Connected information: the Hyper-representation of Andrea Palladio's Villas

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1. Introduction

Classical or digital representation is not just a simple mean of reproduction or imitation of reality, its enormous potential passes through complex mechanisms of interpretation, creating new possible worlds: the purpose of representation, therefore, lies in its creative potential. If we consider the planning process, at any architectural scale, it is also evident that the representation has an important role of virtual mediation, in fact, it communicates the spatial, aesthetic, material, functional and metric information: the architecture becomes reality only if it is represented. Another important function, which representation may successfully cover, is the mapping of the historical architectural heritage, which today is losing the link with its culture, in fact, even in the best preserved city centre there are a lot of appearances which have altered or destroyed the original space and the system of signs; we always see all around new changed landscapes not only from a naturalistic point of view but also considering infrastructural and architectural aspects. It is not Semantics (the system of signs), which are changing, but how to read them: Media have influenced our experience of the visual world with fluid images. For all these reasons and to coordinate the vast amount of existing data, we can broaden the definition of the usual hypertext, which is seen as a combination, which changing values run free from all kind of references, the information is switched outside the constraints of specific locations (Dematteis, 1993). Sailing within a hypertext can be read as a metaphor for the dynamic and discontinuous perception of current space (architecture, city and landscape), because hypertext allows reading reality through many codes, all valid at the same time and all bringing legitimate messages – we can consider the vision of a spatial configuration not like the result of a single author, but as the sum of the individualism of each reader-authors – .

Another example of connected reading is the Augmented Reality, it combines the images of the world with computer data, creating a virtual reality in which computer graphic objects are blended into concrete footage in real time: in other words, AR uses live video imagery 'augmented' by the addition of computer graphics. If we refer to hypertext as an extraordinary coexistence of text, tells, documents, biographies, repertories (Pavia, 1996) or if we refer to the Augmented Reality in order to show the analysis of the characteristics of an actual reality, adding computer qualities; then it would be better to use an Hyper-representation to study architecture and landscape, because they are not only exterior

entities. In fact, as the hypertext – the textual information arrives usually to the reader in a linear and sequential manner – is an associative and interactive link between information placed in different points of the same document, and as the Augmented Reality is an overlap of virtual and real images, then Hyper-representation of architecture, city and landscape, can be seen as a new tool not only for visualization, but also for knowledge and communication of a rapid and accurate analysis of complex data and variables. Only the Paper is inadequate for representation of all aspects of architecture and urban configurations, to which we add the dynamic space, so it is necessary to turn our attention to a 'digital organization', an Hyper-representation of a 3D model, in which one can find connections between measurements, iconographical images, historical maps, movies, synthetic reconstructions of CAD; this management allows to provide the highest level of completeness through the analysis of the available resources.

In this context, we suggest the following procedural steps:

- planning the GIS – Geographic Information System – of the space, where the studied architectural object is, verifying the real functionality;
- testing the GIS and its standards, identified by the digital formats for architecture, city and landscape;
- testing Hyper-representation as a tool to show, know and communicate data;
- defining the possible procedures to validate a digital architectural model in its landscape.

2. The Hyper-representation of Palladio's villa Almerico-Capra

The renewed interest in representation can be found not only in educational and academic fields, but also in every kind of planning project, at any architectural scale; so representation constitutes the main instrument to study all things, that we identify with the terms architecture, city and landscape: it is sufficient to read any text about history of representation to realize that, all the steps of innovation of this discipline usually are connected to the development of history in architecture, engineering and technology. As examples for this *liaison* we remember the influence of axonometry in planning mechanical pieces during the XIX century or the link between digital programs and contemporary planning.

Of course the act of planning does not depend on the techniques of drawing, but they are the preferred solution to explain, manage and describe all the data in a project. Knowledge and communication of architecture, cities and landscape have to rely on representation, this is an important subject not only for our specific studies, but also in many other disciplines, from architecture to town planning.

