The RESCULT project: a new European Interoperable Database for improving the resilience of Cultural Heritage subject to disasters

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1. Introduction

Disasters represent a serious threat to CH: they can cause permanent damages or the destruction of entire areas where movable and immovable cultural goods are located. Moreover, inadequate emergency operations can intensify what natural injuries have already done. The need to provide an immediate response can lead first responders to take wrong decision causing more damages than the ones generated by the disaster.

In the last decades, the overall cost of damages due to hazards increased as well as the numbers of events. From this point of view, the necessity to increase efforts for a cooperation at European level carried out to protect CH from natural hazards is fundamental. On the other hand, political attention is often focused upon environmental issues and a marginal role is given to the protection of cultural heritage.

The set of laws, actions and organizations for Cultural Heritage (CH) protection was born in the different countries of the European Union from local cultural situations: the ability to cope with the emergency is certainly different according to such complex and variegated set of approaches.

The emerging inefficiency in the management of cultural heritage is due to: inadequate assets knowledge; inability to evaluate the real loss and damage costs and complexity to assign an economic value to all the cultural goods outside of the market mechanisms; lack of criteria to define priorities among hundreds of artworks/buildings to be saved.

The actions and strategies for the protection of cultural heritage must be based upon an in-depth knowledge of the European CH at risk. The situation is different from a country to another and it is also related to the IT and technologies used at national level.

Taking into account past disasters, has come to the light that a well-coordinated management, good preparation and a best knowledge of the goods at risk, such as their status and their structural and other features, would reduce the errors done and as a consequence the numbers of artworks lost.

For the mitigation of natural hazard effects, the following measures need to be taken into account: regular monitoring and accurate maintenance of historical heritage; better planning and management of the territory; awareness campaigns and regular coordinated training; international cooperation and the availability of economic resources; legislative support.

In order to gain knowledge on CH protection during emergencies, a European Project named RESCULT was designed in order to create a supporting decision tool for the safeguarding of cultural assets. RESCULT is a project funded by the European Commission (European Civil Protection and Humanitarian Aid Operations), coordinated by SiTI (Higher Institute on Territorial Systems for Innovation) which involves the following partners: Politecnico di Torino; UNISDR, The United Nations Office for Disaster Risk Reduction; TUB, Technische Universität Berlin; CORILA, Consortium for managing research activities in the Venice Lagoon system; SDIS 04, Service Départemental d'Incendie et de Secours des Alpes de Haute-Provence.

1.1 The European Interoperable Database (EID)

The RESCULT project (Increasing Resilience of Cultural Heritage) aims at enhancing the capability of Civil Protection to prevent or lessen disasters impacts on CH by defining an Integrated Interoperable Database (EID) in order to provide a unique framework for multi-stakeholders partners as Civil Protection, national Ministries, the European Union and local authorities as a supporting decision tool to understand the risk of damage to CH as well as its impact on cohesion, sustainable cultural tourism and engagement with local communities in protecting environment.

The main features and functionalities that the proposed EID have to satisfy are:

- a European Heritage Map to offer a representation of the European cultural assets using information as classification, location, ownership, vulnerability, etc;
- a cadaster to provide historical archives of disasters and their classification (fire, earthquake, flood, human induced), magnitude, technical data, damages, etc.;

- risk scenario platform that allows to view risk indicators (classes, values, weights) for various kind of threats and to produce risk maps;
- connection to 3D models acquired by a 3D multiscale survey with different level of details to preserve people memory and support post emergency restoration. In some cases there will be the possibility to visualize the 3D models through the link to an external viewer in order to make available and accessible the geometry and further information.

2. European policies for risk reduction

It is necessary to define strategies for risk reduction in order to create a European Interoperable Database (EID) building a robust database of norms, ontologies, data formats and queries. Disaster risk mitigation is a development strategy that is attracting notably the increasing concern of policy makers and the general public, because of the current emphasis on various components of human and environmental security. The European Commission in the “Communication on a Community…” established an approach for the prevention of natural and man-made disasters which defines an overall disaster prevention approach to minimize the impacts of disasters (European Commission, 2010). Member States are invited to create a common framework about risk prevention, creating methodologies for impact analysis, risk assessments, scenario development and risk management measures. Europe has given rise to well organized disaster management practices in order to limit negative consequences of hazards. Some regions have developed valuable specialized competence for specific types of risks. A European view is essential to combine resources and finally prevent and mitigate shared risks.

