Information systems and Cultural Heritage. Methods to promote its valorisation and fruition.

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ABSTRACT

Nowadays, the digital technology increasingly influences how we perceive, understand and use Cultural Heritage. The range of technologies to capture and represent the cultural heritage made huge advances, varying in terms of costs, scales, purposes and outputs. In fact, they become more democratised in terms of both economic and practical accessibility of equipment and techniques, and access to information and models through the use of internet portals.

The adoption of information modelling that embedded architectural, structural, plumbing, and more data, becomes mainstream in a lot of professional fields, encouraged also by the spread of Building Information Modelling. In this case, the structured models are used for lifelong activities (planning, maintenance, monitoring) and they develop into a professional tool made for experts. Within a consideration of Cultural Heritage, however, it is necessary to not lose sight of the need to capture and understand also the social aspects of the heritage. It always owns an inner meaning, tradition, stories, and cultural resonance which constitute the kind of information needed for its fruition and valorisation. It is important to focus on the contents of the model, which have to be sharable not only among specialist, but also among "common" people. To make the information open, it is necessary to overpass the BIM concept, and to think about the more generic and customizable conception of the terms: the information systems can be an efficient channel to capture the attention of visitors and to communicate cultural subjects.

Proposing my research, I mean to explore the methods to valorise the Cultural Heritage, using the multi-layered information systems as an incentive to the fruition and re-appropriation of buildings and territories, suggesting new meaning and supporting innovation and insights. This is a vision where multiple competences give their expertise to valorise the Cultural Heritage. In fact, only the interoperability between software, professionals, areas, and more can generate a complete knowledge and can bring the buildings of the past into the world of the future.

Keywords: Cultural Heritage, information, multi-layered models, methodology, fruition, valorisation, scenario

Background

Nowadays, speaking about Cultural Heritage and development, the question is: why should we invest in cultural heritage during an economic and political crisis? Lots of official international documents e.g. the

Council of Europe Treaty Series – No. 199 (Convention on the Value of Cultural Heritage for Society, Faro 2005), or the Horizon Work Program 2018-2020 (Horizon 2020, 2017), highlights the answer to this question: through the culture it is possible to make innovation, to strengthen the identity and unity, to improve the quality of life and to make the development sustainable.

Moreover, the 2018 is the European Year of Cultural Heritage, celebrating the diverse cultures across Europe at national, regional and local level. In a Europe where some part of population takes the distance from the unification (e.g. the Brexit, the exit of United Kingdom from the European Union, Referendum on June 23rd, 2018), the aim of the European Year of Cultural Heritage is to "encourage more people to discover and engage with Europe's cultural heritage, and to reinforce a sense of belonging to a common European space (https://europa.eu/cultural-heritage/)".

Considering this political/economic situation, it is clear the great interest to engage with communities and "the need to put people and human values at the centre of an enlarged and cross-disciplinary concept of Cultural Heritage (Convention on the Value of Cultural Heritage for Society, Faro 2005)". The matter now is how to make innovation through cultural heritage, engage with population, and strengthen the sense of belonging. For this reason, these are the topics of Horizon 2020 Work Program.

In general, it is possible to say that there are many formulas to do this, for example the following complementary methodologies:

1 – The Cultural Heritage Management 3.0 (from protection to pro-action) that aims to involve the citizens through collaborative governance forms according to the European model of smart specialisation.
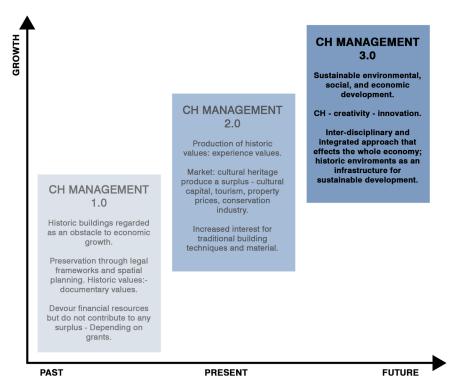

Figure 1: Features of Cultural Heritage Management 3.0 compared to the 1.0 and 2.0.

2 – the European model of smart specialisation that includes a dedicated point about visioning.