On one hand, hypertext has renewed the textual organization, passing from the simple text to additional text, critical contributions, stories, documents, biographies and pictures (see the extensive bibliography on hypertext, formed by operational, practical and philosophical contributions, in which it stands out that it is not possible to organize a connected study like an hypertext, and for this reason, we propose the Hyper-representation as solution, as a new tool for viewing, understanding, communicating and providing a rapid and accurate analysis of a large quantity of complex data. If the term Hyper-representation is today used in cinema, legal or psychoanalytical fields, it is in the history of ideas and philosophy that we can find the most original and interesting remarks: Hyper-representation is seen as an immense system of representation, a way to demonstrate and show the idea of a complex

object through its appearance here and now (Nancy, 2002). Also the scholar Baudrillard expressed in 1978 a same concept in an interview for the magazine «TRA», talking about hyper-reality as a reality of a world that is free from any last reference to all things.

In scientific field the proposal of the research team (S. Foresti, J. Bermudez, D. Westenskow, J. Agutter) of the Centre for High Performance Computing (CHPC-University of Utah, USA) is interesting: it develops a visual program (IntuInfo+) involving multidisciplinary contributions (architecture, mathematics, science, etc..) with the aim of creating a coordinated and interactive Hyper-representation, which helps to understand medical and physiological data for diagnostic purposes in a simple and immediate way.

In art the work by Michael Naimark is remarkable. Working in the field of cinematography, interactive systems and virtual reality (his works are shown in the American Museum of the Moving Image in New York and in the Exploratorium in San Francisco), he produces what he calls Hyper-representation, repeating a simultaneous representation of the same object from different points of view.

Finally, even in landscape, with photography, cinema, television and other media there have been some changes: technical tools are increasing and the experience of nature has shifted dramatically, what was a simple portion of nature now is a Hyper-representation of the same (Tramontano, 2006-07).

Not considering the Augmented Reality, where the perceived reality is augmented by virtual objects on real space, examples of Hyper-representation in architecture, cities and landscape are actually non-existent. However, we have already begun to build and test this tool, studying Almerico-Capra villa named the *Rotonda*, one of the most famous Palladio's villas in Veneto, trying to show how useful Hyper-representation is for knowledge and communication in landscape and architectural analysis.

Therefore our Hyper-representation organizes this kind of information:

• metric-type (architectural and urban survey);
• analytical-type (study of the sources and documents);
• synthetic-type (creation of 3D interactive model).

All this information must be referred to the 3D model. Landscape and changes over time, as well as aesthetic and geometric attributes are further information for its complete definition. The effort to realize and to display this type of 3D model does not have to deal only with the shape, location, colour or texture (these aspects are now easily detectable with a 3D scanner), but it has to provide a process, an organization of a constructive and structural system, only in this case representation can contribute for understanding and communicating knowledge, with the development of new technological tools. If our purpose is to provide means and techniques of representation of villa Almerico-Capra in its landscape (as physical location and place of culture), trying to create a centre for documentation and research; a useful model to develop a series of scientific studies and cultural events, where focusing the documentation and knowledge of architectural and urban transformations, it is necessary to proceed as follow:

• planning the GIS of the place where the building is, contributing to the testing of functionality, and mapping the available data produced also by other researches;

