. The above separation of "Object description" and "Object history" is a pragmatic one and it is useful when the state of the object is "relatively" stable within the time frame of consideration.

The sub parts of "Object description" and "Object history" are slightly different when the documentation is about buildings or archaeological sites. They change significantly over the time under consideration. For example in the case of monument decoration, there is a data element "*Decoration*" instead of "*Depiction*" in "*Object description*" part which supports the current observable decoration of the monument and there is a "*Other decorations*" data element in "*Object history*" part for supporting the descriptions of decorations that a monument had in the past and they are not observable now. They are known by references in old designs, books, old pictures, etc. Also there are additional data sub elements in "Production", "Use" and "Intervention/Modification" for describing the composition of the building in historical times. The third subpart of the data elements support the documentation of the object relations with other events or with other similar objects by type or by style etc.

The "*Management*" part supports the documentation of the events and procedures occurring in the museum in which the object participates. The structure of these data elements is event based. They are mostly trivial events in the history of the object but they are essential to museum administration. Part of them may be regarded "history" at a later stage.

The last part, "Reference", comprises the associations of source material that refers to object or describes the object. Source material may be photos, designs, texts, archives, bibliographic reference. It may be digital or not.

The system design and functions

The characteristics of small museums and the required data model constitute a particular challenge for building collection management systems. The demand is the support of the above data model for addressing semantic interoperability via data integration as well as the support of structured data exchange (in the form of XML documents) for syntactic

interoperability. Therefore the Centre for Cultural Informatics in ICS-FORTH has developed a detailed, but generic XML Schema of the proposed data model for museum object documentation in close collaboration with a series of small museums and cultural institutions in Greece, and a light-weighted database solution called “Synthesis”, which can easily be adapted to special requirements in order to keep customization cost low.

The organization in XML [6] documents allows the dynamic exploitation of the data in the internet and supports additional translations of the same document in more than one language. It is the best solution for data exchange between cultural information systems.
The system is implemented on eXist [7], a free-ware native XML database, with a multi layered architecture, Web interface and Web presentation. The use of this technology reduces drastically the overhead for schema customization. Since the database handles the complete document as information unit, the data entry can be detached from the database and data import and export is a non-issue. Changes in descriptional parts of the Schema do not affect the management functions of the database, only the data entry and presentation forms. Multilingual editions are easily created and maintained as parallel documents. The system supports five languages, controlled vocabulary and term translations.

An overview of the system architecture is presented in the figure 1.

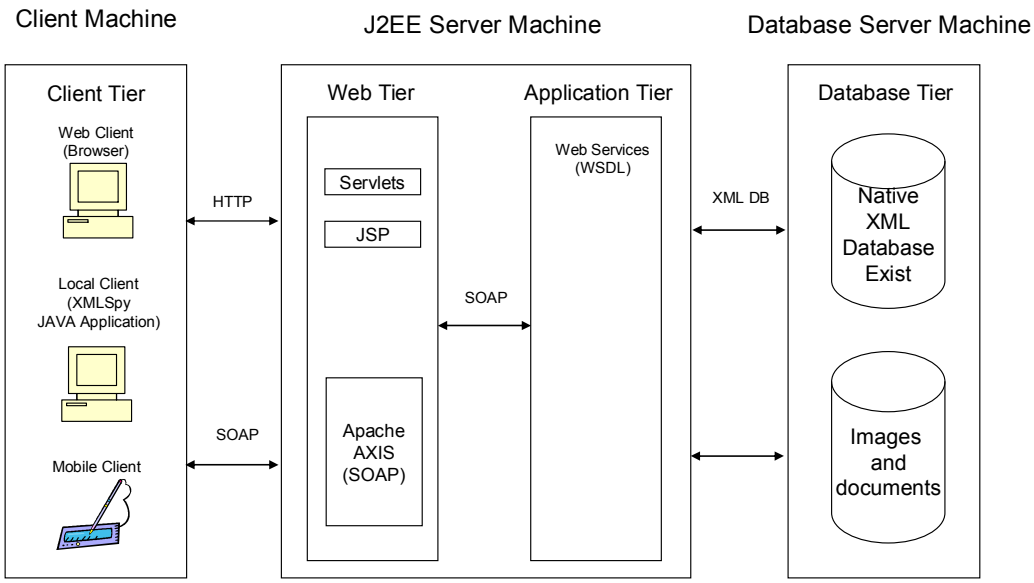

Figure 1: System architecture

The main components of system are:

- Database Server Tier
- Web services – application tier
- Client Tier

The database Server Tier provides all the necessary operations and mechanism for storing, retrieving, updating the xml documents, binary objects and unstructured text and preserving their integrity constraints.

