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Representation and narration as a form of knowledge. The network of Mediterranean lighthouses.

This paper investigates the possible creation of a replicable methodology based on interoperable models through which to generate strategies of connection and understanding of the architectural heritage, in this brief dissertation of lighthouses, present in the Mediterranean basin. This geographical space presents itself as the ideal place to experiment with new methodologies, approaches and models: a test field defined by a concentration of unprecedented events, by introspective coastline, a place flooded with smells, layered by cultural networks and connected by infinite meanings. The lighthouses, architectures with a high historical identity, although today they have maintained a high symbolic and identity value, in many cases, no longer see their use as a dwelling, causing the sudden and inexorable transformation of the buildings into relics of history, fragments of memory now gone.

It is in this context that the BIM application aimed at the built historical heritage is inserted, starting from the cataloging of the artifacts up to their use and enhancement. With the semanticization of the compositional characteristics of the building, through the identification of replicable and non-replicable variables, it will be possible to create a typological catalog that allows a simpler modeling of the lighthouses and therefore a more immediate project of restoration, reuse or fruition. The methodology follows a top-down approach, making it possible to use it for all types of built historical heritage.

Keywords:
Methodology; Mediterranean; lighthouses; semantization; interoperability

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1. INTRODUCTION. THE LIGHTHOUSES IN THE MEDITERRANEAN AREA

The concept of the Mediterranean changes in space and time. It is the geographical place where the most fascinating events and stories of all time take place; a concentration of unprecedented events. Flooded with smells, common flavors, mild climates, it presents itself as the representation of a grandiose overall design, layered by cultural networks and connected by infinite meanings. Made up of three continents with changing and economically unbalanced balances, it is a central space for cultural and political flows (Giovannini, 2006). The coast represents the identity sign of this closed geographical enclosure, a sinuous organism that delimits spaces and boundaries, which redefines the relationships between the city area and the waterfront, playing a fundamental role in affirming the processes inherent in material and intangible cultural heritage (Magnani, Pistocchi, 2017). If, on the one hand, the Mediterranean can be described in the first instance as an agglomeration of traditions, cultures and landscapes, on the other hand, each waterfront must be considered as an element in its own right, structuring, capable of defining the city it designs and of which it is integral part, catalyst of urban experiences and values (Governa, 1999).
Cultural heritage, in this territorial context, cannot be taken into consideration according to one-dimensional logic: diversity becomes the peculiar element and driving force of Mediterranean cities, fortified by connections capable of bringing about mutual contamination and, net of the creation of a dense network, of establishing an empowerment of its intrinsic value [1]. In this context, the lighthouses of the entire Mediterranean basin are inserted, architectures that have always intrigued the collective imagination, from their location on the highest promontories of the city to the coasts flooded with sand and rocks.
Their history dates back to very distant times, already Homer in the nineteenth book of the Iliad compared the sparkle of Achilles' shield to one of those fires that at night show the way to the sailors. Today, the use of automatic lighting systems marks the further evolution of these artifacts. Although they have maintained a high symbolic and identity value, in many cases they no longer see their residential use, causing the sudden and inexorable transformation of the buildings into relics of history, fragments of past memory. The lighthouse becomes a barren container, observed from afar, as one would observe a romantic useless ruin and, despite its essentiality, a manifestation of a heritage of memory (Mollica, Marraffa, 2020). The lighthouse represents in the coastal system a point of recognition of the people and the territory on which it is located. But the identity of the places, however, is not definitive, but is in continuous evolution, because the process of cultural definition of a people who inhabit a territory is in continuous evolution (Carta, 1999). For this reason, in order to carry out an incessant recognition by the population of the cultural heritage it is ecessary to reconnect it through a dense network of existing beams of light, new lines and unexplored rays. In a metaphysical sense, the connecting beam of the lighthouse can be assimilated to a monad (fig. 1), ie a central nucleus surrounded by a "radius of action", which communicates with the surrounding area through the intersection and the relationship with the other monads / lighthouses, through rays and lines.
The Mediterranean basin, a space that is closed and "connected" by nature, is therefore connected and stitched up by coastal networks (fig. 2) joined together by variables and invariable, by cultural processes, by peoples. Firstly, the reconnection systems of coastal systems and lighthouses aim to promote cultural-oriented initiatives based on the creation of tourist routes capable of establishing a new 'value-identity' of the architectural asset towards the population. An example of this are the tourist routes already in place in Galicia, on the *Camino de Santiago*, and in Brittany. There are also numerous initiatives in the Italian and Mediterranean area that aim at the creation of a new coastal unit, as we will see in the next chapter. In fact, the lighthouses overlooking the Mediterranean basin have represented, since the time of their creation, a network capable of illuminating all coasts

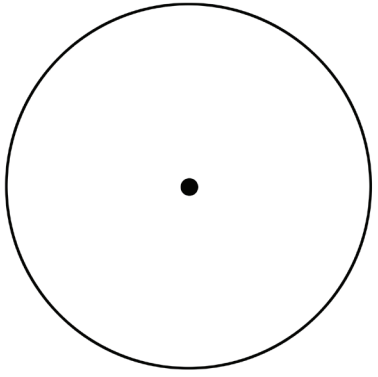

Fig. 1 - The monad.
Source: Hemenway, P. (2005). *Divine Proportion: Phi In Art, Nature, and Science*. New York: Sterling Publishing Company Inc., pag. 56.

