

# STANDARDIZATION: A NECESSITY FOR THE DOCUMENTATION & ARCHIVING IN CULTURAL HERITAGE

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## ABSTRACT:

The authors will give an overview of the State of the Art in the field of Standardization in the area of Cultural Heritage worldwide. This is especially important due to the fact that Cultural Heritage is currently being influenced by computer technology and utilizing the advantages of digital documentation along with the reconstruction of the past taking on a 3D form.

Focusing on the advantages and disadvantages of the modern Information Technology (IT) tools, it will be demonstrated how user dependent data can cause many critical situations. The revolution of IT and the continuous expansion of this technology has set the experts of Cultural Heritage under massive pressure to become familiar with and use the computer technology available. Cultural Heritage data and information has to be reliably read, sorted, indexed, manipulated, retrieved, and communicated between systems nationally and internationally. The use of IT is highly encouraged and has proven itself a vital tool. However, at its present state, "island solutions" have emerged limiting the study area of the researcher which leads to the incompatibility of cataloguing, archiving, presenting and conserving archaeological artefacts, monuments and sites in a unified worldwide format.

A "standard", in Information Technology can be defined as a set of regulations for the guarantee of the protection of the long-term value of digital data for the storage, exchange, sharing, searching and retrieval of information between different users / professionals around the world using the global computer network (Internet) and different Hardware and Software structures.

Based on specific examples, the advantages of standardization and dangers of non-standardization of the globalization of e-documentation and e-archiving in Cultural Heritage in the areas of e-libraries and e-museums will be demonstrated and discussed.

## 1. INTRODUCTION

In contrast to most disciplines where repetition is a basic presumption of the scientific approach, in the area of cultural heritage, we have to face the uniqueness of the subject matter (e.g. archaeological finding, folklore element, museum exhibit, etc). Thus, the record constitutes itself the major source to describe events, research results, findings, since the subject matter can never be restored to its previous condition, once it has been disturbed (Hadzilacos et al. 2002; Dekoli et al. 1997). Recording has used many different technologies that vary along a wide spectrum starting from paper and progress to more state-of-the-art digital technologies (Hodder, 1999).

The exponential growth of Information Technologies in the last decades has permitted easier and less costly applications in many scientific domains, resulting into a creation of numerous projects with respect to the area of cultural heritage (Custer, 1999). However, at its present state, the user dependent utilization of IT has resulted into the creation of "island solutions" that limit the study area of the researcher which leads to the incompatibility of cataloguing, archiving, presenting and conserving archaeological artefacts, monuments and sites in a unified worldwide format (Barcelo et al., 1999; Llobera, 2001). This practice results into a disparate, localized information sources that lack a coherent and valuable global resource (Doher, 2000)

This problem is not new in modern science (Richards, 1998). It has been faced by many disciplines and solved successfully by internationally accepting a set of regulations for the guarantee of the protection of the long -term value of digital data for the storage, exchange, sharing, searching and retrieval of information between different users.

In other words, different parties have agreed upon a standard way of handling data. Voluntary consensus standards for products, processes, services are at the foundation of the world economy and society. Several countries and professional societies, like USA, European Union, IEEE and VDI, have a proud tradition to support the needs of the consumer and the competitiveness of industry.

Standards make an enormous contribution to most aspects of our lives - although very often, that contribution is invisible. It is when there is an absence of standards that their importance is brought home. For example, as purchasers or users of products, we soon notice when they turn out to be of poor quality, do not fit, are incompatible with equipment we already have, are unreliable or dangerous. When products meet our expectations, we tend to take this for granted. We are usually unaware of the role played by standards in raising levels of quality, safety, reliability, efficiency and interchangability - as well as in providing such benefits at an economical cost. Consequently, we can easily deduct that standards are a public good. They shape innovation and patterns of technological change (Wilson, 1996).

The basic characteristics of standards are that:

- they are relevant, meeting agreed criteria and satisfying real needs by providing added value.
- standards are responsive to the real world; they are available, current technology and do not unnecessarily invalidate existing products or processes
- Standards are performance based, specifying essential characteristics rather than detailed designs.

The most compelling reason for using standards is protecting the long-term value of data as well as acting as a basis for sharing information.