The main part of the application is composed of web services. The web services implement all the functions of the system expect those which manipulate the user interface forms. The web services include all the system logic. Their implementation is based on J2EE technology(http://java.sun.com/j2ee/overview.html). A web service is identified by a URL [IETF RFC 2717], or by a URI [IETF RFC 2396] and its programmatic interface and its interactions are defined and described in xml format.

The use of J2EE technology ensures interoperability, encapsulation, availability, publication, extensibility, open architecture, expandability, adaptability, flexibility and low cost of creation and use. The client tier involves the management and the format of user screens. It has been built on internet browser (internet explorer), and makes use of java (http://java.sun.com/) and the Altova Authentic®2005 (http://www.altova.com/download_authentic.html) xml editor.

The system "synthesis" supports a generic workflow for documentation of cultural entities and provides functions for creating, editing, navigating and retrieving documents, for data migration, for document translation and for associating documents of cultural entities with documents of additional entities like events persons, organizations, places, materials, photos etc..

Conclusions

Customizations of the system "synthesis" have been implemented for three different organizations. The first organization had to document the conservation works of Byzantine wall paintings and the monuments where the paintings belong, the second organization had to document Byzantine monuments and sites and their objects and the third organization had to document museum objects. The average time for each customization was about two weeks.

The customization work mainly concerned the user interface and hiding particular details rather than adding. Also some marginal fields were added or changed. In any case the database design and function stayed unaffected by these changes.

As a conclusion we may say that when transferring ontology into a data model, the data structure represents an epistemology to manage the knowledge expressed by this ontology. If the created epistemology is in line with the ontology and both follow the event pattern mechanism, then the integration, mediation, adaptation and interchange of heterogeneous information are possible without loss of information. To use a well-crafted ontology as underlying model and systematic understanding of the epistemological elements that have to be added turned out to be extremely helpful to create a surprisingly generic data structure, even for quite specialized applications. The native XML technology fits perfectly to the demands of cultural documentation systems.

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Annex A: A description of data model for museum objects.

It follows the description of the data model. The mappings to CIDOC CRM elements are denoted in brackets. The Document Type Definition (DTD) of this data model is presented in http://cidoc.ics.forth.gr/docs/CIDOCdtd.pdf

Document / Record Identification		
Element name	**Sub elements**	**Description**
Record Identification	*This data is necessary for linking the document with other documents*	
	Value [*CIDOC CRM E15 Identifier Assignment: P37 assigned: E42 Object Identifier*], **number category** [*E42 Object Identifier:P2 has type: E55 Type*], **Creation date** [*CIDOC CRM E15 Identifier Assignment :P4 has time-span: E52 Time-Span*], **Expiration date** [*CIDOC CRM E15 Identifier Assignment:P4 has time-span: E52 Time-Span]*, **creator** [*CIDOC CRM E15 Identifier Assignment:P14 carried out by: E39 Actor*]	
Version number	*This data is necessary for the validation control, for the recording of the evolution of the knowledge about the object and for linking the data with the person which register this data.*	
	Value [*CIDOC CRM E15 Identifier Assignment: P37 assigned: E42 Object Identifier*], **number category** [*E42 Object Identifier:P2 has type: E55 Type*], **Creation date** [*CIDOC CRM E15 Identifier Assignment :P4 has time-span: E52 Time-Span*], **Expiration date** [*CIDOC CRM E15 Identifier Assignment:P4 has time-span: E52 Time-Span*], **creator** [*CIDOC CRM E15 Identifier Assignment:P14 carried out by: E39 Actor*]	