The visioning process derives from the criticism about the planification that uses conventional tools based on zoning for ruling the territory in an effective way. The alternative to this model for the development of the

territory is the production of vision. This process aims to see towards the future to understand what to do in the present. For this reason, the promoters of this approach deal with the construction of the program in a practical way, producing knowledge through the planned design and defining the values and the meanings to act through the interaction with the different actors. The vision action produces several scenarios, as an elaboration of a storytelling that continues with the action plans. In conclusion, the visioning practices are a collective effort to imagine a more attractive future.

A recent example that includes also the Cultural Heritage World is the Joint Programming Initiatives (JPIs) Strategic Research Agenda on CH in Europe. The main objective of JPI CH is to "promote the safeguarding of cultural heritage in its broader meaning including tangible, intangible and digital assets" (www.jpi-culturalheritage.eu/). It promotes "a joint multidisciplinary approach to cultural heritage sustainability which arises from research. It develops within a multi-frame scenario called the Scientific Cultural Area – as a part of the European Research Area – which includes science, engineering, technology, art, literature, conservation and culture. Supporting research activities and researcher training means reaffirming the European cultural identity as worldwide ambassador of cultural heritage excellence."

One of the most famous example of visioning is the Atlanta vision 2020, started 15 years ago, even if it does not regard directly cultural heritage field, it definitely codified the visioning process in its phases and tools because of the types of action and the workflow used, (http://consensus.fsu.edu/).

Other national experiences that used the scenaristic tools are: Mantova Cultural Districts (Fanzini D. et al., 2014), Territorial marketing of Oltrepò Mantovano (Casoni G. et al., 2008), and others.

Digital tools and Cultural Heritage

What is digital? According to the European Year of Culture 2018, it is digital the resources that were created in digital form (for example digital art or animation) or that have been digitalised as a way to preserve them (including text, images, video, records). The term is part of Cultural Heritage definition (https://europa.eu/): "Cultural heritage has a universal value for us as individuals, communities and societies. It is important to preserve and pass on to future generations. You may think of heritage as being 'from the past' or static, but it actually evolves though our engagement with it. What is more, our heritage has a big role to play in building the future of Europe. It comes in many shapes and forms: tangible – for example buildings, monuments, artefacts, clothing, artwork, books, machines, historic towns, archaeological sites. Intangible – practices, representations, expressions, knowledge, skills - and the associated instruments, objects and cultural spaces - that people value. This includes language and oral traditions, performing arts, social practices and traditional craftsmanship. Natural – landscapes, flora and fauna. And digital."

I started my research considering the more "technical" field, aimed to the professional as architects and engineers, who has to restitute an ancient building with a BIM process. Analysing this methodology and understanding its potentialities and issues in the Cultural Heritage field, I understood that this methodology alone can't fit to the aim of my research project. In fact, it is necessary to remember that the BIM methodology is a technical process oriented to specialists. Most of the issues that I already faced in modelling of Cultural Heritage with this kind of software are "practical" and "specific" problems that are more and more reduced every year, thanks to the technology progress.

On the other hand, my work also explores a "socio-cultural" field, studying how to valorise the case study for the public, creating the model not only for a "specialist" fruition. Probably, considering this second part of the research, it is necessary to go beyond the BIM concept, and focus on more flexible tools. In fact, to use the information model also for fruition purposes, it is necessary to integrate inside them also other type of information (intangible heritage), which is something that BIM software are not made for doing. The ad-hoc platforms for the visualisation of the Cultural Heritage are the last trend to manage the model and sometimes also the information related to an ancient object, building, or site. Some examples of this movement are: an integrated database for Palladio's work (Apollonio et al. 2010), ARIADNE (2013), SACHER (Smart Architecture for Cultural Heritage in Emilia Romagna, 2014), and 3DHOP (2014), also used to create the platform for the Fontana del Nettuno in Bologna (2016). Since several years the researchers

feel this problem. In fact, also my working group at Politecnico di Milano, the 3D Survey Group2, developed the BIM3DSG platform (Fassi et al. 2012; Achille et al. 2012; Fassi et al. 2015; Rechichi et al. 2016; Fassi et al. 2016; Mandelli et al. 2017), an ad-hoc system that can be created time by time on the specific needs of the case study. In this way, the platform becomes a tool for the action of "participatory design", pointing to social enterprise and generating an eco-system of services, actors and stakeholders. They can produce new value sequences in the fields of production and collaborative fruition of cultural services. In particular, the three main typologies of fruition are:

- fruition aimed to the maintenance and restoration activities
- fruition intended to the public, especially regarding the valorisation of the object from real to virtual, e.g. virtual museums, ad hoc platforms, and more
- fruition targeted to a marketing strategy, taking advantage of the local heritage to create new products.