- an example of this are the numerous strategies implemented in order to create coastal modernization projects, such as the *Album dei fari* dating back to the Unification of Italy - of the although not connected in an 'interoperable' way. Therefore, implementing the connections from a geometric and interoperable point of view means, as we will see later, ordering the data in order to transport them according to a reading key that can be read by the community and usable by the scientific community. In order to reconnect, and therefore to order, the data of the artefacts it is appropriate to proceed with the semantization of their components, recognizing in them variables, in turn broken down into macro and micro variants, and invariable. If for invariants we mean the exogenous characterizations such as the coastline, the landscape and the light, for variants we identify three macro groups: the lantern, the tower and the accommodation/office building. But the building is also

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characterized by those that are the most aesthetic aspects of the architecture, relating to the not strictly structural part, such as moldings, colors of the plaster, columns, etc. The identification of variables and invariable is configured as the first step of a methodology explained below.

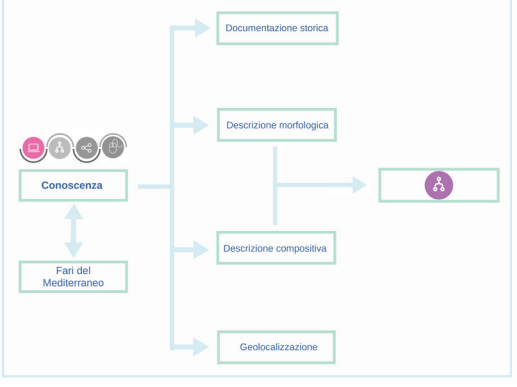
2. RESEARCH METHODOLOGY: SEMANTIZATION, REPLICABLE AND NON-REPLICABLE VARIABLES

The research aims in the first instance to define a replicable methodology, valid for the entire cultural heritage which, through a semantic reinterpretation of the lighthouses, is able to enhance in the first place the coastal identities and, secondly, the link that unites them with the territory. In the application field, the methodology aims to use BIM methods through the creation of interoperable models, in order to optimize the management of the common heritage and encourage possible future developments.
In order to make the methodology as scientific and useful as possible, it is based on wide-ranging references at national and international level such as ResCult [2] and MEDPHARES [3] on the international front, and VALORE Paese-Fari [4], at national level . These projects-initiatives represent the main methodological references to highlight the real need to generate databases, interoperable protocols and enhancement strategies on a national and international scale to encourage the protection of our heritage and the recognition of the heritage itself by citizens. Italy, in fact, has the largest cultural heritage in the world: over 4.000 museums, 6.000 archaeological areas, 85.000 churches subject to protection and 40.000 historic homes registered. But our peninsula is also the land of open-air art with its coasts, its landscapes, its reserves (Graziero, 2020). The lighthouses, in this context of neglect, lay their foundations in the wide range of architectural emergencies now in a state of neglect and advanced decay. Interest in these architectures, however, is constantly growing, as confirmed by the creation of numerous specialist sites, blogs, tourism initiatives and redevelopment projects.

Fig. 2 - The network of the mediterranean lighthouses. Source: elaboration by the author

Fig. 3 - Methodologic workflow. Source: elaboration by the author

Fig. 4 - Methodologic workflow: the knowledge phase. Source: elaboration by the author



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Albania								
ID* (E-)	Nome e località	Mare	Coordinate	Data	Altezza luce (s.l.m.)	Altezza torre (metri)	Portata (miglia)	Descrizione luce**
3742.3	Sarandë	Mare Adriatico	39°51'50.6"N 20°01'35.5"E	2010	215	8	20	Fl (3) W 30s
3741.5	Kepi i Feruc	Mare Adriatico	39°52'09.2"N 20°00'11.3"E	2019	6	4	n.d.	Fl W 3s
3741	Kep i Qefalit	Mare Adriatico	39°54'28.4"N 19°54'50.5"E	n.d.	155	12	20	Inattivo
3734	Kep i Palermos	Mare Adriatico	40°03'00.4"N 19°47'38.8"E	n.d.	113	10	n.d.	Fl W 8s
3733.8	Himare Bay	Mare Adriatico	40°04'18.8"N 19°46'43.0"E	2019	32	12	6	Fl W 3s
3732.5	Kep i Gjuhezes	Mare Adriatico	40°25'19.3"N 19°17'29.2"E	n.d.	58	8	11	Fl W 6s
3732	Sqepi i Sevasinit	Mare Adriatico	40°22'33.7"N 19°24'16.2"E	n.d.	75	6	8	Fl (3) W 8s
3731	Gji Dukatit	Mare Adriatico	40°19'39.8"N 19°25'11.4"E	n.d.	21	8	8	Fl (2) W 5s
3729.5	Kep i Kalaja	Mare Adriatico	40°24'48.6"N 19°28'55.8"E	1864	44	6	10	L Fl W 10s
3727	Kep i Treportet	Mare Adriatico	40°30'43.8"N 19°23'45.7"E	n.d.	18	10	9	FL W 5s
ALB-004	Ishull i Sazanit	Mare Adriatico	40°30'14.6"N 19°16'00.8"E	1871	n.d.	12	n.d.	Inattivo
3723	Ishull i Sazanit	Mare Adriatico	40°30'40.0"N 19°16'11.0"E	1871	157	5	12	Fl W 15s
3726.5	Kep i Jugor	Mare Adriatico	40°28'26.8"N 19°17'09.4"E	n.d.	18	8	n.d.	Fl W 6s
3719	Faro di Selina	Mare Adriatico	41°08'46.8"N 19°26'19.8"E	n.d.	71	8	11	Inattivo
3711	Kep i Durresit	Mare Adriatico	41°18'56.2"N 19°26'06.8"E	1864	126	14	n.d.	Fl (2) W 10s
3708	Kep i Pali	Mare Adriatico	41°24'48.0"N 19°23'30.6"E	n.d.	32	14	10	Fl W 10s
3705	Kep i Rodonit	Mare Adriatico	41°35'14.9"N 19°26'40.0"E	2007	40	3	9	Fl (2) W 10s
3704	Talej	Mare Adriatico	41°42'36.1"N 19°35'10.9"E	n.d.	10	9	6	Fl W 6s
3702	Mali Renzit	Mare Adriatico	41°48'38.2"N 19°34'58.6"E	n.d.	46	16	12	Fl W 5s