Object Identification		
Element name		**description**
Current Inventory Number	*Keeps track of the museum inventory*	
	Value *[CIDOC CRM E15 Identifier Assignment: P37 assigned: E42 Object Identifier],* **number category** *[E42 Object Identifier:P2 has type: E55 Type],* **Creation date** *[CIDOC CRM E15 Identifier Assignment :P4 has time-span: E52 Time-Span],* **Expiration date** *[CIDOC CRM E15 Identifier Assignment:P4 has time-span: E52 Time-Span],* **creator** *[CIDOC CRM E15 Identifier Assignment:P14 carried out by: E39 Actor]*	
Other Numbers	*holds other ids which identify a museum object. These may be also older identifiers given by the museum (for example ids used in special records) or foreign identifiers used outside a museum, as a foreign collection identifier or as an id given by a previous owner*	
	Value *[CIDOC CRM E15 Identifier Assignment: P37 assigned: E42 Object Identifier],* **number category** *[E42 Object Identifier:P2 has type: E55 Type],* **Creation date** *[CIDOC CRM E15 Identifier Assignment :P4 has time-span: E52 Time-Span],* **Expiration date** *[CIDOC CRM E15 Identifier Assignment:P4 has time-span: E52 Time-Span],* **creator** *[CIDOC CRM E15 Identifier Assignment:P14 carried out by: E39 Actor]*	
Responsible	[*CIDOC CRM E74 Group*]	*holds information about the organization which is responsible for the museum object.*

Organization		
Collection	*holds information about the personal collection of a donator or a seller either information about a collection created from a field research or a researcher's collection*	
	Collection name *[CIDOC CRM E78 Collection:P1 is identified by: E41 Appellation],* **collection id** *[CIDOC CRM E78 Collection: P1 is identified by: E41 Appellation]*	
Object category	[*CIDOC CRM E55 Type*]	*holds information about the kind of the museum object.*
Basic material	[*CIDOC CRM E57 Material*]	*holds information about the basic material of which an object was made.*
Basic color	[*CIDOC CRM E26 Physical Feature*]	*holds information about the basic color / colors that an object has.*
Object composition	*holds information about a "whole", documented as an individual object, of which the documented museum object is part*	
	Composition type *[CIDOC CRM E18 Physical Thing: P46 is composed of: E18 Physical Thing: P2 has type: E55 Type],* **number of parts** *[CIDOC CRM E19 PhysicalObject:P57 has number of parts:E60 Number]*	
Object parts	*holds information about the number of the object parts and the number of all the other objects that are used as accessories of it. Parts are documented as individual museum objects independently on a requirement for an individual documentation.*	
	Description *[CIDOC CRM E19 Physical Object: P46 is composed of: E19 Physical Object : P3 has note:E62 String] or* **subpart id** *[CIDOC CRM E19 Physical Object: P47 is identified by: E42 Object Identifier],* **subpart object type** *[CIDOC CRM E19 Physical Object:P2 has type:E55 Type],* **subpart object description** *[CIDOC CRM E19 Physical Object: P3 has note:E62 String]*	
Subpart of inventory id	Link with the inventory number of the object which is part [CIDOC CRM E19 Physical Object: P47 is identified by: E42 Object Identifier]	
Representative image	[*CIDOC CRM E38 Image*]	*It is an indicative, small image of low resolution or a drawing/design of a museum object.*
General Description	[*CIDOC CRM P3 has note*]	*Holds a brief description about the visible properties of the object*
accessories	*holds information about the accessories of an object*	
	Accessory category *[CIDOC CRM E79 Part Addition P111 added: E19 Physical Object: P2 has type:E55 Type],* **Count number** *[CIDOC CRM E79 Part Addition P111 added:E19 Physical Object: P57 has number of parts: E60 Number],* **description** *[CIDOC CRM E79 Part Addition P111 added: E19 Physical Object: P3 has note]*	
Condition	[*CIDOC CRM E3 Condition State*]	*holds information about an assessment of a general condition state of the museum object. Condition also includes a characterization about the wholeness the object.*
InHouse	[*CIDOC CRM E19 Physical Object: P55 has current location: E53 Place*]	*holds information about the current location of the museum object: whether it located inside or outside the museum. It is intended to appear as a flag.*