testing the GIS standards for all kind of digital formats to study architecture and landscape, mostly related to the problem of the representation scales (indeed today the use of computer as a drawing and an information tool has become a vehicle for innovation in the field of representation, but anyone, who uses computer design programs, knows
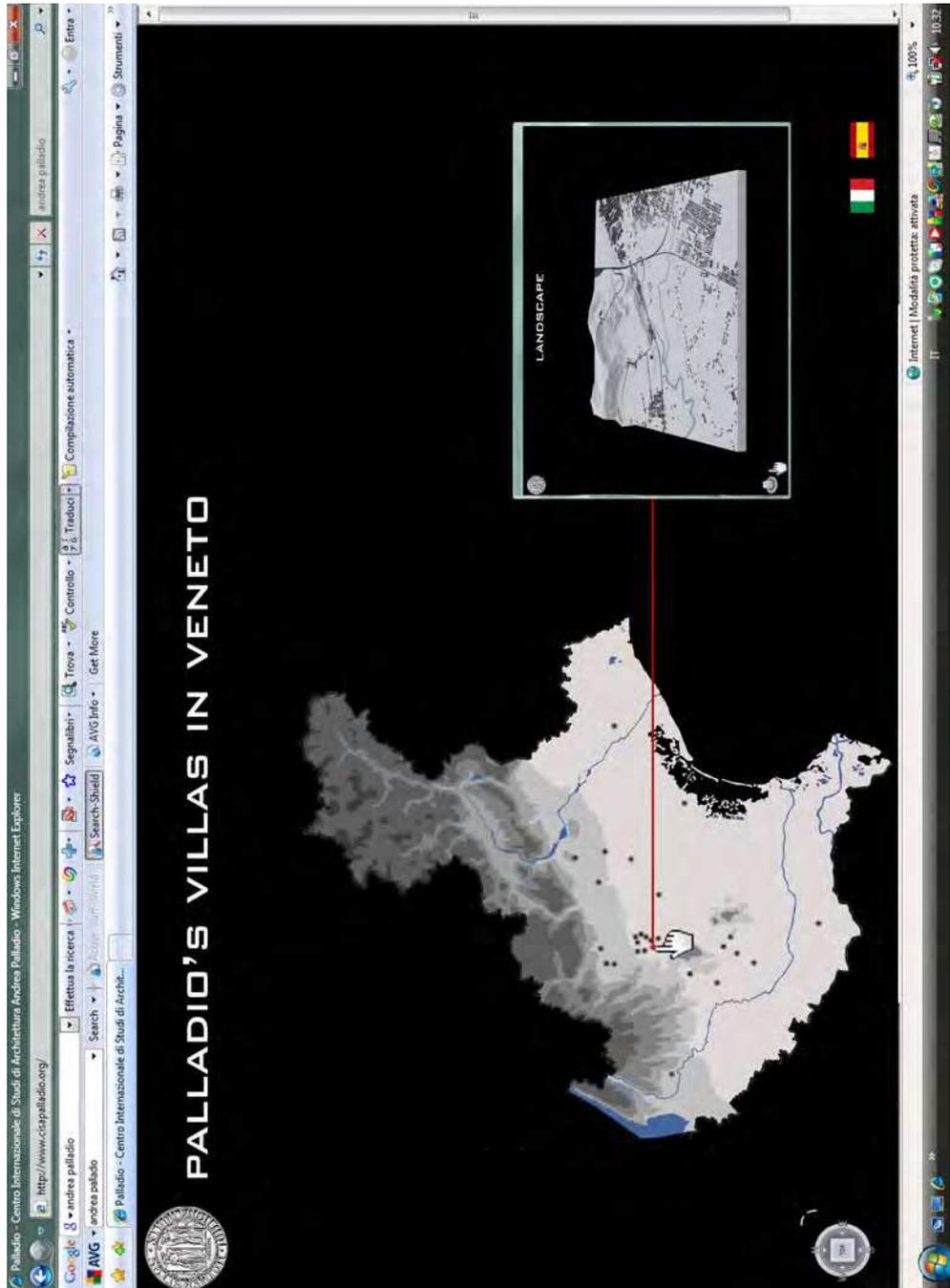
Fig. 1. Homepage of Hyper-representation.

the difference between the scales of representation and that its methods can generate different level of readings);

- planning and testing the Hyper-representation, as part of the GIS, considering it as a coordinated and interactive system of data, in an easy and immediate format of knowledge; in particular: planning 3D models with not only geometric but also semantic and descriptive contents; according to the recent OGC standards (Open Geospacial Consortium); identification/testing/development of methods for creating these special 3D models; testing tools for surfing and querying these models, possibly through the Web;

- implementation of the metric and formal elements through a classic survey, setting the limits of the constructed buildings and checking the space size and their formal definition, not ignoring their values and meanings (formal and structural study of surfaces, which constitutes the spaces, and their mutual intersections, can be viewed not only in orthogonal projections, but also in three-dimensional virtual space freely oriented);

- projective control and analysis of surface, not only using preferential points of view (axonometries and perspectives) but mainly dynamic observation (interactive movies and 'immersive projection');

- testing of topological elements that are essential to guide and to define the system of relations and links, because it presides over any process of semantic and geometric organization of data.