Fig. 5 - Extract from the list of geolocated and categorized lighthouses. Source: elaboration by the author

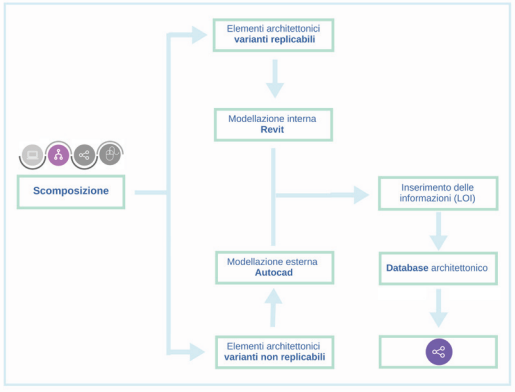

Fig. 6 - Methodologic workflow: the decomposition. Source: elaboration by the author

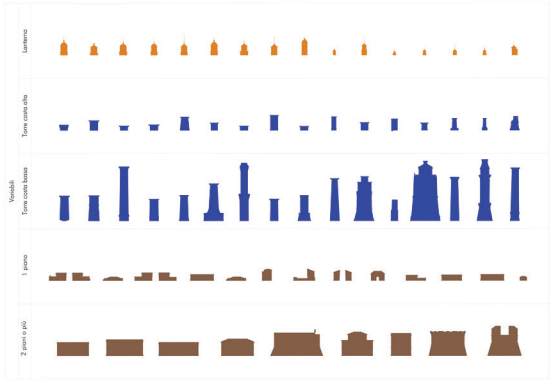

Fig. 7 - The replicable headlights variables. Source: elaboration by the author

The methodology, in order to implement processes of recognition in the population of the common good and of cultural heritage cataloging protocols, intends to bridge the gap between architecture and engineering, laying the foundations on four different phases: knowledge, decomposition, dissemination and reconstruction (fig. 3). The knowledge phase (fig. 4) represents the basis for the creation of an atlas of the Mediterranean lighthouses: the mapping begins its journey in the georeferenced location of all the Mediterranean lighthouses, combined with the identification of their formal characteristics, such as height of the lighthouse above sea level, light range and height of the tower (fig. 5). All this through historical documentation, in order to make research ever more reliable and precise.
Once this first phase is completed, we go into the identification and semanticization of the lighthouse (fig. 6), the heart of the methodology, characterized by variables and invariable, through which to create correlations and study the components that change with respect to specific certain locations. The invariables, as previously written, consist of the coastline, the beam of light and the landscape. These represent the characteristics that make up the relationship with men, with nature, with sailors, for this reason, they can be treated according to an immaterial guise. The variables (fig. 7), on the other hand, represent the material and formal nature of the building, the essence of which is twofold: these are macro-variants and micro-variants. The former appear to consist of the lantern, the tower and the accommodation/office building, elements therefore recognizable at a first examination of the architecture, which categorize the building and make it easily distinguishable from the others. This first semantization makes possible the composition of the formal elements that recur in several cases, identifying recurring typological characteristics. The micro-variants, on the other hand, are made up of the building's characterizing elements, which make up its formal quality and are identified in the complex of moldings, the color of the plasters, ashlar, etc. The micro and macro variants can in turn be divided into replicable and non-replicable ones.
As regards the first category, that is the replicable elements, by restricting the field of study to Italian case studies, and more specifically to the geometric and dimensional analysis inherent to the variant of the tower, we have arrived at the axonometric representation of all the towers that make up the Italian headlights (fig. 8). This phase allows the interception of basic types, that is the 'matrix of the architectural element', which can be repeated in all the lighthouses present in the Mediterranean basin, in search of a common coastal language. From their analysis, in fact, it was possible to identify four matrices inherent to the tower element of the lighthouse (fig. 9), depicting four different volumes whose height and width is given by the average of all Italian towers. The non-replicable variants, on the other hand, are those inherent to the characteristics that cannot be combined with other lighthouses, and for this reason they are not taken into consideration in the creation of the matrix. It is through these replicable matrices, duly reproduced with BIM technology, that it is possible to transform research from a simple analysis to an analysis model/methodology for all 'characterized' architectures, that is, all those architectures in which it is possible to distinguish recurring characteristics.