Detailed documentation		
Element name	**sub elements**	**description**
Description	*holds a description of the object as it is today*	
	Object name *[CIDOC CRM E19 Physical Object: P1 is identified by: E41 Appellation]*	*holds information about a name given to the object*
	Type	*Object scientific classification*
	functional type *[CIDOC CRM E19 Physical Object: P2 has type:E55 Type],* **structural type***[CIDOC CRM E19 Physical Object: P2 has type:E55 Type],* **morphological type** *[CIDOC CRM E19 Physical Object: P2 has type:E55 Type]*	
	Depiction	*holds information about a depiction on a museum object*
	Location *[CIDOC CRM E25 Man-Made Feature: P53 has former or current location : E53 Place],* **Subject** *[CIDOC CRM E25 Man-Made Feature: P62 depicts:E1 CRM Entity],* **things being referred** *[CIDOC CRM E1 CRM Entity: P67 refers to**:** E73 Information Object],* **Color** *[CIDOC CRM E26 Physical Feature],* **Type of depiction** *[CIDOC CRM E25 Man-Made Feature: P2 has type: E55 Type],* **Condition** *[CIDOC CRM E25 Man-Made Feature: P44 has condition: E3 Condition State] ,* **Dating** *[CIDOC CRM E25 Man-Made Feature: P108 has produced: E12 Production: P4 has time-span: E52 Time-Span],* **Technique** *[CIDOC CRM E25 Man-Made Feature: P101 had as general use: E55 Type],* **Material** *[CIDOC CRM E25 Man-Made Feature: P45 consists of: E57 Material],* **Dimensions** *(measurement event) [CIDOC CRM E16 Measurement: P40 observed dimension: E54 Dimension]*	
	Mark	*holds information about marks or inscriptions attached to a museum object*
	Location *[CIDOC CRM E26 Physical Feature: P53 has former or current location: E53 Place],* **Type** *[CIDOC CRM E26 Physical Feature: P2 has type: E55 Type] ,* **Content** *[CIDOC CRM E26 Physical Feature: P138 represents: E37 Mark/E34 Inscription],* **things being referred** *[CIDOC CRM (E26 Physical Feature: P67 refers to: E73 Information Object],* **Dating** *[CIDOC CRM E26 Physical Feature: P16 used specific object/was used for: E7 Activity: P4 has time-span : E52 Time-Span],* **Condition** *[CIDOC CRM E26 Physical Feature: P44 has condition: E3 Condition State],* **Technique** *[CIDOC CRM E26 Physical Feature: P101 had as general use: E55 Type],* **Material***[CIDOC CRM (E26 Physical Feature: P45 consists of: E57 Material],* **Dimensions** *[CIDOC CRM E26 Physical Feature: P43 has dimension: E54 Dimension] ,* **Purpose** *[CIDOC CRM E26 Physical Feature: P16 used specific object: E7 Activity:P21 had general purpose: E55 Type]*	
	Measurement	*holds information about the measurement of the physical properties of the object*
	Dimension *[CIDOC CRM E16 Measurement: P40 observed dimension : E54 Dimension],* **Type of measurement** *[CIDOC CRM E16 Measurement: P2 has type: E55 Type],* **Measurement maker** *[CIDOC CRM E16 Measurement: P14 carried out by: E39 Actor],* **Date** *[CIDOC CRM E16 Measurement: P4 has time-span: E52 Time-Span],* **description** *[CIDOC CRM E16 Measurement: P3 has note: E62 String],* **measurement instrument** *[CIDOC CRM E16 Measurement: P125 used object of type: E55 Type]*	
	Condition check	*holds information which scientifically describes and documents the condition state of a museum object*
	Condition state /*CIDOC CRM E3 Condition State],* **Checker** *[CIDOC CRM: P14 Carried out by:E39*	

