CIDOC-CRM Extensions for Conservation Processes: A Methodological Approach

Evgenia Vassilakaki[1,a)], Daphne Kyriaki- Manessi [1,b)], Spiros Zervos [1,c)] and Georgios Giannakopoulos[1,d)]

[1]Dept. Library science & Information Systems, Technological Educational Institute of Athens, Egaleo, Greece

a)Corresponding author: evasilak@teiath.gr
b)dkmanessi@teiath.gr
c) szervos@teiath.gr
d) gian@teiath.gr

Abstract. This paper aims to report the steps taken to create the CIDOC Conceptual Reference Model (CIDOC-CRM) extensions and the relationships established to accommodate the depiction of conservation processes. In particular, the specific steps undertaken for developing and applying the CIDOC-CRM extensions for defining the conservation interventions performed on the cultural artifacts of the National Archaeological Museum of Athens, Greece are presented in detail. A report on the preliminary design of the DOC-CULTURE project (Development of an integrated information environment for assessment and documentation of conservation interventions to cultural works/objects with nondestructive testing techniques [NDTs], www.ndt-lab.gr/docculture), co-financed by the European Union NSRF THALES program, can be found in Kyriaki-Manessi, Zervos & Giannakopoulos (1) whereas the NDT&E methods and their output data through CIDOC-CRM extension of the DOC-CULTURE project approach to standardize the documentation of the conservation were further reported in Kouis et al. (2).

INTRODUCTION

The importance of applying conservation techniques on museum artifacts was widely acknowledged to secure timely presence. However, the need to systematically and thoroughly record the details of the conservation techniques and activities applied each time in an Information System (IS) with the use of well known and widely accepted standards is relatively new. The realization that human and natural actions threaten the cultural heritage's existence stressed the efforts for succeeding accurate documentation of the museum artifact and of the conservation techniques applied each time. Specifically, conservation documentation provides an important insight on the artifact's state as well as on its historical background (3).

A significant number of studies employed CIDOC-CRM as a mapping tool. In particular, Doerr, Ore, & Stead (4) provided a tutorial on requirements and semantic problems concerning the integration of information in large scale meaningful networks of knowledge. It adopts CIDOC CRM due to its ability to support integration of information of diverse domains, mainly from cultural heritage, e-science and biodiversity. Kakali et al. (5) proposed an ontology-based metadata interoperability approach for describing cultural heritage collections. They employed CIDOC-CRM as a mediating schema for mapping Dublin Core (DC) Type Vocabulary. In the same line, Naoumidou, Chatzidaki, & Alexopoulou (6) outlined the "ARIADNE" Conservation Documentation System developed for the Department of Conservation of Antiquities & Works of Art at Technological Educational Institute of Athens (TEI-A). The system was developed as a relational database and CIDOC-CRM concepts and relationships were employed to describe the conservation process. Finally, Bountouri & Gergatsoulis (7) adopted CIDOC-CRM

to map the semantics of Encoded Archival Description (EAD) in the domain of archival collections. Three hierarchies of semantically expressing archival collection were identified: a) hierarchy of physical object, b) hierarchy of information object and c) hierarchy of linguistic object.

A few studies reported on CIDOC CRM as an interoperability tool. Specifically, Bœuf et al. (8) outlined the Concept Browser developed for accessing different museum collections. CIDOC-RM served as the mean to facilitate querying of different museum collections, described in different standards and built with different architectures. In the same line, Ronzino et al. (9) proposed use of CIDOC-CRM extensions in order to succeed integration of large scale datasets provided by national institutions.

Only a few studies employed CIDOC-CRM to facilitate conservation processes. Specifically, Lahanier, Aitken, & Pillay (10) presented the European Research Open System (EROS) developed to manage restoration processes in museum collections. In addition, Karagiannis et al. (11) developed a system for recording the documentation produced by applying nondestructive analysis on art projects. Again, CIDOC-CRM was used for standardization purposes. Finally, Locatelli et al. (12) outlined the TIVal project, an effort for developing a system for accommodating the documentation data produced during the conservation and possibly restoration processes of cultural collections. The CIDOC-CRM extensions and the architecture of the system were thoroughly presented.

This study aims to describe the process for developing the CIDOC Conceptual Reference Model (CIDOC-CRM) extensions and the relationships established to facilitate the depiction of conservation processes. Specifically, this study outlines the CIDOC-CRM extensions developed for defining the conservation interventions performed on the cultural artifacts of the National Archaeological Museum of Athens, Greece. This study contributes in providing a fully developed ontology for conservation purposes for any type and format of cultural artifacts (e.g. image, sculpture). This research contributes to creating extensions suitable for describing conservation processes. In addition, it develops an important tool for museum curators, conservators, conservation scientists and information professionals for successfully documenting conservation activities performed on museum artifacts using worldwide accepted standards.