Moreover, these strategies, promoted by the EU, are in line with the targets and principles set forth in the Sendai Framework (UNISDR, 2017). The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government and the private sector. It is linked to the Sustainable Development Goals (United Nations, 2015) in which cultural heritage is fully included in the objectives of 2030 Sustainable Development Agenda linked to poverty, sustainable cities and climate action. The Sendai Framework also highlights 4 priorities for action, key elements for RESCULT Project: Understanding Risk, Strengthen DRR Governance, Invest in DRR, Enhance Preparedness. Cultural Heritage is also clearly considered in the monitoring process of the Sendai Framework with the Indicator C6: Direct economic loss to cultural heritage damaged or destroyed attributed to disasters. ResCult IED will be able to contribute to this objective.

In addition to the damages that can occur to cultural assets after a disaster, an inadequate emergency intervention can sometimes cause further losses to the CH. The effectiveness of response depends on the adequacy of advanced planning. Some countries have designed disaster risk management plans but their databases (DBs) are fragmented, incomplete and not standardized. It is thus necessary to establish a DB for emergency assistance and maps of CH at risk to be compared with maps of natural hazards and risks, in order to take preventive and operational measures, as well as agree on a common terminology and international standards. The project aims at enhancing the capability of Civil Protection to prevent disasters impacts on CH by implementing a European Interoperable Database (EID) as supporting decision tool to understand the risk of damage to cultural assets.

2.1 Protection of Cultural Heritage

It is well known, in this risk mitigation framework, what is the link among cultural heritage, risks and hazards: natural and human induced disasters are the main threat that affect movable and immovable heritage. Many CH are compromised by inadequate emergency plans, in that regard the necessity to create planning and rehabilitation schemes for recovery, sensitive to cultural heritage, and emergency measures is essential. The protection of CH is a marginal issue for politicians and governments in most European countries. Some countries have designed a CH databases, but it's not related to hazards and risks assessment processes and risk management approaches and tools; they are fragmented, incomplete, not standardized, not harmonized. Moreover, these databases don't contain a whole map of potential natural hazards related to cultural heritage across the European territory. The maps of the European CH at risk connected to maps of natural hazards and risks symbolize the necessity to estimate risks and could support to predict the catastrophes entity. The role of disaster prevention is crucial in order to safeguard cultural heritage (Drdácký et al, 2007). The European Commission has been promoting several international research projects regarding possible preventive measures to cope natural and human induced disasters and their effects; ResCult project is one of these projects and is not alien to the scenario above defined.

2.1 Risk prevention

As explained in the previous paragraph, the risk mitigation is one of the main phases in the strategy plan for risk reduction connected to built heritage and artworks. The heritage conservation field places great importance on the use of principles in guiding practitioners to appropriate interventions for heritage properties. ICOMOS (International Council on Monuments and Sites), starting from the Charter of Venice (1964), has developed charters and guidelines in the areas of cultural tourism, underwater archaeology, historic towns, archaeological heritage management, historic gardens, recording and documentation, training and education, and, in the context of the World Heritage Convention, authenticity. This represents one of the attempt to draft a set of universal principles (ICOMOS, 1998). A more recent document concerning cultural values and heritage conservation is the FARO Convention (Council of Europe, 2005). It defines cultural legacy as a collective Europe legacy, to preserve and safeguard, inasmuch "cultural heritage is a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions" (Council of Europe, 2005).

3. Standards for Interoperability

3.1 Standard to represent Cartographic Objects

In order to ensure an effective interoperability of the DB, to obtain a comprehensive model that could represent all the information useful for the RESCULT analyses and to provide the chance to suitably represent the richness and complexity of CH to the connected risks in an interoperable and standard compliant map, four mapping international standards have been analyzed. INSPIRE (compulsory by 2020) and CityGML have been selected, according to completeness, updating, extension possibility, international acknowledgement.