In all cases of these typologies, the target is a "participated fruition", where all the people (independently on the culture, age, and instruction) can understand what they are looking at. In fact, if they can understand, they will lengthen the permanence time in a museum, city or territory.

At this moment, it becomes mandatory the collaboration with other disciplines and specialities: "the integrated and suitable planning and management of heritage should be based on the mediation amongst institutions, businesses and universities, as well as the other cross-sectional elements connecting these three main protagonists of the valorisation project:

- conservation, both in terms of growth and diffusion of knowledge on heritage, its features and particularities and in terms of the promotion of new strategies and supply chains aimed at restoration and valorisation;
- usage, as a lever of social and economic sustainability of conservation and precondition for the effective re-appropriation of cultural, environmental and landscape heritage;
- development, through promoting creative activities and innovation process relying on heritage to create new values and new heritage (increase of cultural capital, development of cultural tourism, enhancement of real estate values, entrepreneurial development in the areas of conservation and craftmanship, etc.) (Mussinelli E., 2014)."

The languages used in the valorisation projects belongs to the new technologies (virtual, digital, multi-media) and their products are emotional experiences, creates to surprise the public in a vision of "edutainment" (education + entertainment) (REF).

The professionals of tomorrow have to be able to use the data and the 3D models (tangible and intangible), to create products that don't merely show these outputs, but that tell a story about them. In this term, the right tool is digital storytelling, which is a narration using the digital tools. It has a narrative structure, containing a range of multiple elements (such as video, images, models, texts, maps, and more). To testify the combination of a correct geometric survey and the information for both maintenance and valorisation purposes, it is necessary to show some practical examples of cross-media approach: the emotional setting of "Sarcofago degli Sposi Etruschi" that unifies the correct 3D model with an emotional experience of video mapping (https://hpcforge.cineca.it/), the History Museum of Bologna, where in collaboration with some artists, they created a video to tell the history of Bologna, using 3D models, computer graphics, and storytelling (https://www.cineca.it/), and the project Experience Etruria, an experience of territorial marketing (http://www.experiencetruria.it/).

Innovative aspect of the research

My research project aims to create an intermediary role between the field of digital technologies and the socio-cultural aspect bonded to the intangible aspects of the heritage. In this sense, this professional figure has to be able to plan a valorisation program of a selected case study, having in mind all the multiple aspects of an enhancement process, and being able to manage them.

In particular, the main features to consider are:

* Recording the tangible aspect of the case study, identifying the most appropriate methodology and technology for surveying the case study and modelling the data, according to the needs and purposes of the work.

* Acquiring the intangible aspects of a building/site, considering all the layers of information.

* Making a deep analysis of the data acquired (tangible and intangible) and combine them to create strategies of interventions and products.

* Community interactions with heritage, considering a heritage community as "people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations (Convention on the Value of Cultural Heritage for Society, Faro 2005)."

* Engagement and exploitation with stakeholders and local communities.

* Instigation and evaluation of impact.

* Project management.

The innovation of my research work lays on the way that I use the data at disposal (tangible or intangible) of a selected case study to create valorisation and participatory fruition of Cultural Heritage. And the added value is to conduct an interdisciplinary work, being aware of all the multiple processes contained in each point of the bullet lists.

All the considerations made from the beginning of my PhD career until know, find their first application in the H2020 proposal where I actively participate, the CROISSANT PROJECT.

H2020 Croissant Project

In November 2017, prof. Richard Laing from Robert Gordon University, Abeerdeen, invites my supervisor prof. Cristiana Achille, my tutor prof. Daniele Fanzini, and I to participate to a H2020 call. Our proposal, coordinated by the RGU group, is inside the topic DT-TRANSFORMATIONS -12-2018-2020: Curation of digital assets and advanced digitalisation.

The proposal includes other research groups from Greece, Denmark, Spain, and UK, and also involves lots of organisation, local associations, and public Bodies as partners.