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Fig. 8 - 'Abacus' of the italian tower. Source: elaboration by the author

As we will see better in the course of the paper, it is necessary to combine the use of BIM methodologies, through a modeling articulated by family types, therefore importable and modifiable, with a traditional type modeling, to generate meshes and solids that can be imported without any possibility of modification. The set of variants makes up the compositional apparatus that can be divided into replicable and non-replicable. The first category concerns all the elements that can be replicated within different projects, even if characterized by the variation of some parameters or of the type and instance properties; this category includes simple typological forms of architecture such as cylindrical towers, hexagonal towers, symmetrical buildings, lanterns, etc. Therefore, a sort of architecture matrix is created, which can be used during the modeling phase of different lighthouses. The second category, on the other hand, includes all the elements that constitute an exception to the project, capable of markedly characterizing it compared to the others, such as particular moldings, large geometric shapes, ornaments, etc.
A sort of architectural vocabulary therefore takes shape, capable of relating all the identity points, the lighthouses, identifying and breaking down their formal characteristics, through which to theorize recurring models and characteristics. However, it is necessary to highlight how the methodology proposed here is still in the experimental phase and therefore appears to be for the moment lacking in iconographic apparatuses capable of better clarifying the methodological process, outlined here only in a theoretical sense. For this reason, fundamental projects are proposed below as a reference and for understanding the methodological process.
In a study conducted by the architect Livio De Luca on the capital of Dougga, in Tunisia, the reasoned decomposition of all the semantic elements of the temple is proposed in order to create an architectural vocabulary (De Luca, 2001). The capitals (fig. 10), the moldings (fig. 11) and the pediment (fig. 12) are isolated, in turn broken down into many small elements through which to study relationships and proportions. The creation of a vocabulary constitutes a library of elements, in this case described according to the knowledge obtained from the architectural treatises of the Roman period (Vitruvius), linked by the fundamental rules of the production processes of ancient buildings, in the specific case of tetrastyle temples of Corinthian.

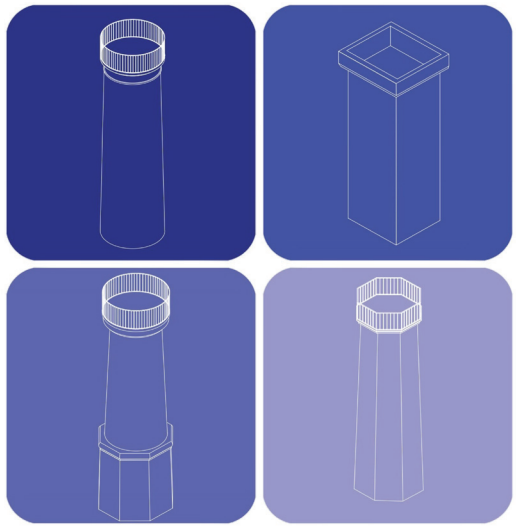

Fig. 9 - Array of lighthouses of Italian towers. Source: elaboration by the author

Similarly, the Dublin Institute of Technology [5] has already used this decomposition to create a library of parametric architectural objects. What is the simple survey as an end in itself is overcome and the so-called "labeled" model is created, based and ordered on the identification and isolation of the different formal characteristics of the building (fig. 13).
The creation of an architectural vocabulary, resulting from the transposition of the semantic components into architectural words, makes it possible to create architectural clusters through which to create processes and opportunities for mutual contamination and analysis between models (De Luca, 2011), characterized by interactions and exchanges of information, generating what can be defined as an interoperable model (fig. 14).

3. APPLICATIONS: BIM AND HBIM

In order to better clarify the process of identifying the most common typological characteristics of lighthouses, it is necessary to introduce and examine

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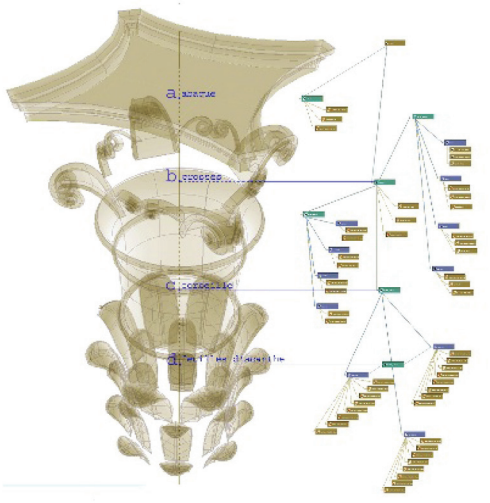


Fig. 10 - The capital of Dougga. Source: De Luca, L. (2001). Photomodélisation par primitives architecturales. Application au Capitole de Dougga, Tunisie. Retrieved September 30, 2016

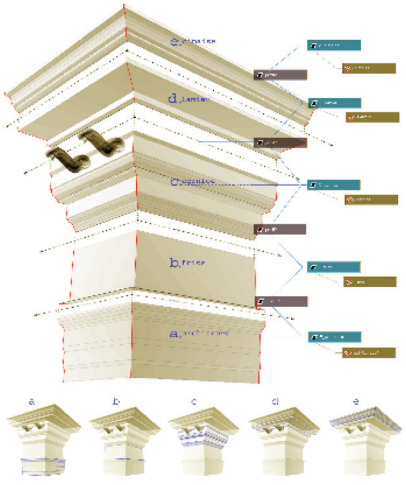


Fig. 11 - The molding. Source: De Luca, L. (2001). Photomodélisation par primitives architecturales. Application au Capitole de Dougga, Tunisie. Retrieved September 30, 2016