In addition, since more and more cultural heritage centres throughout the world invest in documenting their collections (e.g. museums, archives, libraries), often with sophisticated new technologies, the need for standards to manage the information these collections contain becomes more and more urgent (Bower et al., 2001).

Acknowledging the existing standardization efforts done in the area of cultural heritage by several bodies, this paper will avoid stating commonplaces. Rather, the aim of this paper is to raise awareness regarding the emerging importance of standardization in cultural heritage on the international scale and aid in the effort to build the basis for an international voluntary consensus type standard.

Motivation for this effort is a result of years of collaboration of the authors in different areas of cultural heritage, where the need for data analysis, sorting, indexing, retrieving and exchange was identified

## **2. STANDARDIZATION: THE WAY FORWARD**

The days where a kilobyte was regarded as ‘a lot of data, and 10 Megabytes was an ‘enormous database’ are a recent memory.

Today, however, the whole world is dealing with databases of multiple terabytes. –If one considers the internet revolution and the end of the previous century and its dramatic growth the last few years, one can easily realize the enormous amount of data circulating the globe every day. The on-line “complex multimedia encyclopedia” with millions of computers, databases and information worldwide connected together providing information and data are a challenge to any user attempting to crop out valuable information. When there are millions of archaeological sites, billion of archaeological items/artifacts distributed all over the world and each one of these has its own unique idiomorphic/situation/complexity/civilization of description (like excavation reports, – pictures, manufacturing technology, originality, substance-materials, etc) how can one come to an easy, quick and meaningful conclusion about this piece and especially about a special civilization when there are thousands of archaeological departments and museums around the world using individual methods of documentation, archiving, restoration and exhibitions? How can someone use the efficiency of the 21<sup>st</sup> century IT to have an easy, quick and meaningful access to several terabytes of worldwide civilization data?

It is a fact that there are thousands of archaeologists, historians, anthropologists, scientists, researchers, restaurateurs and students working and/ or researching at different places, using individual methods of reporting, documenting and archiving

and as a result it is not surprising to establish that much of their hard work and effort is not available to different interested parties. This situation becomes even worse when the majority of the above mentioned experts have neither the IT tools nor an unlimited access to the Internet as well as the knowledge of how IT can be a useful device/mechanism in their work.

There is, however, a tested solution to this problem, a bridge to unite these islands of research exists in the documentation of cultural heritage and that is through the use of modern information technology tools, specifically through the use of worldwide accepted formats of structuring data.

It is at this point where IT and cultural heritage experts must come together to build the foundation for a new digital documentation format which can be used for archiving and catalogizing that can be accessed by all – everywhere around the world and at any time of the day. The laying of the first stone will pave the way to success in creating and developing the encyclopedia of worldwide civilizations. The large amounts of data that are required in order to acknowledge or recreate these civilizations can be efficiently managed, updated and distributed through the use of IT.

IT and the creation of standardization in this area of documentation can also address other obstacles in the cultural heritage sector, such as language (use of virtual lexicas/glossaries/dictionaries, e-Translators), legal and regulatory issues (identification methods), lack of knowledge of standardization methods by experts (e-Education/Learning), lack of a national/regional/international initiation as well as technical and infrastructure issues.

## **3. STANDARDIZATION: THE STATE OF THE ART**

Every government in each country is currently facing new challenges in all areas which affect its own society. The increasing concern for health and safety, the protection of the environment and the protection of cultural heritage, combined with dramatic increases in world trade and competition have brought to light the importance of standardization while at the same time altering the national/international needs. The European Union, USA, Japan and other international societies (like IEEE or VDI) are successfully promoting their technology and practices in these developing areas to other nations around the world through their own standards (protocols) and processes through their national representation (ANSI, SLBS, DIN, ELOT, BSI, etc ) in the international standards activities of the European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC), European Telecommunication Standards Institute (ETSI), International Standard Organization (ISO: from Greek Ισος=equal), the International Electro-technical Commission (IEC) and the International Telecommunication Union (ITU). Furthermore, such organizations have the ability to provide on-line information on technical standards/protocols, and – regulations and conformity assessment procedures which can be obtained globally. This aspect of service is necessary to ensure that the private sector, exporters, government departments/agencies and the general public are kept abreast with these trends and developments which have the capacity to affect their competitiveness (ISO, ANSI, VDI, CEN).