	Actor], **Date** *[CIDOC CRM E3 Condition State P4 has time-span: E52 Time-Span],* **Place** *[CIDOC CRM E3 Condition State: P7 took place at: E53 Place],* **Examination method** *[E14 Condition Assessment:P3 has note:E62 String],* **Condition description** *[CIDOC CRM E3 Condition State:P3 has note:E62 String],* **Conservation report** *[CIDOC CRM E31 Document]*	
History	*holds information about events at which an object was present*	
	Production	*holds information about the production of the object. We make a distinction: between a production that is one complete action/phase, and a production that has/consists of more than one production phases*
	Object Production Note*:* **Producer** *[CIDOC CRM E12 Production: P11 had participant:E21 Person],* **Location** *[CIDOC CRM E12 Production : P7 took place at: E53 Place],* **Purpose** *[CIDOC CRM E12 Production:P21 had general purpose:E55 Type],* **Date** *[CIDOC CRM E12Production: P4 has time-span:E52 Time-span],* **Technique** *[CIDOC CRM E12 Production:P32 used general technique: E55 Type],* **Material** *[CIDOC CRM E12 Production:P126 employed: E57 Material],* **State of completion** *[CIDOC CRM E12 Production: P2 has type: E55 Type],* **Style** *[CIDOC CRM E12 Production: P15 was influenced by : E1 CRM Entity: P2 has type: E55 Type],* **Description** *[CIDOC CRM E12 Production: P3 has note: E62 String],* **Authenticity** *[CIDOC CRM E12 Production: P3 has note:E62 String]*	
	Production Phase*:* **Name** *[CIDOC CRM E12 Production: P1 is identified by: E41 Appellation], Date [CIDOC CRM E12 Production: P4 has time-span:E52 Time-span],* **Characterization** *[CIDOC CRM E12 Production: P2 has type: E55 Type],* **Person(s) involved** *[CIDOC CRM E12 Production: P11 had participant: E21 Person],* **Object(s) involved** *[CIDOC CRM (E12 Production:P12* occurred in the presence of: E77 Persistent Item], **Institution(s)involved** *[CIDOC CRM E12 Production: P11 had participant: E74 Group],* **Location** *[CIDOC CRM E12 Production : P7 took place at: E53 Place],* **Purpose** *[CIDOC CRM E12 Production:P21 had general purpose: E55 Type],* **Technique** *[CIDOC CRM E12 Production:P32 used general technique: E55 Type],* **Material** *[CIDOC CRM E12 Production:P126 employed: E57 Material],* **Description** *CIDOC CRM E12 Production:P3 has note],* **Related event** *[CIDOC CRM \E12 Production: P15 was influenced by:E5 Event]*	
	Usage	*holds information about the known usage phases of the object. We consider a usage phase to change every time an object has a different use. The notion of usage also refers to the presence of an object in exhibitions*
	Usage Phase: **Name** *[CIDOC CRM E7 Activity: P1 is identified by: E41 Appellation],* **Date** *[CIDOC CRM E7 Activity: P4 has time-span:E52 Time-span],* **Characterization** *[CIDOC CRM E7 Activity:P2 has type:E55 Type],* **Person(s) involved** *[CIDOC CRM E7 Activity: P11 had participant: E21 Person],* **Object(s) involved** *[CIDOC CRM (E7 Activity:*P12 *occurred in the presence of: E77 Persistent Item]*, **Institution(s) involved** [CIDOC CRM *E7 Activity: P11 had participant: E74 Group*], **Location** *[CIDOC CRM E7 Activity : P7 took place at: E53 Place],* **Purpose** *[CIDOC CRM E7 Activity:P21 had general purpose: E55 Type],* **Technique** *[CIDOC CRM E7 Activity: P16 used specific object: E70 Thing],* **Description** *[CIDOC CRM E7 Activity : P3 has note],* **Related event** *[CIDOC CRM E7 Activity: P15 was influenced by:E5 Event]*	
	Exhibition: **Title** *[CIDOC CRM E7 Activity: P1 is identified by: E41 Appellation],* **Location** *[CIDOC CRM E7 Activity : P7 took place at: E53 Place],* **Duration** *[CIDOC CRM E7 Activity: P4 has time-span:E52 Time-span],* **Organizer** *[CIDOC CRM (E7 Activity P14 carried out by: E39 Actor],* **References** *[CIDOC CRM E31 Document]*	
	Field collection	*holds information about the procedure of a field collection or the finding of*