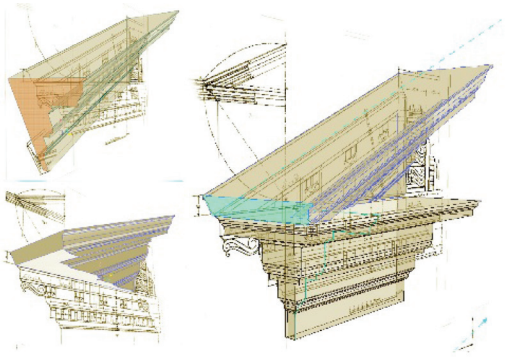


Fig. 12 - The pediment. Source: De Luca, L. (2001). Photomodélisation par primitives architecturales. Application au Capitole de Dougga, Tunisie. Retrieved September 30, 2016

the BIM methodology, for the creation of semantic libraries. Building Information Modeling is a design strategy that wants to be much more than a mere tool for information exchange: it, in fact, allows for the integration of updated data for all actors, facilitating changes in real time (Garagnani, Cinti Luciani, Mingucci, 2011). From this perspective, however, these systems are still too rooted in the macro sectors of construction architecture, civil engineering, structures and industrial systems. It is necessary to integrate innovative interpretations that can describe, define and catalog the cultural heritage to purely "engineering" models. These are the issues already partly treated under the acronym of HBIM [7], or a process applied to existing buildings, a discipline still little used in our country, but with enormous potential. Unlike the older CAD, where the model is first treated in a bidirectional sense and then derived in its three-dimensional components, with BIM we are witnessing a parameterization of the model, which contains, from its first formulation, elevations, physical and technological characteristics.

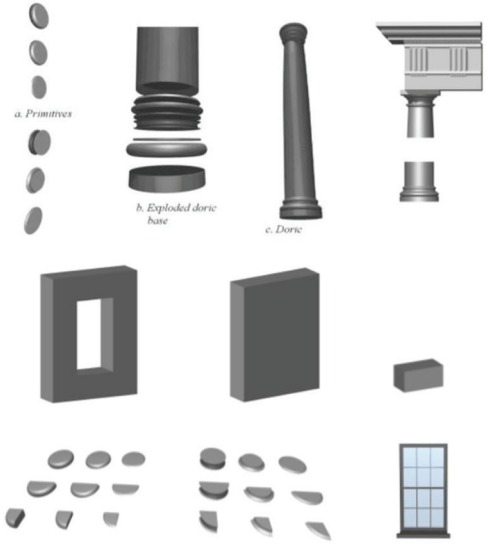
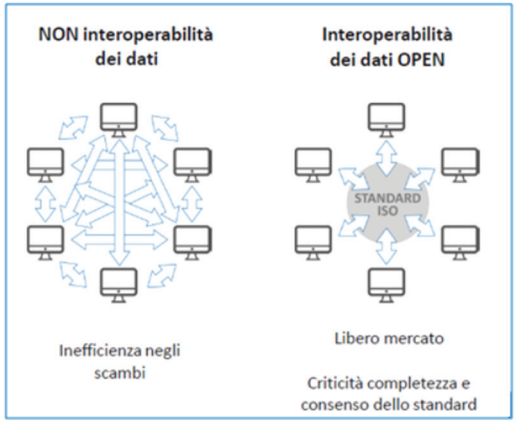


Fig. 13 - The architectural vocabulary. Source: Dublin Institute of Technology

Fig. 14 - The interoperable model. Source: https://www.ibimi.it/partecipare-alle-attivita-buildingsmart/