CityGML is an open data model and XML-based format for the storage and exchange of virtual 3D city models. It is an application schema for the Geography Markup Language version 3.1.1 (GML3), the extendible international standard for spatial data exchange issued by the Open Geospatial Consortium (OGC) and the ISO

TC211. The aim of the development of CityGML is to reach a common definition of the basic entities, attributes, and relations of a 3D city model. This is especially important with respect to the cost-effective sustainable maintenance of 3D city models, allowing the reuse of the same data in different application fields (OGC, 2014). As this standard is based on ISO TC 211 and OGC concepts, it was a natural candidate for the modeling of 3D Buildings in INSPIRE.

Figure 1 – EID Screenshot (CITYGML Level of Details) *– from Biljecki, F., Ledoux, H., & Stoter, J. (2016). An improved LOD specification for 3D building models. Computers, Environment and Urban Systems, 59, 25-37.*

So, the use of existing standard data models and ontologies in the geographic information have been the base for defining the RESCULT conceptual model that could be considered as an extension of the INSPIRE Data model. In this way data can be shared at European level, the fulfillment of the database will be easier for all the users and, on these bases, a risk map with a standard symbology for all Member States could be produced.

3.1.1 3D models and the Level of Details

The open data model City GML is also aimed for the storage and exchange of virtual 3D city models (OGC, 2012). It specifies the semantic values of city objects for the 3D representation and here several geometries can be associated to the same object for obtaining a multi-representation, based on time, on different reconstruction hypotheses, or different Levels of Details (LoDs). The concept of LoDs, as implemented in CityGML is an essential issue for ResCult: in fact, different levels of detail in the representation of the city and the landscape enable different levels of scale in the analysis of the data. The different levels of detail for the modeling of buildings are: LoD 0 that offers a 2D model for buildings has been included in the latest version of City GML; LoD 1 with block models (flat roofs); LoD 2 with the shape of roofs; LoD 3 with accurate description of exterior (including openings: doors and windows); LoD 4: interior model.

This concept, in the standard, considers the accuracy of the represented features, which is indicative of the representation scale. For instance, the LoD4 generally respects a 0.2 m accuracy, which is used for 1:1000 representation scales. Nevertheless, a reference scale of 1:500 can be considered as maximum foreseen detail, which is used for the historical city centers maps. So, the concept of LoDs, as implemented in CityGML is an essential issue for the ResCult project and the DB: different levels of detail in the representation of the city and the landscape enable different levels of scale in the analysis of the data and could be really useful during an emergency even or during a post-disaster recovery.

3.2 Representation of Cultural Heritage

The necessity to document cultural heritage is well known and acknowledged at international level. For this reason, several cataloguing systems are developed at both national and international level in order to inventor the cultural heritage items. In this scenario, the aims of documentation consist mainly in conservation and in some studies and analysis about cultural heritage. The documentation is a fundamental tool in order to increase resilience. The concept of resilience related to CH has spread over the last years.

To model the ResCult EID, it was essential to consider the classification of the cultural heritage. Different categorizations are possible, because they are developed at national or international levels and sometimes they are articulated in different catalogues having different scope or, simply, a different level of updating.

For these reasons, the project has analyzed the most update catalogue systems in Europe, Italy, France and Germany (Country of project partners), and starting from these systems, the Rescult classification of CH was made, in order to integrate national and international classifications.

In the European scenario, the UNESCO Classification describe in the Convention Concerning the protection of the World Cultural and Natural Heritage: The General Conference of the United Nations Educational, Scientific and Cultural Organization meeting in Paris from 17 October to 21 November 1972, at its seventeenth session, (…) the definition of CH (UNESCO, 1972). In the first article it defines monuments, group of buildings and sites. However, for the ResCult DM, this classification is dated and it is not sufficiently updated and complete.

In this regard, it is integrated for the considered RESCULT classification, by adding the more recent definitions of CH items in the UNESCO documents. In particular: the concept of Cultural Landscape (1992), combined works of nature and humankind (UNESCO, 1992; WHC-92/CONF.002/12 point IV); and Intangible CH (the more recent definition of CH, 2003) (UNESCO, 2003).