		an object. It is defined as an event of finding/collecting
	Name *[CIDOC CRM E7 Activity: P1 is identified by: E41 Appellation],* **Date** *[CIDOC CRM E7 Activity: P4 has time-span:E52 Time-span],* **Characterization** *[CIDOC CRM E7 Activity:P2 has type:E55 Type],* **Person(s) involved** *[CIDOC CRM E7 Activity: P11 had participant: E21 Person],* **Object(s) involved** *[CIDOC CRM (E7 Activity:P12* occurred in the presence of: E77 Persistent Item], **Institution(s) involved** *[CIDOC CRM E7 Activity: P11 had participant: E74 Group],* **Location** *[CIDOC CRM E7 Activity : P7 took place at: E53 Place],* **Purpose** *[CIDOC CRM E7 Activity:P21 had general purpose: E55 Type],,* **Description** *[CIDOC CRM E7 Activity : P3 has note],* **Related event** *[CIDOC CRM E7 Activity: P15 was influenced by:E5 Event],* **Excavation layer** *[CIDOC CRM E7 Activity:P12 occurred in the presence of:E77 Persistent Item],* **Field collection number***[CIDOC CRM E15 Identifier Assignment: P37 assigned: E42 Object Identifier],* **References** *[CIDOC CRM E7 Activity:P70 is documented in:E31 Document],* **Research activity** *[CIDOC CRM E7 Activity:P9 consists of:E7 Activity],* **Related find** *[CIDOC CRM E7 Activity:P8 took place on or within:E19 Physical Object]*	
	Intervention/Modification	*holds information about all the interventions made on an object. An intervention can be completed lump sum, over all or it can be analysed into discrete phases. "Intervention note" is about the last, complete intervention.* *If there is information about a new intervention, it must be analysed in intervention phases - in that case, we suggest to use "Intervention note" for filling information about the last intervention action*
	Intervention Note*:* **Conservator** *[CIDOC CRM E11 Modification: P14 carried out by:E39 Actor],* **Location** *[CIDOC CRM E11 Modification: P7 took place at: E53 Place],* **Purpose** *[CIDOC CRM E11 Modification: P21 had general purpose: E55 Type],* **Date** *[CIDOC CRM (E11 Modification: P4 has time-span: E52 Time-Span],* **Technique** *[CIDOC CRM E11 Modification: P32 used general technique: E55 Type],* **Material** *[CIDOC CRM E11 Modification: P126 employed: E57 Material],* **State of completion** *[CIDOC CRM E11 Modification: P2 has type: E55 Type],* **Alteration signs** *[CIDOC CRM E11 Modification: P2 has type: E55 Type],* **Description** *[CIDOC CRM E11 Modification: P3 has note:E62 String]*	
	Intervention Phase*:* **Name** *[CIDOC CRM E11 Modification: P1 is identified by: E41 Appellation],* **Date** *[CIDOC CRM (E11 Modification: P4 has time-span: E52 Time-Span],* **Characterization** *[CIDOC CRM E11 Modification: P2 has type: E55 Type],* **Person(s) involved** *[CIDOC CRM E11 Modification: P11 had participant: E21 Person],* **Object(s) involved** *[CIDOC CRM E11 Modification: P12* occurred in the presence of: E77 Persistent Item], **Institution(s) involved** *[CIDOC CRM E11 Modification: P11 had participant: E74 Group],* **Location** *[CIDOC CRM E11 Modification: P7 took place at: E53 Place],* **Purpose** *[CIDOC CRM E11 Modification: P21 had general purpose: E55 Type],* **Technique** *[CIDOC CRM E11 Modification: P32 used general technique: E55 Type],* **Material** *[CIDOC CRM E11 Modification: P126 employed: E57 Material],* **Description** *[CIDOC CRM E11 Modification: P3 has note:E62 String],* **Related event** *[CIDOC CRM E11 Modification: P15 was influenced by :E5 Event]*	
	Ownership	*holds information about the event which resulted in the ownership of an object by a museum*
	Name *[CIDOC CRM E8 Acquisition: P1 is identified by: E41 Appellation],* **Date** *[CIDOC CRM E8 Acquisition: P4 has time-span:E52 Time-span],* **Characterization** *[CIDOC CRM E8 Acquisition: P2 has type: E55 Type],* **Person(s) involved** *[CIDOC CRM E8 Acquisition: P11 had participant: E21 Person],* **Object(s) involved** *[CIDOC CRM E8 Acquisition:* P12 *occurred in the presence of: E77 Persistent Item*],	