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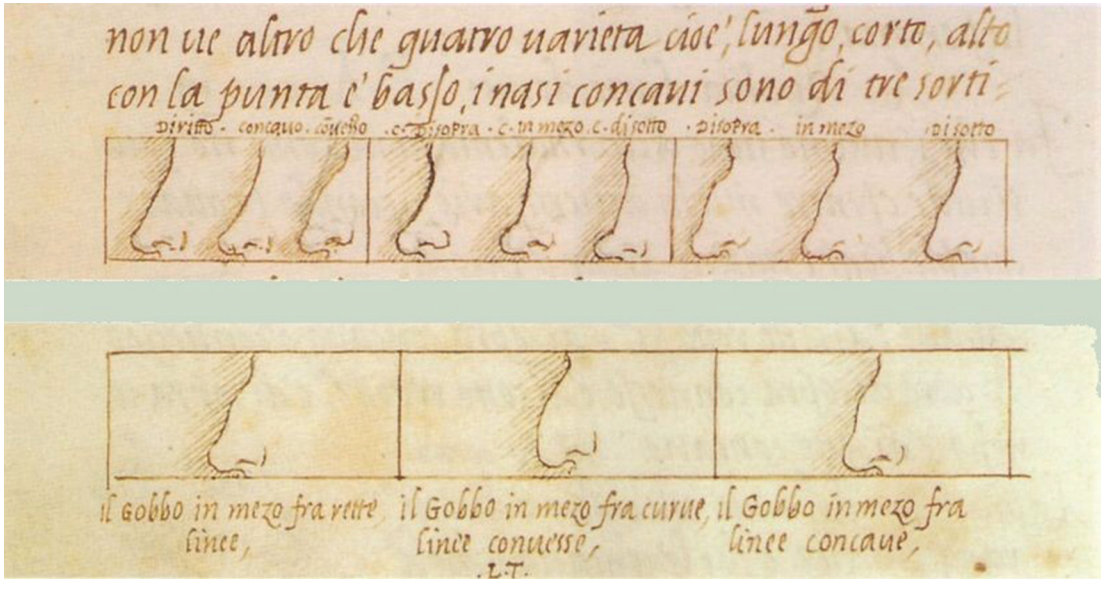
To design a recovery, a restoration or more simply a parametric survey that can make reuse easier, the HBIM methodology follows a different path than the latter. First of all, it is necessary to know in depth the history of the building, to understand its semantics, stratification and construction processes that led to the construction of that building (Peretti, 2019). After conducting an in-depth survey campaign using scanning systems such as laser scanners, terrestrial or drone scanners, and with the consequent generation of a dense and detailed point cloud, we proceed with importing the point cloud into the chosen software. The acquisition of the point cloud does not represent the point of arrival but the starting point of a parameterization of the cultural heritage which, in fact, must be reconstructed through the use of numerous parametric objects through which to effectively represent the components of the artifact, often free from regularity characteristics. In this sense, it is therefore necessary to create numerous models and local masses to implement the modeling process.
In this sense, the identification and the modeling of recurring typological elements, defined on the basis of the above, allows the speeding up of the process of creating other related elements, through the use of loadable families. They are families that are not created directly in the project, like system families, but are modeled to be inserted into other models as needed. In addition, loadable families that contain numerous types, as in the case in question, can be inserted into type catalogs, allowing you to enter only the types necessary for a given project. This is where the issue of interoperability and Research comes into play which, with the help of the semanticization of the lights, intends to create catalogs suitable for speeding up the process of parametric reconstruction of the existing heritage. Interoperability [8], in fact, manages to interact and integrate on different models like a prefabricated building.

Fig. 15 - The types of nose. Source: Illustration to a text from the Book of Painting copied from the lost Book A, 1508-1510 from the Vatican Code Urbinante 1270. Vatican City: Vatican Apostolic Library



4. INTEROPERABILITY AND FUTURE PROSPECTS

As we saw in the previous point, interoperability is configured as a very effective system to make any type of project faster. The first to use an interoperable model, although at the time it was not yet a theorized term, was Leonardo da Vinci. In the third part of the Treatise on painting, entitled De 'various accidents and movements of man and proportion of limbs' [9], he analyzes different types of noses, giving life to the first vocabulary of parts that can be used for his paintings and drawings. according to the character and morphological characteristics that he wanted to convey to the character (fig. 15).
Similarly, the Research proposed here ultimately aims to create a database from which to draw upon during the modeling of cultural heritage, which will be as vast as the parametric objects created will be. In this way, it will be possible to import a parametric model in whole or in part consistent with the object to be created, using common semantics and characteristics. All this is necessary in the face of an increasingly consolidated need to document the cultural heritage, regardless of any restoration and reuse projects. In fact, the growing inclusiveness and accessibility of data is one of the most current challenges at European level: the creation of high definition databases are extremely valuable tools in the cultural heritage sector. The "geometric memory", made up of metric, morphological and surface characterization data, is essential for the knowledge, conservation and enhancement of the cultural heritage, whose relief is often up to itself, that is, "not interpreted" (Maietti, Ferrari, 2018).
One aspect to consider when it comes to effectiveness in the field of databases is the organization of information. The creation of data arranged on fragmented and non-communicating databases makes the whole acquisition process not very exhaustive and useful for the valorisation process. What is defined in the field of telecommunications as "conceptual interoperability" is necessary, that is the relationship at the semantic level between