In France, the situation about CH cataloguing and standards differs greatly from the Italian MIBACT system.

The Department of Architecture and Heritage is comprehended in the Ministry of Culture and it deals with the inventory of Cultural Heritage. The CH databases are administered by the Department of studies, documentation and inventory and these databases are improved with the help of the General Inventory of Cultural Heritage, Historical Monuments, and the Media Library of Architecture and Heritage. The cataloguing databases (DB) form a coherent whole organized according to the following principle:

- Architecture DB (Name of the DB: “Mérimée”), lists buildings in which movable works studied in the DB Palissy can be kept.
- Furniture DB (Name of the DB: “Palissy”), lists of movable objects, whose conservation building can be studied in Mérimée.
- Images DB (Name of the DB: “Memory”), contains still images, some of which illustrate the works of Mérimée and Palissy DBs as well as the Thesaurus records.
- Bibliography DB (Name of the DB: “Archidoc”), contains bibliographic records which can also be related to the records of Mérimée and Palissy.

Another database very known In France is Joconde, a digital inventory of the works of national museums which catalogue the movable cultural heritage. Nowadays, the only available standard for museums and artworks is the CIDOC CRM, but it’s not declared if it is used for the Joconde system.

In Germany, there is not a classification system of CH, it is possible to find only the Normative/Law that considers the history of the monuments and some rules of conservation, restoration and protection of CH. Each German Region is responsible for the cultural heritage present in it, and some of them independently fill in a list of the more important monuments, together with some information mainly connected to their management (e.g. phone number, property, etc.). However, they are not included in databases, nor described through cataloguing sheets. For representing German monuments, the UNESCO classification can be used.

The RESCULT classification derives from the previously described catalogues, these were integrated in a unique list, an integration of national and international levels.

3.3 Representation of Hazards and Risks

In order to realize the ResCult DM, also some existing standards about classifying risks and hazards or prevention and management were considered. After analyzing them, the more updated and detailed ones were chosen as a reference for being included in the DM. Before this research the meanings of risk and hazard were investigated, as defined by UNISDR in the DDR (Par 2.) (Risk=hazard impact*probability of occurrence) (UNISDR, 2009). There are lots of researches in the field of disasters and crisis management.

More recent researches divided disasters into two categories: Natural and technological (or human-induced) disasters according to international federation of red cross and red crescent, as is here repeated for having a general framework: natural hazards are naturally occurring physical phenomena caused either by rapid or slow onset events; Technological or human induced hazards, complex emergencies/conflicts, famine, displaced populations, industrial accidents and transport accidents.

The Centre for Research on the Epidemiology of Disasters (CRED) and Munich Reinsurance Company (Munich RE) also classified disasters. In the INSPIRE data model a classification is proposed, borrowing the CRED classification of natural disasters. An even more update classification derives from the work of Integrated Research on Disaster Risk (IRDR). This research group was established by the International Council for Science (ICSU) in 2010 in cooperation with the International Social Science Council (ISSC) and the United Nations International Strategy for Disaster Reduction (UNISDR). Its aim was to address hazards and make informed decisions on actions to reduce their impacts. The work of IRDR developed a new integrated classification (published in 2014) (IRDR, 2014). The resulting document is employed as main reference for the glossary of the International Disaster Database (EM-DAT) published by the CRED, in which also the technological hazards are included.

Finally, the ResCult classification of risks and hazards derives from these previous analyzed classifications, and it includes natural and technological disasters.

4. EID design: a database platform for disaster risk management plans

The most important issue is to ensure an effective interoperability of the database, then to asset a general methodology for risk analysis, combining the CH representation with the hazard and risk representation. As the EID has to be visible, accessible and available for everyone, it has been foreseen the use of free and open data in some cases and structured data in others.

Existing standard models for object classification and 3D model mapping (INSPIRE and CityGML) were used, defining a particular extension of standard model for CH and Risks and proposing a new methodology able to connect CH and Risks.