This paper is structured as follows. The specific steps for developing the CIDOC extensions and the relationships established to accommodate the depiction of conservation processes are thoroughly described. The main findings are discussed; implications and limitations of the research are identified. Finally, conclusions are drawn and future work is proposed

METHODOLOGY

Identification of the specific user groups and of their information needs in terms of museum artifact's description and conservation techniques documentation had to be determined. In this context, three main user groups were identified: a) museum curators, experts in describing museum objects but with little or no knowledge of computers and new technology; b) conservators, experts in developing, applying and producing documentation regarding the conservation techniques; and finally, c) conservation scientists, interested in retrieving information regarding damage assessment and material characterization (for more details see Kyriaki-Manessi, Zervos & Giannakopoulos (1).

The act of conservation is very important and it entails preventive conservation, examination, documentation, treatment, research and education. The conservation process starts when the owner of the museum artifact decides that it needs conservation. Therefore, the owner commissions or contracts a conservator (an individual or a team) and enquires on an assessment of the artifact's condition and an intervention proposal. The conservator often based on a diversity of factors needs to consult with other experts (archeologists, historians etc) before formulating an intervention proposal. Once the conservator starts to apply the intervention techniques, he/she needs to document each stage (e.g. before, during and after the conservation) as well as all the applied procedures, including instruments and chemicals used. Finally, the conservator submits the museum artifact with all the relevant documentation and the experts' reports (for more information see Kyriaki-Manessi, Zervos & Giannakopoulos (1).

Once the type of museum materials, the stages of the conservation process and the information needs of the user groups involved were recorded, the literature on standards employed for describing museum artifacts had to be examined. Specifically, a priority was given on standards used to describe conservation procedures; standards which promote interoperability; and finally, standards which are in accordance with open data movement. In this context, two such standards were identified CIDOC-CRM and Dublin Core (DC). This paper focuses on developing and

reporting on the CIDOC-CRM extensions. More information on the DC extensions developed could be found in Kouis et al. (2) and Kouis & Giannakopoulos (13).

CIDOC-CRM Extensions

Four different classes were identified mainly: 1) the Physical object, which is the museum artifact of any type and format, 2) Event, which corresponds to each conservation intervention on the museum artifact performed, 3) Document, which is the documentation produced from the applied conservation techniques and procedures, and finally, 4) Measurements, which are the different measurements of the conservation intervention recorded by conservators (e.g. before, during and after). Each class is represented with an "E". This study will focus on one of the main classes that of E5: Event (see figure 1).

Specifically, the class E5: Event was sub-divided into four sub-classes that of E7: Activity to record the actions which result in changes of the museum artifact, E4: Period to document the physical condition of the museum artifact in a specific time span, E63: Beginning of Existence and finally, E64: End of existence (see Figure 1). Two new CIDOC-CRM extensions were identified under the sub-classes E7: Activity and E4: Period in terms of describing the conservation process performed on museum artifacts. E91: Conservation activity was assigned to the E7: Activity to describe in detail the process of conservation. E92: Frequency was identified under the E4: Period to further describe the frequency of the time span (see Figure 1).
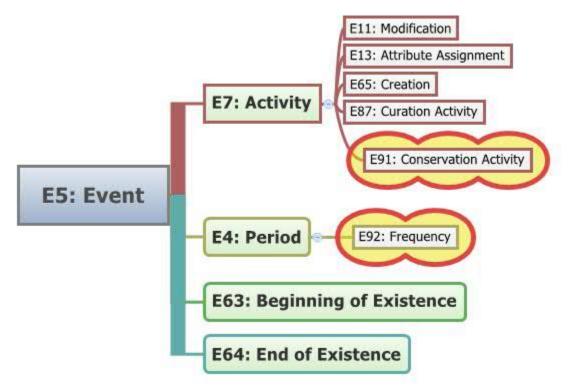

FIGURE 1. CIDOC-CRM extensions E91: Conservation activity & E92: Frequency

The E91: Conservation activity class was further extended with the view to describe the conservation process performed on the museum artifacts of the National Archaeological Museum of Athens, Greece. As a result, a series of subclasses were identified and assigned under the specific event (see Figure 2). Further report on the specific extensions can be found in Kyriaki-Manessi, Zervos & Giannakopoulos (1).
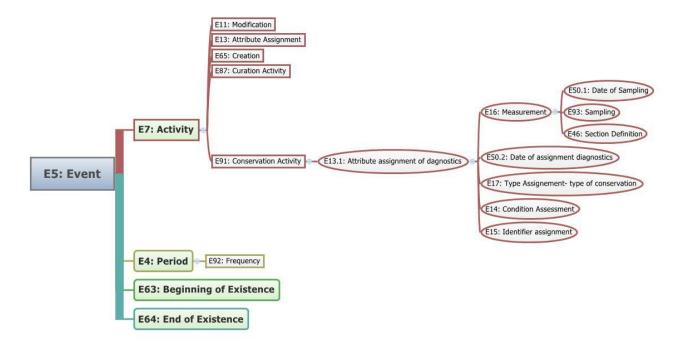
FIGURE 2 CIDOC-CRM extending E91: Conservation activity