The Hyper-representation of Almerico-Capra villa develops this aspect of geometry, no longer as a sum of rigid formulas and theorems, but rather as set of laws that regulate the formation of any structure and space, therefore, as the geometric configuration of the architectural and urban spaces have a specific and important role, not only in representation but also in the act of building as well as in the intellectual and graphic design, with Hyper-representation we want to facilitate a deeper knowledge and correct translation of the real data with static drawings and dynamic images, assuring a very rich number of choices and alternatives, all connected to the primary structure, communicating also the possible intervention acts to modify the same reality.

3. The Hyper-representation of the villa Almerico-Capra landscape

In contemporary culture, landscape consists of two fundamental aspects: a subjective dimension, as perceptions derived from the knowledge of a place, and an objective one, from which real elements and phenomena emerge in the geographical space. So, on one side, landscape is an expanded representation produced at an individual level, a source of feelings and emotions, that can be communicated through verbal and figurative language; and on the other side, it is considered as a territorial system with environmental and morphological qualities (Tosco, 2007). The complexity inherent in the concept of landscape arises from a strange ambiguity, because the term denotes at the same time the object and its representation. But the analysis is not yet complete, it is necessary to take into consideration the human interventions and the resulting changing of the territory over time.

The Hyper-representation of villa Almerico-Capra, named the Rotonda, in the section devoted to landscape, intends to collect and show all the elements of its environmental context, because the monument can not be considered as an isolated object: a masterpiece of art can be really understood only inside its world, history and territory. The creation of a digital platform, a solid and orbiting model, can be consulted and allows a coordinated
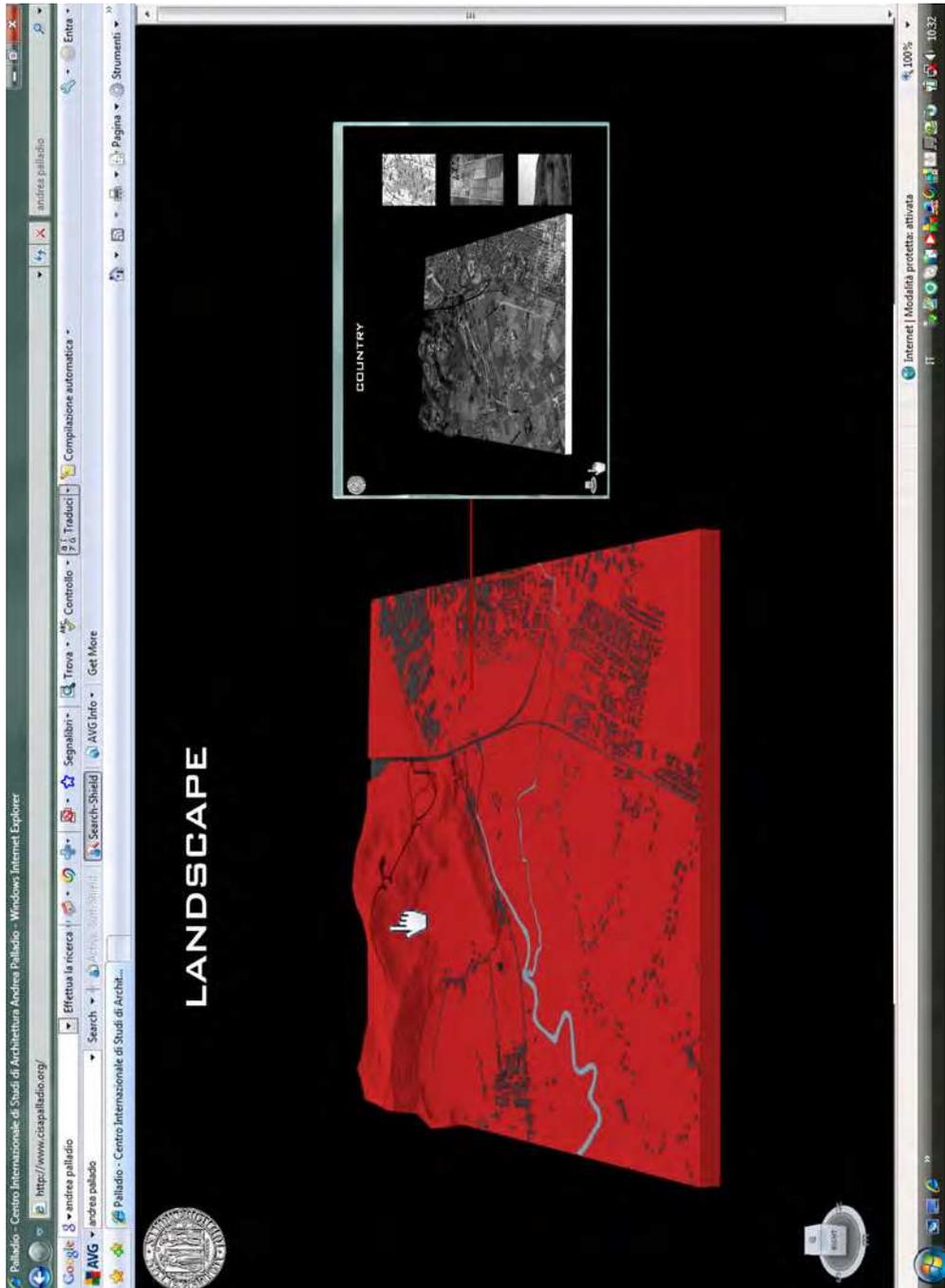
Fig. 2. Connection in the Hyper-representation between territory and country.
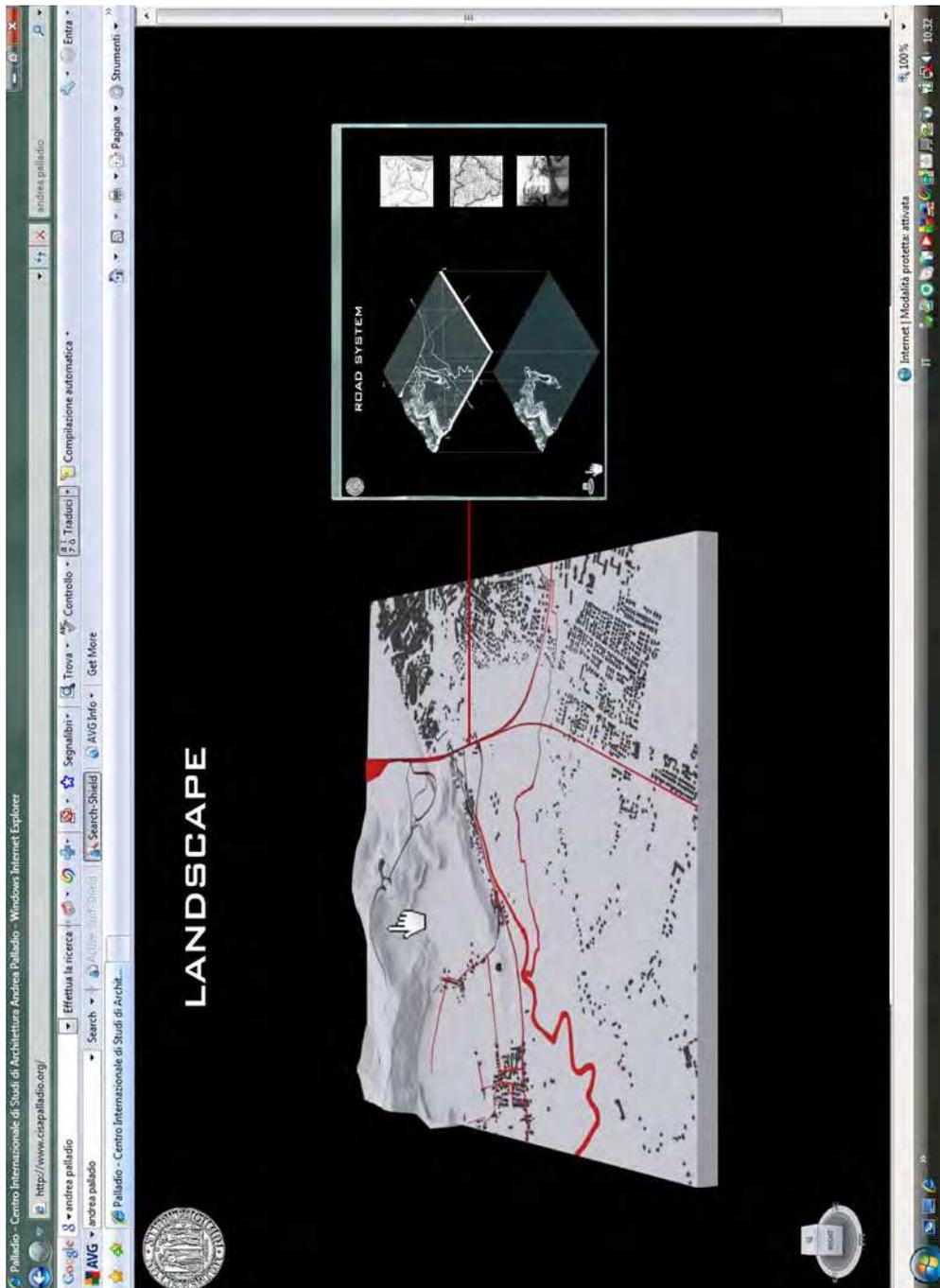
Fig. 3. Connection in the Hyper-representation between territory and road.