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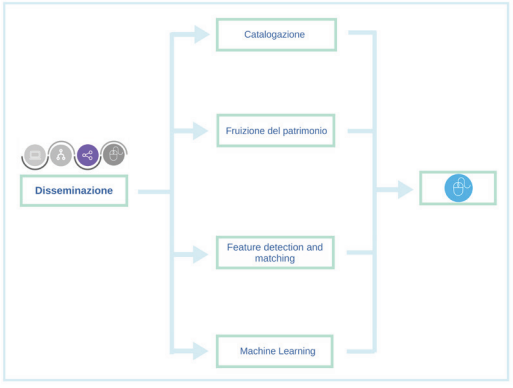
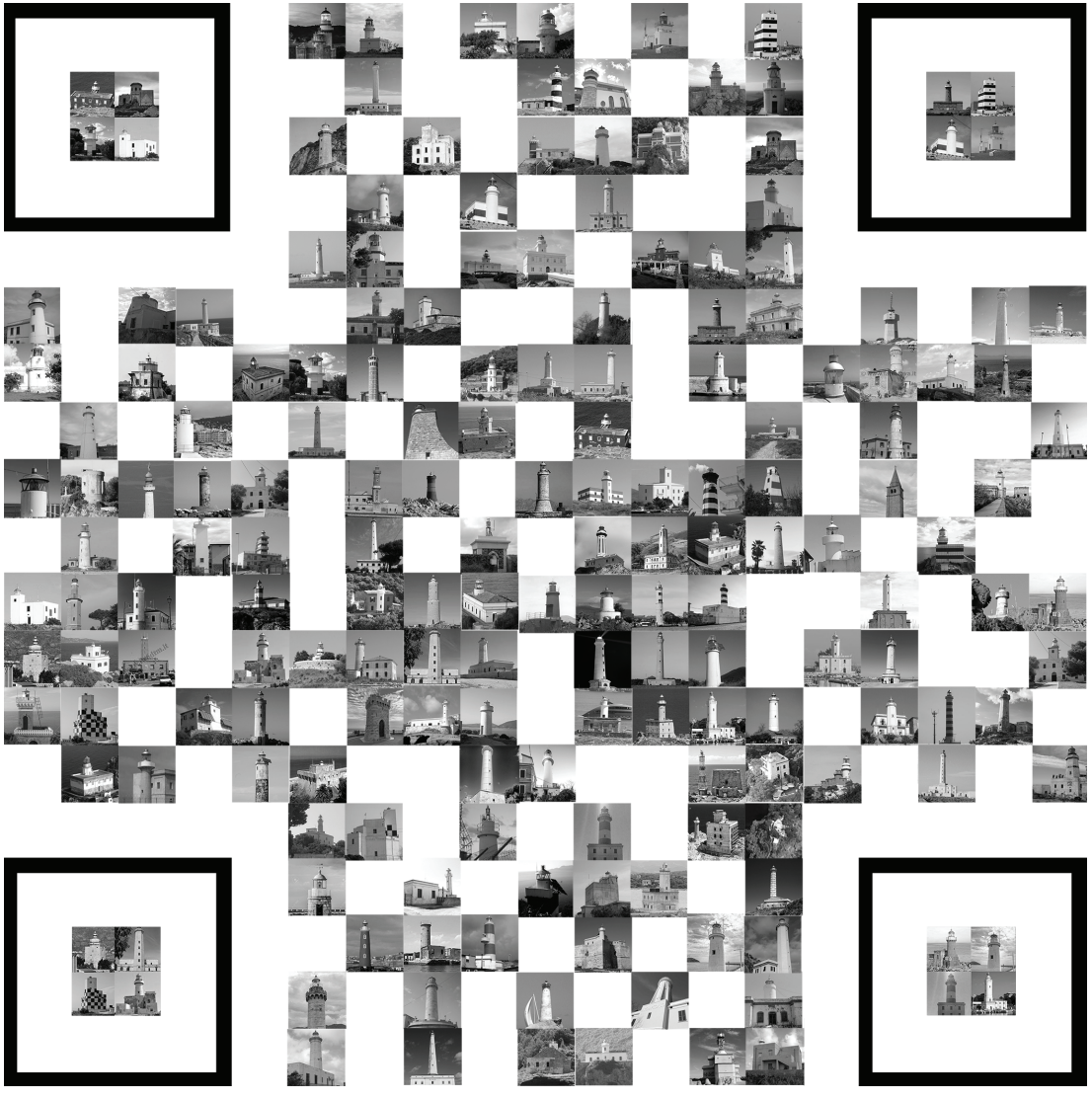


Fig. 16 - Methodological workflow: the dissemination of data. Source: elaboration by the author

different databases. In this sense, the INCEPTION [10] project aims to obtain interoperable models capable of enriching the interdisciplinary knowledge of European cultural identity by scholars, researchers and non-experts. Among the objectives proposed by this project is the creation of an open standard platform in order to "contain", implement and share digital models. The last ten years of modeling, if on the one hand have brought with them an important increase in the field of computer knowledge, on the other, the same new software, have brought with them multiple types of files, with different extensions and different structures of data and metadata within them, often with very fast times of obsolescence (Maietti, Ferrari, 2018). It is from this need that INCEPTION finds its *raison d'etre*, starting from the need to achieve the highest degree of interoperability of digital models. The formats accessible by users are BIM, GIS, Semantic Web and point cloud formats, allowing for data integration and management.
An effective dissemination of data (fig. 16) therefore makes it possible, together with the speeding up of heritage modeling processes, to enhance the places of community interest through the use and creation of fruition

Fig. 17 - The use of Italian lighthouses. An unexplored heritage. Source: elaboration by the author



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systems (fig. 17) such as, for example, feature detection and matching, capable of associating relationships between the architecture framed by a smartphone and the identification through visual association to the corresponding model, with the related historical information, in order to increase the receptivity of places.
In fact, at an economic and cultural level, digitization represents today one of the most effective methods of transmitting cultural heritage to future generations. In fact, the extraction of three-dimensional representation systems can be effectively addressed to the enhancement of the places of interest. In this regard, Pier Luigi Sacco proposes an analogy between culture and creativity to identify the enormous economic potential of the cultural sector. The use of information systems for dissemination, from the most innovative to the most common ones such as Apps, tablets and smartphones, are proposed as means with an extraordinary ability to produce economic and employment value, also in relation to European development programs (Sacco, 2013).
After dissemination, reconstruction actions are practicable (fig. 18) capable of elevating the artefact to a complete management of its life cycle, through which to undertake possible restorations and reuses, with the relative parameterization of degradation, also understood in a computational sense. But this phase, which in the methodological flow is configured as the last, does not close the protocol proposed here. In fact, there are still many possible unexplored data disseminations that can make the process of cataloging the parametric data more and more significant, transforming what was initially configured as an inverted pyramid methodology into a cyclic methodology, in which the determination, the identification and dissemination of the data are constantly updated.
To conclude, we mention the words quoted by Verganti about the relationship between innovation and the economy: "Producing economic value without generating significant content at the same time is today quite simply a contradiction" (Verganti, 2009).