	Institution(s) involved *[CIDOC CRM E8 Acquisition:P11 had participant: E74 Group],* **Location** *[CIDOC CRM E8 Acquisition: P7 took place at: E53 Place],* **Description** *[CIDOC CRM E8 Acquisition: P3 has note:E62 String]*
Relations	*holds information about the relations that may exist between the museum object (which is recorded) and other objects or events*
	Relation type [CIDOC CRM P130.1 kind of similarity: E55 Type], Event [CIDOC CRM (E5 Event: P12 occurred in the presence of: E77 Persistent Item] or Related object [CIDOC CRM E18 Physical Thing: P130 shows features of: E18 Physical Thing], Description [P3 has note:E62 String]

object management		
Element name	**sub elements**	**description**
accession	*holds information about the procedure of the accession of objects in a museum*	
	Value *[CIDOC CRM E10 Transfer of Custody: P141 assigned: E15 Identifier Assignment: P37 assigned: E42 Object Identifier],* **number category** *[E42 Object Identifier:P2 has type: E55 Type],* **Creation date** *[CIDOC CRM E15 Identifier Assignment :P4 has time-span: E52 Time-Span],* **Expiration date** *[CIDOC CRM E15 Identifier Assignment:P4 has time-span: E52 Time-Span],* **creator** *[CIDOC CRM E15 Identifier Assignment:P14 carried out by: E39 Actor],* **Notes** *[CIDOC CRM E10 Transfer of Custody:P3 has note:E62 String]*	
Other accession	*holds information about other possible actions of accession of the object (or parts of the object) in a museum*	
	Value *[CIDOC CRM E10 Transfer of Custody: P141 assigned: E15 Identifier Assignment: P37 assigned: E42 Object Identifier],* **number category** *[E42 Object Identifier:P2 has type: E55 Type],* **Creation date** *[CIDOC CRM E15 Identifier Assignment :P4 has time-span: E52 Time-Span],* **Expiration date** *[CIDOC CRM E15 Identifier Assignment:P4 has time-span: E52 Time-Span],* **creator** *[CIDOC CRM E15 Identifier Assignment:P14 carried out by: E39 Actor],* **Notes** *[CIDOC CRM E10 Transfer of Custody:P3 has note:E62 String]*	
Acquisition	*holds information about the acquisition (event) of an object by a museum*	
	Acquisition type *[CIDOC CRM E8 Acquisition: P2 has type: E55 Type],* **Date** *[CIDOC CRM E8 Acquisition: P4 has time-span:E52 Time-span],* **Person(s) involved** *[CIDOC CRM E8 Acquisition: P11 had participant: E21 Person],* **Organization(s) involved** *[CIDOC CRM E8 Acquisition:P11 had participant: E74 Group],* **Place** *[CIDOC CRM E8 Acquisition: P7 took place at: E53 Place],* **Description** *[CIDOC CRM E8 Acquisition: P3 has note:E62 String])*	
Locations	*holds information about the locations (permanent or not) of the objects within a museum's custody*	
	Current location *[CIDOC CRM E19 Physical object :P55 has current location:E53 Place],* **Permanent location** *[CIDOC CRM E19 Physical object: P54 has current permanent location: E53 Place],* **Previous location** *[CIDOC CRM E19 Physical object: P27 moved from: E53 Place]*	
Packaging	*holds information about the way of packing an object*	
	Dimensions *[CIDOC CRM E70 Thing: P43 has dimension:E54 Dimension],* **Packaging recommendations** *[CIDOC CRM E70 Thing/E7 Activity: P3 has note:E62 String],* **Notes***[CIDOC CRM E70 Thing/E7 Activity: P3 has note:E62 String]*	
Contract	*holds information about a contract concerning the object*	
	Type of legal contract *[CIDOC CRM E31 Document /E7 Activity: P2 has type:E55 Type]* , **Short title**	