Moreover, according to international standards, a designing process has been used for EID modelling from real word to database implementation. The process starts from the external model that contains the analysis of the perceived reality of the application domain by users, stakeholders and actors described in natural language (high-level language) (Laurini, Tompson, 1992).

This model has to be formalized in a conceptual model that is a graphical representation of the application domain using entities and relationships among them. The conceptual model can be understood all over the world from various experts and users.

The ResCult data model, as INSPIRE extension, in a nutshell consists of mutual connections among the three topic themes (“Buildings” as INSPIRE Object, “Protected Site” and “Natural Risk Zone”) each of them conveyor of semantic and geometric contents compliant to the several existing standards.

For this EID, the value “architectural” is added. The values justifying the protection for cultural heritage are therefore:

- Archaeological, which regards the archaeological sites and objects;
- Landscape, which usually include large portions of land, with specific characteristics to be preserved;
- Architectural, which regards any sort of building or construction with high architectonic value;
- Cultural, for all the other sites having some cultural value, difficult to be included in the previous categories (e.g. mixed built and natural heritage, a site connected to intangible heritage, and so on).

5. Features

The EID data framework starts from the representation of 4 core entities: the Cultural Entity (considering both tangible and intangible cultural heritage, as well as both movable and unmovable), the Container Object (a building, a park, a vehicle, taking into account it may not only contain but also be a Cultural Hentity itself), the Hazard and the Risk.

The European Interoperabile Database (EID) is a webservice-providing tool composed by seven different elements:

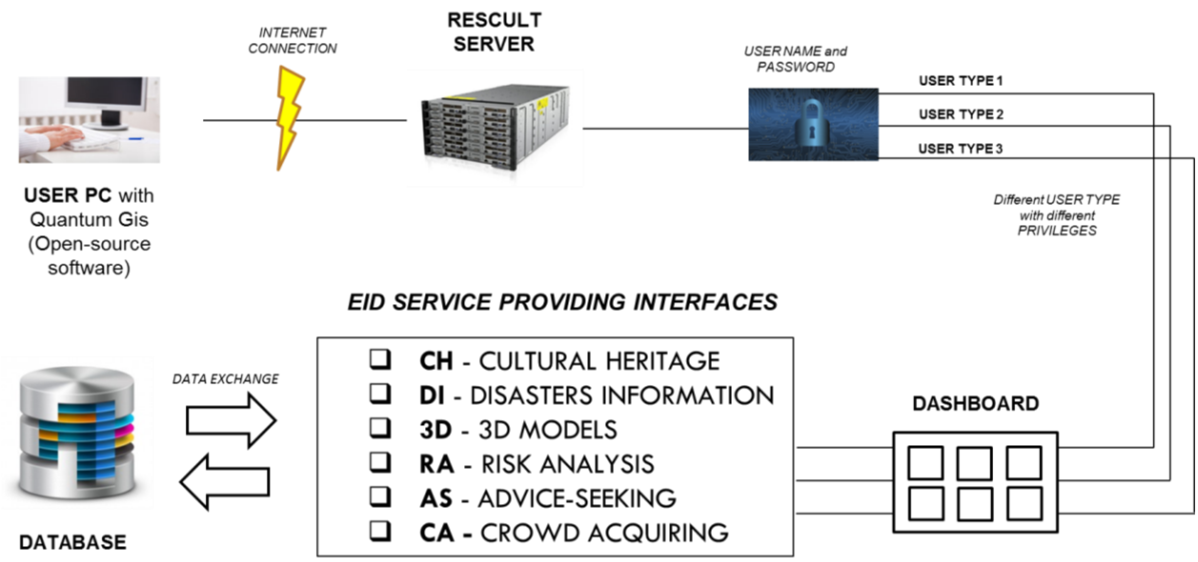

Figure 2 – EID Structure

1 database (EID) compliant with with CityGML for GIS data sharing; and -concerning CH classification- Joconde (F), Europeana, UNESCO, MIBACT (I) and ICCD (I). The EID structure contains an extension of the INSPIRE data model for cultural heritage.