System-management of the available data (photographs, environmental data, documentary sources, maps, filing, etc..), furthermore the translation as "solid" information promotes the convergence on landscape of all the interdisciplinary investigations.

The Hyper-representation keeps information open to updating for future acquisitions(open to future acquisitions or updating), derived from direct analysis on the ground or from further studies of archival sources. Unlike other computer systems, the effort of Hyper-representation is to create, through the 3D model, an immediate visual communication of the contribution of the different disciplines, to direct the search to a specific strand or to promote a sort of *consonantia universalis* from an immediate comparison of the data.

Starting from a solid portion of the environment, which lies around the Rotonda, it is possible to begin the path of landscape analysis through the four main selectable categories: "The territory", the "road system", the "urban development" and the "context" of the villa. For each of these paths one can find the contributions of subjective (maps, historical documents and iconographic, pictorial representations, photographs, verbal descriptions) and objective types (natural or man-made elements such as climate, topography, vegetation, urban organization, building types, spatial functions etc.).

After selecting the territory (fig. 2), the same portion of space is shown with a zenithal photograph to display the three-dimensional country, hill, industrial and urban appearances of landscape, whose links lead to a further study: quantitative surveys in the economic, demographic, productive sectors and so on, but especially the comparison between the transformation of the area over time.

The hills have the advantage to be immediately discernible compared to the plain, which is characterized by a dense agricultural subdivision known as *centuriatio*, this testifies the survival of the Roman technique for the control and development of the territory; usually the *centuriatio* began close to an urban center, to keep the political control on territory, which was connected to the administrative center through streets and waterways (Ackerman, 2003). As for the country, also for the Berici hills, around Vicenza, along which there is the Rotonda, it is possible to start from the solid model to obtain information relating to the artistic aspect (literary and pictorial evidence) and to the geographical and natural links (flora, fauna, business etc.).