The name "CROISSANT" refers to the multiple layers of information contained in a Cultural Heritage building/site. The project has as its focus the collection, modelling and presentation of those layers of information, with an emphasis throughout on deep collaboration with potential user groups. That collaboration extends into the design and development of new digital tools, to ensure that methods and outcomes best meet the needs and expectations of a wide audience. This extends, also, across the use of state of the art mobile technology and approaches, to ensure that accessibility of the project, its activities, its findings and its outcomes, is optimised.

The Croissant project aims to apply digital technologies to enhance the user experience of interaction with cultural heritage. Such enhancement is a core concept of Digital Curation and refers to the full range of user experience including aspects of enlightenment or illumination which may emerge through the use of digital tools, whether in combination with in-person interaction, or via a digital artefact. Croissant carries the following objectives:

- Explore the effects of a range of digital technologies in practice, recording tangible and intangible heritage, thanks to the combined use of complex and highly accessible approaches.
- Engage with communities to explore and model community interactions with heritage, with particular reference to the project living labs.
- Establish a typology of methods appropriate for the capture for cultural heritage data, across scales (i.e. size of artefact and site) and purposes.

- Explore the effects of methods of digital capture on perception of heritage, and the ability of participants to retain and understand information.
- Develop and demonstrate an online platform to support the hosting and presentation of cultural heritage information.
- Explore and demonstrate the capabilities of the online platform to record and suggest cultural heritage narratives, drawing on both tangible and intangible data sources.
- Establish and demonstrate workflows to capture intangible aspects of cultural heritage, including experiential studies and perception.

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Tasks and objectives of POLIMI group in CROISSANT PROJECT

The task of my supervisor, my tutor and me was to lead the work package 1, and to propose an Italian case study to become a "living lab" of our activities. The title of our wp is "new ideas for re-activation applying technologies", and our overall objective is to act in the phase of recording data (tangible and intangible), using digital technologies, and then to investigate models and frameworks of the project that can activate urban and territorial re-generation process based on the valorisation of cultural heritage. "Re-activate" means promoting initiatives in a territory aimed at the creation of opportunities considering all profiles: architecture, economy, social, and functions. To do this, it is necessary to start a knowledge phase to understand the needs of a district, where to collect all the tangible and intangible aspects of a site and generate a range of strategies and products for its valorisation, fruition, and re-activation.

Summarising, the overall objectives of WP1 are to:

- Combine technological approaches used to survey the tangible of the selected site. The methodologies chosen to collect the data (range-based and image based methods) have to be appropriated across the scales and the purposes of each case study.
- Elaborate and produce digital products (reality-based 3D models) useful for different purposes (measure, geo-referencing the information, maintenance and conservation, multimedia products, online platforms, and others) and to share with an inspecting community, which can help to enrich the data collected with their local experiences.
- Give some best practices about how to reach a good knowledge of a site/object and how to use the data acquired through the surveys to create a project of re-activation.

These objectives will be achieved through:

- The reconstruction of state of the art about the existing technologies and trends.
- Analysing case studies to define new organisational formats based on participatory and long-period design.
- The use of different survey technologies and methods, according to the purpose and the scale of the case study (from mobile and static laser scanners, to UAV and close-range photogrammetry).
- Applying the new organisational forms to the living labs.
- Constantly involving the local communities, to collect intangible data.
- Creation of lifelong learning courses to valorise the processes and increase the competencies in the record of the tangible and intangible.
- Creation of territorial datasets aimed to organise the knowledge complex necessary for documenting and monitoring the heritage.
- Creation of relationships with international realities and strengthen the existing ones.
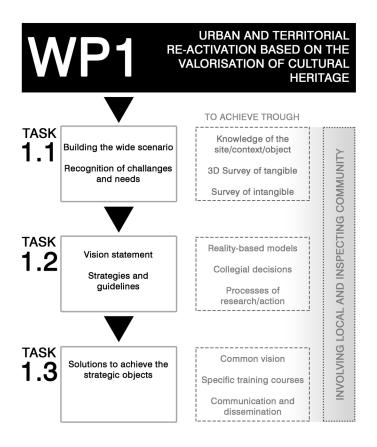
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Figure 2: WP 1 (Lead: Polimi) structure.

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