6 web service-providing interfaces:

- CH - CULTURAL HERITAGE

- DI - DISASTERS INFORMATION
- 3D - 3D MODELS
- RA - RISK ANALYSIS
- AS - ADVICE-SEEKING
- CA - CROWD ACQUIRING

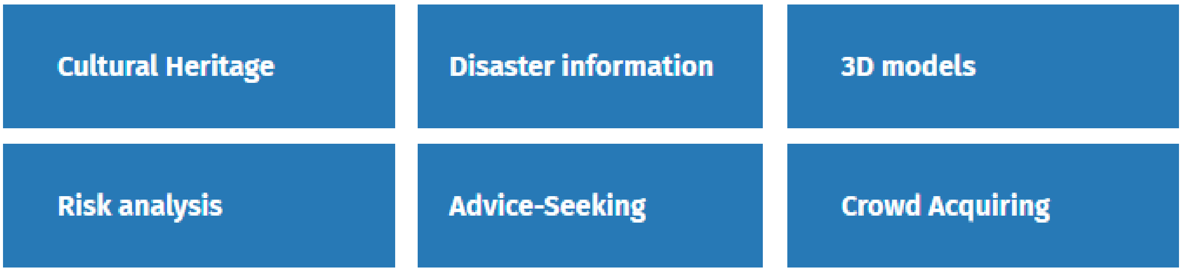

Figure 3 – EID Dashboard

The EID-CH hosts different cultural heritage types, so ALL Cultural heritage types can be stored and properly represented:

- Either tangible or intangible
- Either movable or unmovable
- A structural part of another Cultural Heritage (ex: inlaid roof as a part of an historical building)
- A Cultural Heritage “inside” another Cultural Heritage (ex: an artwork inside an historical museum)

- A spatially extended area (ex: natural landscape)
- A progressively detailed scale based on 3D geometry (CITYGML LOD 1-2-3-4)

Other existing datasets can be automatically integrated in the EID: a SQL scripts library was created to enable the automate integration of other existing cultural heritage databases (after exported in excel format). The EID is being currently tested for Europeana Database, Joconde Database and SIRPAC Database.

The EID-DI provides information about previous disasters, with technical data as magnitude, mm of rainfall, damages, etc. The purpose is to share GIS-based information about Natural Hazards (with focus on Flood, Fires, and Earthquakes) including data which are relevant to support the monitoring process of the Sendai Framework implementation. Data includes Sendai Framework Indicators from Target C (Estimate Direct Economic Loss), in particular C6 Group (Direct economic loss to cultural heritage damaged or destroyed attributed to disasters).

The EID-3D provides 3D models to support the restoring operations of artworks and buildings; to be used to feed virtual reality scenarios, in order to make cultural heritage virtually accessible to all citizens (including disabled people who cannot travel); to preserve the historical memory of destroyed or irreparably damaged cultural heritage.

Figure 4 – EID Screenshot (Prehistoric Mandible 3d Model)

Figure 5 – EID Screenshot (Prehistoric Vase 3d Model, Console Panel)

A web platform is connected to the EID to visualize cultural heritage 3D models, that are shown with the support of an open-Source web platform (3DHOP) which allows a number of functions, including integrations of “hotspots” (focal points) with additional information, lights shifting, planes cutting, etc.

The EID-RA provides a model of analysis of cultural heritage vulnerabilities to disasters, to support the implementation of resilience recovery measures (Assumma et al. 2019; Bottero et al., 2019). A GIS-based interface connected to the EID is made available to visualize risk indicators related to different cultural heritage and disaster types. Two different methods to perform risk analysis are possible: Unmovable cultural heritage ("Asset Risk Evaluation Cards - AREC") and Movable cultural heritage ("Methods of Analysis for Safeguarding Artworks - MASA). Each method can produce either single-distasters risk indicators (Fire, Flood, Earthquake), or global indicators.