The road system (fig. 3) plays a primary role in the development of an area and for this reason a specific path was dedicate to it in the Hyper-representation of the landscape. Selecting the lines of communication it is possible to distinguish between waterways, major routes, secondary roads and railway connections. Also in this case, the references to data for a further study are readily available through the solid model; the relations on the road system are not limited to an analysis of the current range but are widened also over time in order to compare the changes of routes and their different utilizations. Some economic reasons, first of all the location near the main communication routes and waterways, essential for irrigation and transport, assume a key role in life and organization of the territory. The Bacchiglione River, this specific example, was the main communication route between the city of Vicenza and the rest of the region, from hinterland to the lagoon.

The urban system (fig. 4) and the anthropic development and transformation are themselves subject of study and can not be separated from the landscape. Only the knowledge of forms, structures and types is able to provide a concrete basis to the economic and social intervention. The spatial analysis, in all its aspects, highlights the structure of human geography and its potential. The most significant pattern in this case is the clear relationship

between building and territory. The works of man can not be analyzed as a closed phenomenon, but they need to be studied in relation to environmental conditions and processes, involving the entire area. The analysis of the city involves the geographical space, observing the organization on a large scale and taking into account traffic, agricultural partitions and infrastructures: the eye of those who see this particular path, through the Hyper-representation, skims over ground and turns its interest to the historical maps, offering a zenithal view to supply valuable information and to reconstruct the landscapes of the past and present.

The last digital proposal (fig. 5) collects what has been emphasized in the previous paths passages, but it synthesizes all the researches in relation to the Rotonda. A group of data focuses on the descriptions and evocations of the villa, in particular with regard to the pleasures it offers to the owners. These writings deal only marginally with times and problems attached to agriculture, and concern rather to the enjoyment of nature and *otium*; the issues related to the "barchesse", their functions and role in the villa are connected to the Hyper-representation of other Palladian examples.

There are as well additional guidance regarding to the choice of the site where to construct the villa: spatial data on the safety of the place and its configuration, the ground all around the Rotonda is pending; some views that emphasizes the orientation of the building, south-east facing to benefit from warmth in winter and coolness in summer. The relationship between of closeness and connection of the villa to the city of Vicenza has also been represented, and for Palladio, this aspect involves considerations of an economic nature. In his treatise of 1570, Palladio describes the site of the Rotonda as a theatrical scene, perhaps in homage to the *anphiteatrum* of Plinio: "… il sito è de gli più ameni, e dilettevoli che si possano ritrovare: perche è sopra un monticello di ascesa facilissima, et è da una parte bagnato dal Bacchiglione fiume navigabile, e dall'altra è circondato da altri amenissimi colli, che rendono l'aspetto di un molto grande Theatro". The Primary aim of the rich owner of the Rotonda was not comfort or profit enterprise, but the representation, of the message of strength, greatness and majesty, public recognition of the power: his villa, located on top of a hill was designed to be seen and admired by everyone on each side. The elevations are equally impressive and face the main roads and consists of, as in other Palladian villas, a pediment over columns. The composition is a mix between the ancient temple and the imagination of Palladio, as can be deduced from a series of studies, shown in the Hyper-representation, relating the landscape of the Rotonda with some hypothetical reconstruction of the monumental complex by Palladio. These drawings can not be considered archaeological reconstructions, but rather, a fantasy project that considers the landscape as the place in which to relate a political symbolism and a drama. The Rotonda is a well known and familiar building that it is now considered an integral part of the territory and culture, so it belongs to its landscape. This visual addiction drives us to forget how fantastic, witty and magnificent the villa appeared to his contemporaries.