Emerging economies with the potential for explosive growth are looking to and adopting ISO, CEN and IEC standards.

However, in some areas/activities these standards do not reflect the needs and practices of other countries.

Another current practice is that worldwide the public and private sector interests have reduced their investment in the development of globally accepted standards because of downsizing and deregulation. In addition to this, there is a limitation of rights for the use of the standards which prevents governments, businesses and clients from being able to afford to use the standards. In order to increase the rights for the use of these standards a much larger financial investment is necessary.

Unfortunately libraries, museums and archaeological departments as well as NGOs in the area of cultural heritage are commonly known to be under strict budgetary constraints. Their involvement in using standardization is largely a question of finances since the experts are already aware of its need.

The cultural heritage experts are also under further pressure from their homeland country in that when standards are applied these standards must also comply with the specific government's laws, regulations and procurement processes.

Due to the history and difficulties incurred through the use or attempted use of standardization it is often desired to exclude the experts, technology and/or the standards themselves from supporting the documentation, protection and preservation of cultural heritage. This, however, is detrimental for the current and future preservation of culture throughout the entire world.

Experts around the world also share this opinion and continue working towards an improvement to the current situation. The present developments in this area are two-fold. Further discussion will be focused on the *practical* application of standardization and then the *methodology* offered to professionals in this field today.

In some initiations through different European funded projects consortia of specialists from different countries in Europe and around the Mediterranean in the area of culture heritage have developed useful universal systems and techniques for the documentation, preservation and archiving of cultural heritage artefacts, monuments and sites.

The case study presented is the two year EU funded Jewelmed project for the comparative analysis of manufacturing technologies in goldsmithing and silversmithing from the VII to I century B.C. in the Mediterranean area ([www.jewelmed.net](http://www.jewelmed.net)). Ancient gold- and silversmithing can only be appreciated by accurately surveying materials and understanding their historical value. The art of goldsmithing is one of the most relevant forms of expression in ancient times, therefore, archaeological research and analysis in this area is paramount to the understanding of *cultural norms, social organisation, technological capacity, economic development and cultural exchanges*. This kind of research is often hindered by the lack of a common descriptive *glossary*, carefully elaborated technological definitions and a distinctive *data structure* and coding system. The goal of the JewelMed project was to elaborate these necessary research tools.

If, on the one hand, the JewelMed project did not include a specific research activity, on the other hand, it indeed highlighted the need and possibility to expand knowledge, *create a common language and set the foundations for further research*. In this regard, one must give due consideration to the

successful elaboration of a *standard, universal and unique language* of documentation and filing/cataloguing methodology. Internal networks facilitated the creation of a complex database, while, through the use of information technology, each object can be classified and entered into the filing system on the basis of its various characteristics. Thus, one can easily select and retrieve individual records – by typology, chronology, origin, etc. – as well as an item's technology, materials and decorative patterns.

JewelMed's extensive data structure, dynamic database and multimedia technology demonstrate, in an objective way, the possibilities and flaws of universal ancient jewellery documentation. Consequently, important developments can be achieved beyond the limits of the specific work in progress. The elaboration and publishing of a *vocabulary* in English (*standard ancient jewellery glossary*), with complementary translations in the most important languages, is an example of such developments. This vocabulary represents a significant contribution to research and communication between various countries. The continuous input into the JewelMed stand alone database (library) will increase the value of available knowledge, which, until now, has been sporadically and incompletely presented. Should this library go on-line (on the Internet – e-Library) everyone can have access to inform themselves about ancient jewellery and also have the possibility to update the library for future developments.

Another advantage of using common regulations is that standardized codified knowledge will reduce the damages derived from collectivism and other illicit trade activities thus preventing present and future cultural heritage, such as historical awareness and knowledge, from being impoverished. It is possible to glean the complexity of the aforementioned transformations and meanings from JewelMed's database. Part of the content in this database is supported by scientific literature and characterization leading to further analyses and important developments. Appropriate typological and archeometric analyses allow unveiling of production details, single components, assembly methods and instruments. This information may help clarify the complex exchanges and interactions between different cultures and jewellery creation centers. In some cases through the careful design of the data structure of such standards innumerable advantages can be provided by the wealth of information being accessed through the database systems (libraries).