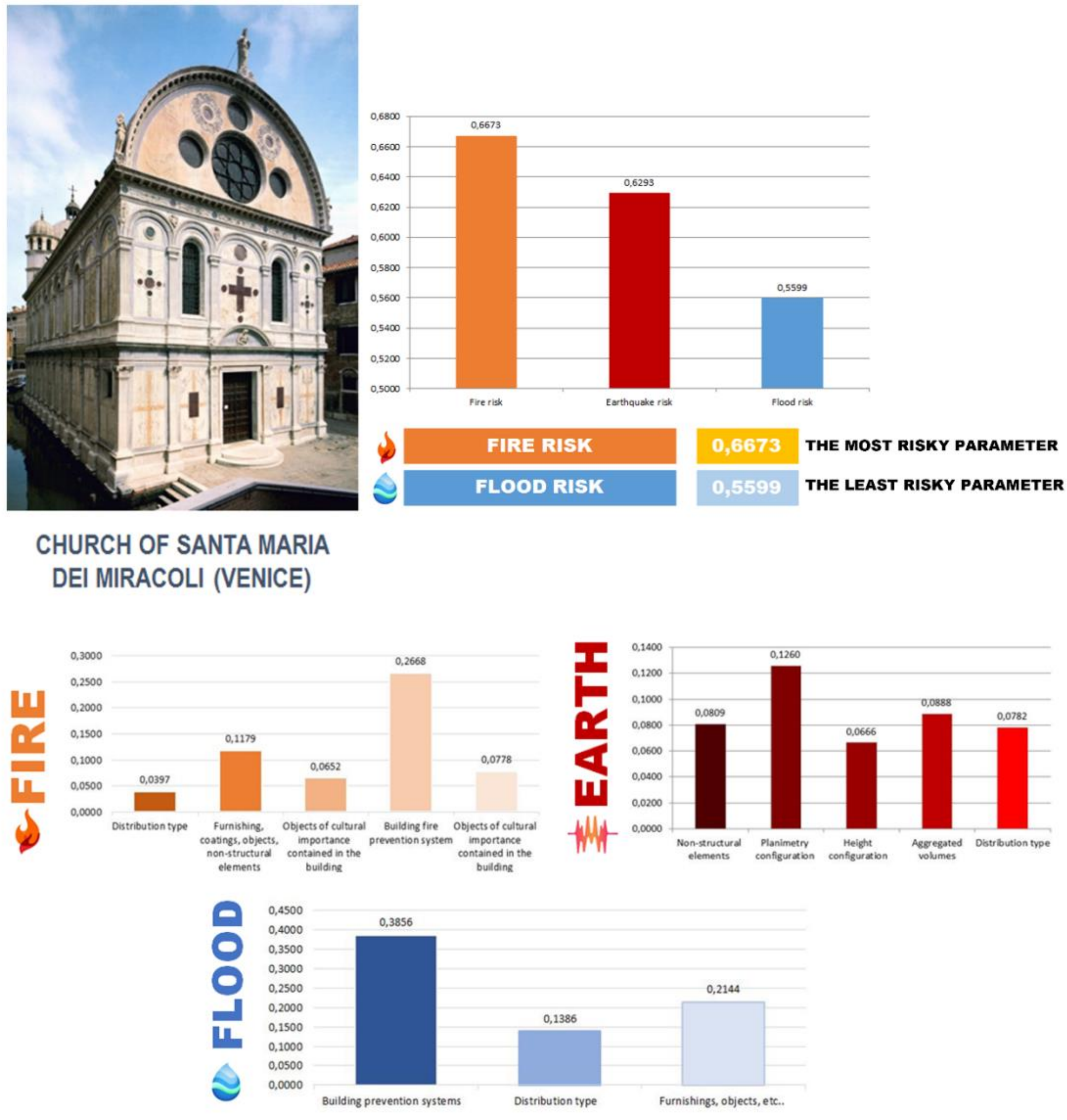

Figure 6 – EID-RA, sample of multi-hazard risk analysis

The EID-AS is designed to diffuse knowledge and best practices related to the protection and resilience increasing of Cultural Heritage against disasters.

A web interface making the user able to search best practices depending on the related disaster and on the desired keyword(s). For each best practice it can report a detailed description and can link further material (such as documents, image, etc.) available on web. Also, each best practice can be linked (or not) to a specific disaster type.

The EIC-CA is designed to allow users to upload information including cultural heritage data, best practices and even entire databases.