5. CONCLUSIONS

Therefore, a strong criticality emerges with regard to the numerous surveys to which our cultural heritage is subjected. In fact, they are often carried out in a not very systematic way and do not appear to be connected by correlations and comparisons that would make their dissemination easier. It is consistent to think of the creation of a methodology that is able to trigger in the study of cultural heritage, on the one hand, an understanding of the semantics of the building, on the other, the possibility of speeding up the modeling times of objects. In this context, the lighthouse, once almost exclusively functional architecture, is now becoming the key element through which to adopt a study methodology capable of establishing new frontiers of knowledge and enhancement of cultural heritage. The use of semantization associated with BIM processes outlines the possible creation of an application methodology defined by pre-established phases that help a simpler understanding and implementation towards more contemporary styles of valorization. In this sense, the BIM methodology, through parametric modeling, is configured as a challenge but at the same time an opportunity for the enhancement of the built heritage, specifically, the one characterized by recurring geometric shapes and characterizing elements.

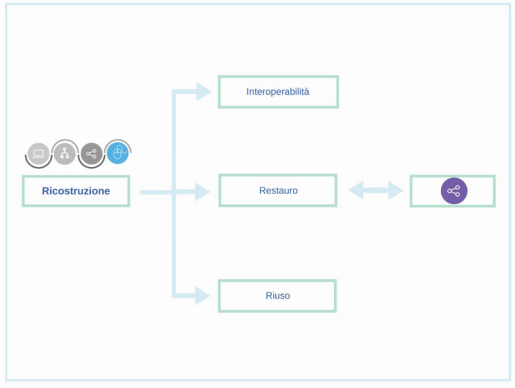

Fig. 16 - Methodological workflow: the reconstruction. Source: elaboration by the author

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NOTE

[1] "Metafisica", Aristotle

[2] ResCult (Increasing Resilience of Cultural Heritage) has as its general objective the improvement of the capacity of the Civil Protection to prevent and mitigate the impacts of disasters on Cultural Heritage sites. This will be done through the creation of an integrated interoperable European database (EID) for cultural heritage, designed to provide a single framework for civil protection, for national ministries of cultural heritage, for the European Union and for local authorities. Specifically, ResCult is working on the following three general objectives: improvement of the disaster risk reduction strategy (for prevention and resilience); increased cooperation and interoperability between EU Member States to protect cultural heritage (sharing of information, interoperable protocols, dissemination of best practices, alignment with EU policies/standards; enhancement of the capacity of protection organizations civil society to understand/prevent/mitigate the impacts of disasters on cultural heritage.

[3] MED-PHARES aims to start the recovery and enhancement of the Mediterranean lighthouses: an immense coastal heritage which, once made accessible and usable again by the local population and tourists, could represent an important development factor for the territory, after having represented for years a precious support to sailors and a fundamental defensive garrison.

[4] The network project, promoted since 2015, aims at the recovery and reuse of lighthouses and coastal buildings for tourism, cultural and social purposes, in line with the principles of sustainability linked to the culture of the sea. With the past three editions, 19 structures have been granted in concession to private individuals who are taking care of their redevelopment.

[5] Dublin Institute of Technology (DIT) was a major third level institution in Dublin, Ireland. The first of January 2019, the DIT was dissolved and its functions were transferred to the Dublin University of Technology. The institute began with the creation of the first technical education institution in Ireland, in 1887, and progressed through various legal and governance models, culminating in autonomy with a statute in 1992.

[6] BIM (Building Information Modeling) is a process that supports document management, coordination and simulation throughout the entire life cycle of a project (planning, design, construction, management and maintenance) starting with the creation of an intelligent 3D model.

[7] Historical o Heritage Building information Modeling.

[8] Interoperability is the ability of a product or system - whose interface is completely declared, therefore without parts of hidden code - to interact and function with other products or systems, existing or still in progress, without any restriction for the access or implementations.

[9] "*In questo caso ti bisogna mettere a mente le varietà de' quattro membri diversi in profilo, come sarebbe naso, bocca, mento e fronte. Diremo prima de' nasi, i quali sono di tre sorta, cioè dritti, concavi e convessi. De' dritti non ve n'è altro che quattro varietà, cioè lunghi, corti, alti con la punta, e bassi. I nasi concavi sono di tre sorta, de' quali alcuni hanno la concavità nella parte superiore, alcuni nel mezzo ed alcuni nella parte inferiore. I nasi convessi ancora si variano in tre modi, cioè alcuni hanno il gobbo nella parte di sopra, alcuni nel mezzo ed altri di sotto*".
Translated: "*In this case one must have in mind the varieties of the four different elements in profile, such as nose, mouth, chin and forehead. We will first mention the noses, which are of three types, namely straight, concave and convex. There are four varieties of straight ones, namely long, short, high with the tip, and low. The concave noses are of three types, some of which have a concavity in the upper part, some in the middle and some in the lower part. The convex noses still differ in three types, that is, some have the hunchback on the top, some in the middle and others below.*"

[10] Inclusive Cultural Heritage in Europe through 3D semantic modelling", funded by the European Commission under the Horizon 2020 program. The project, launched in June 2015, was funded under the Work Program Europe in a changing world - Inclusive, Innovative and Reflective Societies.

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