Evidence of such an activity was provided during the Jewelmed project concerning Malta. Important information was found concerning the trade routes and fashions in this geographic area. Malta was an important stop in the heavily navigated Sicilian Canal and it became a crucial location for interactions between Italian and Greek cultures, on the one hand, and Phoenician-Punic cultures and colonies, on the other. Even though the contemporary collection of items is not very numerous, the coming and going of different jewellery traditions and typologies in the Mediterranean basin can still be clearly traced. Objects of Phoenician-Punic typology and the presence of Egyptian elements in the Greek jewellery of late Classic era, even if in small fragments, reveal fashions and behaviours of the inhabitants or visitors to Malta (JewelMed).

This case study provides an example of the *practical* application of standardization. On the other hand, the CIDOC Conceptual Reference Model (CRM) presents probably the

most successful international effort of standardization methodology in recent years.

CRM ‘provides definitions and a formal structure for describing the implicit and explicit concepts and relationships used in cultural heritage documentation’. In other words the result of CIDOC-ICOM workgroups has resulted into a comprehensive data structure system that provides the basic framework for any standardization effort. As a result CIDOC CRM serves as a basis for mediation of cultural heritage information and thereby provides the semantic ‘glue’ needed to transform today’s information sources into a coherent and valuable global resource (Doher, 2000). Pilot applications have shown the capabilities of such an integration such as museums with large data sets (Crofts et al., 2001).

This effort has placed itself one step forward by being approved by several ISO committees (ISO Committee Draft ISO/CD 21127), aiming to become a voluntary consensus standard. This successful move paves the way for an economically viable project that remains of a high standard.

#### 4. IMPLEMENTATION

Any decisions where different points of view need to converge to one is a vigorous enterprise. Standardization is no exception. The beaten path to achieve a starting line for any type of standardization would include formal meetings and drafting sessions aiming to produce a standard between all stakeholders. ‘Stakeholders’ in the case of a multidisciplinary scientific area as cultural heritage is a considerable number since many sciences, techniques, policies and philosophies meet. Consequently, any effort has to be carefully planned ahead so that best results can be accomplished.

As stated before, standardization efforts have been carried out successfully in the past. However, very few have been directed towards an international role. This section will try to bring together an action plan from the past experience in cultural heritage –through projects like the ones mentioned before- and in other scientific areas.

The aim here is to achieve a globally accepted voluntary consensus type standard that is self sustainable.

The objectives of such an undertaking are as follows:

- the whole effort to be patronized, supervised and organized by an international, widely accepted scientific body
- create a complete and solid data structure for all data in cultural heritage
- undertake conformity assessments

In order to achieve the above objectives it is necessary to have the support and acceptance of the scientific community. For this reason, it is important to highlight the importance of standardization and make clear the aims and objectives of such an effort.

Having said that, a responsible body has to be chosen to organise the project. Several criteria have to be fulfilled:

1. *Wide acceptance*: The responsible body must be able to cooperate with all stakeholders. For this basic reason it has to be widely accepted not only from the academic world of cultural heritage but also in general since it will

have to cooperate with governmental bodies, and private investors, for example.

2. *Expertise*: Largely due to the sensitivity of the researchers to their data, the great expectations from the academic world concerning an international standardization project and / or the extent of the effort itself, standardization has no room for mishandling or failure. To achieve this, it is necessary to ensure that the responsible body has expertise in this field. This would imply completion of past standardization projects and links with standardization bodies.

3. *International*: As expected, the whole effort will demand bringing people, ideas, policies and decisions together from all over the world. Consequently, the body organizing the standardization project will have to have an international character.

4. *Powerful and well linked*: At the same time, it will have to have the power, ability and links to make its decisions heard among all stake-holders. It is very important to have strong links with state institutions so that the latter can act as distributors and keepers of the standards in later stages of the project.

5. *Financially capable*: Last but not least, the body responsible will have to be able to make an investment into such a project.

Several bodies that can be candidates for this place among others are: UNESCO, ISO, CEN, ICOM-CIDOC, CIPA. Also the possibility to create a new organisation having as a specific purpose the standardization of data in cultural heritage has to be carefully considered.