    This study aims to report on the extension of the E11: Modification, a subclass of the E7: Activity (see Figure 3). E11: Modification refers to the ability of creating, altering or changing a item with the use of raw material. E11: Modification comprises of three subclasses that of E79: Part addition which refers to adding man made parts on a museum artifact, E12: Production which refers to creating new museum artifact from an existing one and E80: part removal which refers to removing part of museum artifact which is destroyed. For the purposes of this project, only the E79: Part addition could be adopted since a) no new museum artifact could be created after the application of conservation procedures and b) no part of the museum artifact could be removed. Both E12 and E80 contradicted with the main principals of conservation (see Figure 3).
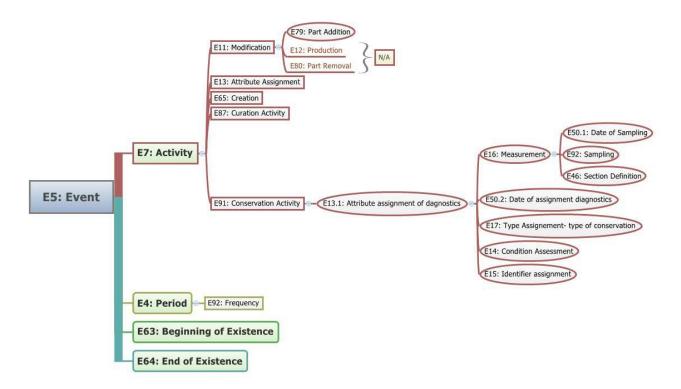
FIGURE 3 CIDOC-CRM extending E11: Modification

As already mentioned E11: Modification is an activity (E7: Activity) performed with the sole objective of adding (E79: Part addition) a man made item to further conserve or enhance the purpose of the museum artifact. By accepting E11: Modification as an Activity, we had a look at the extension E91: Conservation activity to identify possible similarities or differences. Surprisingly, it was found that E79: Part addition could further extend by adopting the same extensions used for E91: Conservation Activity (see Figure 4).
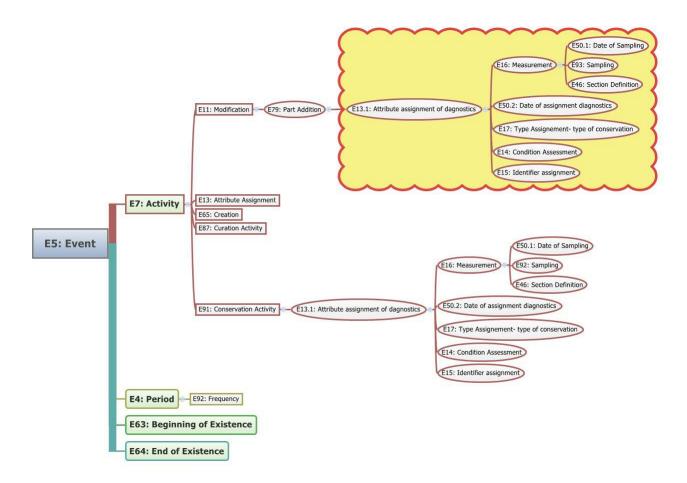
FIGURE 4 CIDOC-CRM extending E79: Part addition

CONCLUSIONS

This study outlined the process of developing the CIDOC CRM extensions for describing the conservation interventions performed on the museum artifacts of the National Archaeological Museum of Athens, Greece. An emphasis was placed on extending the E11: Modification, a sub-class of E7 Activity. Specifically, it was argued that the extensions identified for the E91: Conservation activity could be further implemented in the E11: Modification. In addition, the importance of standardizing the process and using relevant standards was further illustrated.

This study revealed also some implications for research. CIDOC-CRM extensions identified to describe the conservation procedures could be used by any other museum both in Greece and abroad. Extensions can be adopted by any organization and user group since these comply with the specific rules of the CIDOC-CRM standard. Therefore, conservation scientists and experts can know describe their procedures in a detailed and standardized way and organize their notes and documentation produced in this context.

Future research should focus on further extending the sub-classes of E7: Activity, developing the necessary documentation and providing guidelines for developing the Information System for the collection of the National Archaeological Museum of Athens, Greece.

ACKNOWLEDGMENTS

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