Three different upload can be done: single cultural heritage (name, type, location, etc.); single best practice data (related disaster, description, URL link, etc.) and cultural heritage database. A library of SQL script was created to allow the automatic integration of external databases in the EID (starting from the exported excel file). Data are associated to different «reliability» levels, depending on the uploading user account type. Any data uploaded through this interface is always filtered by a manual validation step before becoming part of the EID.

The EID provides support to the Sendai Framework for Disaster Risk reduction implementation monitoring through the collection of disaster loss data for improved risk understanding. Indicators to monitor Sendai Framework target C (Estimate Direct Economic Loss) are integrated in the structure of the EID

The EID format can be used to facilitate the data collection from Member States to fill Sendai TARGET C indicators.

The EID can support decision makers: a risk analysis method for unmovable (“Asset Risk Evaluation Cards - AREC”) and movable (“Methods of Analysis for Safeguarding Artworks - MASA) cultural heritage was developed and integrated in the EID to support emergency operators in identifying Cultural Heritage vulnerabilities to natural disasters (in particular Flood, Fire, Earthquake).

The EID is also a Hub for knowledge sharing: Best Practices can be hosted and uploaded by external users in the EID, on a dedicated repository. The EID can support knowledge exchange and cultural heritage resilience increasing.

6. Impacts on European Scenario

The creation of an integrated database of Cultural heritage, compliant with European standards and including information about exposition, vulnerability and hazards, models and references in essential to design a prevention process and well as to structure the most efficient disaster risk management plans.

The RESCULT Project contributed to support the implementation of International Strategies for Disaster Risk Reduction, raising global awareness about Sendai Framework principles and creating one of the first Cultural Heritage International Database where Sendai Target Indicators from Group C6 (Disater Losses monitoring related to Cultural Heritage damage) are included.

The European Interoperable Database does not only represent a tool able to connect Cultural Heritage representation and risk analysis in a unique tool, but it is also an innovative instrument which does not overlap with all the other European existing Databases. In fact, a relevant strategic element is its capability to deal with other current structures, as the already existing CH databases and inventories, territorial data, hazard and risks classifications, representations and so on. The EID can indeed dialogue with different databases and, after the creation of tailored scripts library, use them as basis for further analysis. Europeana, Joconde and SIRPAC Databases are example of contexts where this feature was specifically tested.

Also, the model of risk analysis integrated in the EID, is adaptable to many case studies in Europe, thus in different geographical and geological contexts. The model is based on objective and general evaluations and works independently of specific regulations of individual states, but it can be well adapted to them.

6. Conclusions

After selecting and analyzing the existing standards, classifications and requirements, an extension to the INSPIRE data model was here proposed in order to represent the information useful to increase the resilience of the CH, enable decision makers to understand the risk of damage to cultural assets and support operators during emergencies or post-emergency situations.

Many attributes and data included in the extension are connected to the hazards fire, flood and earthquake, selected for the project to be better investigated. However, in future work, there is the possibility to further enhance these parameters in order to be useful also for other hazard types, included in the hazard classification code list, employing a similar mechanism, which is described in this document. A connection between different INSPIRE themes is established, which are not directly related in the INSPIRE data model. This is fundamental in order to relate different kind of information about the same studied object.

Further development will also regard the creation of an interface for the DB, the modeling of the geometry for the case studies selected by recognized macro elements included in the classification of the Getty's architectural elements and the implementation of the DB with the data of the three selected cases studies (Santa Maria dei Miracoli, for flood hazard, and Tolentino's Church, for earthquake hazard, in Italy and the Museum of Prehistory of the Gorges du Verdon, for fire hazard, in France).

The proposed solution can represent all the information useful to increase the resilience of the CH, enabling decision makers to understand the risk of damage to cultural assets and support operators during emergencies or post-emergency situations. The proposed solution is being applied to the 3 practical case studies connected with different hazards (earthquake, flooding, fire) in accordance with various kind of CH objects (movable, immovable, tangible, intangible).

The RESCULT Project is oriented to cope with challenges and requirements shown by end-users and Stakeholders. Active and proactive involvement of end users (civil protection bodies, fire brigades, regional and local authorities, museums) in data collection process was at the basis of data collection and emergency process mapping.

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