Having decided upon the body that is going to act as an organiser, the stakeholders have to be determined. Attention has to be placed into this component of the project since all parts of the academic world of cultural heritage have to be determined. Experts from all domains have to form workgroups that as a whole they are going to act as consultants for the standardisation experts from the responsible body.

Bodies that must not be left out in any such attempt are entities in all national, regional and international levels. In more detail, government bodies, industry, professional bodies, NGOs, museums, libraries, academia, researchers in this domain, should have a say in such an effort since a project that aims to construct a platform for standardization will effect everyone to a certain degree.

The output of the meetings and discussions should be a series of tables/regulations that list the data structure when documenting, archiving, presenting and conserving in cultural heritage. They should include all aspects in cultural heritage from museum exhibits, to excavation findings and archive files.

The application working package of the project will take considerable time. Nevertheless, methods to accelerate the process and guarantee compliance can be achieved. Examples of such methods are:

- All state funding to relative projects should demand the application of the standards

- Free training and application of the standards by the responsible body in key institutions (e.g. e-Education)
- Promotion of the project by state organizations

The turning point will be when a growing society accepts and uses the standards to such an extent that the benefits of this effort are visualised.

Thereinafter, the sustainability of the project has to be guaranteed. The responsible body can achieve this by charging training, know-how and / or consulting in other institutions. In addition it can act as a testing organisation that certifies the good operation of a documentation project.

This is a series of steps any successful standardization effort has to take to be successful. Past experience has shown that standardization efforts in cultural heritage have several kind of problems that need more time to be solved. Consequently, no magic or fast solution is going to be given when the decision to push such a project forward is to be seen. Time will be needed in order to visualise the benefits of standardisation.

## 5. EXPECTED RESULTS AND BENEFITS

The greatest result of an international standardization effort is that every researcher can join forces with other experts and no one is left behind. Rich and poor countries alike will take their place in the research and development of cultural heritage the world over. Single countries will not conduct their work/research alone but will be connected to the international community of cultural heritage and expertise. The work accomplished by the experts will no longer be asynchronous resulting into efficient research and development trends that occur worldwide.

Worldwide standards for the documentation, searching, archiving, cataloguing, preservation and restoration will be globally available and used by all interested parties, thus, minimizing the costs of documentation and searching/retrieval of information. In addition a unique universal, uniform, and easy to use multimedia data structure for the development of small and large databases will be created. Complex relationships between the different items (pieces of data in the database) will begin to create the first results of international on-line searching of standardized data which is an advanced IT tool for the researcher in the area of cultural heritage. For example, a question about the route of Alexander the Great or the Pharaohs will be the result of a query search on database which includes distributed data from all related web portals.

## 6. CONCLUSIONS

The first step is the acceptance by all that standardization is the way forward for cultural heritage while at the same time an independent world recognized international body leading the undertaking. It is imperative that the leadership come from a world organization because of the existing funding and infrastructure that it can offer to such a great and development. It must also be in the position to work together with different governments, private organizations and NGOs in order to offer the support that professionals in cultural heritage will need when initiating these changes. And in this way cultural heritage research can take full profit of IT development. These massive changes will provide the only possibility to follow the progress and take advantage of other

research done in other fields, which is of course the ultimate goal of IT and standardization in cultural heritage.

Finally, the greatest achievement of all from the work of standardization and IT will be the world wide webpage of the cultural heritage of each country which can have its own webpage linked together with others under the umbrella body of an official international body as stated previously. There, one can find the virtual museum and virtual libraries, virtual exhibitions important to that specific country/civilization. What is implied here is that pieces of archaeological interest may be physically distributed in all different museums of the world but located in one virtual museum on the specific country's web page/library. Artificial Intelligence and data mining facilities can search and collect different pieces of the information requested much like the train compartments are joined together along the train route. One question may generate information from a number of different digital resources distributed throughout the entire world. These are then connected together and provide a wealth of information for the enquiring person.

In the future we envision the inclusion of GIS technologies, Virtual Reality and 3D-reproduction techniques to support and give an accurate reconstruction of those civilizations which may no longer exist in today's world. In this way the reconstructed past will come alive.

Cultural heritage is at a crossroad. It is time to look to the future and make positive decisions for the generations to come. It's a risk we all have to take.

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