	[CIDOC CRM E31 Document:P1 is identified by:E41 Appellation] , **Date** *[CIDOC CRM E7 Activity: P4 has time-span:E52 Time-span],* **Person(s) involved** *[CIDOC CRM E7 Activity: P11 had participant: E21 Person],* **Organization(s) involved** *[CIDOC CRM E7 Activity :P11 had participant: E74 Group],* **Description** *[CIDOC CRM E31 Document /E7 Activity: P3 has note:E62 String]*
movement	*holds information about the movement of the object inside or outside the museum*
	Date *[CIDOC CRM E9 Move :P4 has time-span: E52 Time-span],* **Purpose** *[CIDOC CRM E9 Move : P21 had general purpose: E55 Type],* **Location** *[CIDOC CRM E9 Move: P26 moved to: E53 Place/ P27 moved from: E53 Place],* **Movement authoriser** *[CIDOC CRM (E9 Move:P14 carried out by: E39 Actor],* **Notes** *[CIDOC CRM E9 Move:P3 has note]*
Loan out	*holds information about all loans of the object to other institutions or museums.*
	Date *[CIDOC CRM E10 Transfer of Custody:P4 has time-span: E52 Time-span],* **Purpose** *[CIDOC CRM E10 Transfer of Custody: P21 had general purpose: E55 Type],* **Destination** *[CIDOC CRM E10 Transfer of Custody: P7 took place at: E53 Place],* **Dispatch authorizer** *[CIDOC CRM (E10 Transfer of Custody:P28 custody surrendered by: E39 Actor],* **Recipient** *[CIDOC CRM (E10 Transfer of Custody: P29 custody received by: E39 Actor],* **Notes** *[CIDOC CRM E10 Transfer of Custody:P3 has note]*
Deaccession	*holds information about a deaccession or disposal (for any reason) of the object by the museum*
	Deaccession type *[CIDOC CRM E8 Acquisition: P2 has type: E55 Type],* **Date** *[CIDOC CRM E8 Acquisition: P4 has time-span:E52 Time-span],* **Legal act** *[CIDOC CRM E8 Acquisition: P2 has type: E55 Type],* **Description** *[CIDOC CRM E8 Acquisition: P3 has note:E62 String],* **Current owner** *[CIDOC CRM E8 Acquisition: P22 transferred title to:E39 Actor],* **Related procedure** *[CIDOC CRM E8 Acquisition: P134 continued:E7 Activity]*

References		
Element name		**description**
Bibliographic reference	**Chapters, Pages, Drawings, Tables, Link to Bibliography entity, Photos** [*CIDOC CRM E31 Document: P70 documents*]	*holds details of bibliographic references to the object*
Archival reference	**Link to Archival entity** *[CIDOC CRM E73 Information Object: P67 refers to],* **Remarks** *[CIDOC CRM E73 Information Object: P3 has note]*	*holds details of every archive reference to the object.*
Other classification	**Classification** *[CIDOC CRM E17 Type Assignment: P42 assigned: E55 Type],* **Source** *[CIDOC CRM E17 Type Assignment: is documented in: E31 Document]*	*holds information about other classifications of the object referred to bibliographic sources.*
Evidences	*Holds references of the museum object by evidence*	
	Name *[CIDOC CRM E65 Creation:P1 is identified by: E41 Appellation],* **Category** *[CIDOC CRM E65 Creation: P2 has type:E55 Type],* **Originator of reference** *[CIDOC CRM E65 Creation: P14 carried out by :E39 Actor],* **Date** *[CIDOC CRM E65 Creation: P4 has time-span :E52 Time-span],* **Object** *[CIDOC CRM E65 Creation: P94 has created:E73 Information Object:P128 is carried by: E84 Information Carrier],* **Content** *[CIDOC CRM E65 Creation: P94 has created:E73 Information Object P67 refers to],* **Event place** *[CIDOC CRM E65 Creation: P7 took place at:E53 Place],* **Bibliographic reference** *[CIDOC CRM E65 Creation: P70 is documented in:E31Document]*	
Texts	*Holds references of the museum object in various texts*	

	Title *[CIDOC CRM E31 Document: P102 has title: E35 Title],* **Paragraph** *[CIDOC CRM E31 Document: P3 has note],* **Language** *[CIDOC CRM (E33 Linguistic Object: P72 has language: E56 Language],* **Reference date** *[CIDOC CRM E50 Date],* **Creator** *[CIDOC CRM E31 Document : P105 right held by: E39 Actor]*