The experiment made on landscape with Hyper-representation can be enriched and expanded, depending on the theme to deepen, but one can also go further and move to a larger or more restricted scale, from region to single architecture, this last case is the object of the analysis of the next Hyper-representation to show all the aspects which concern the architecture in its constitutive elements.
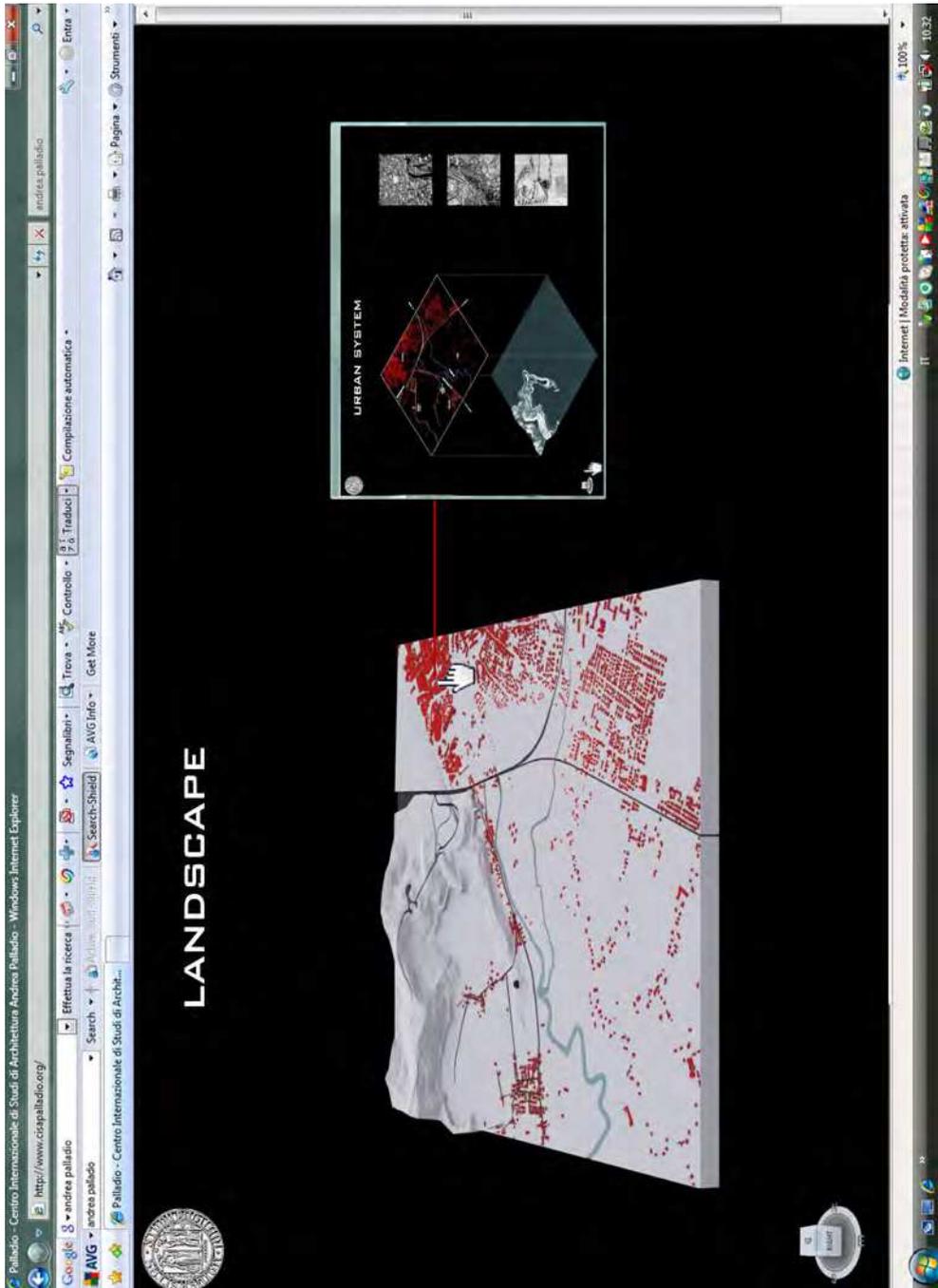
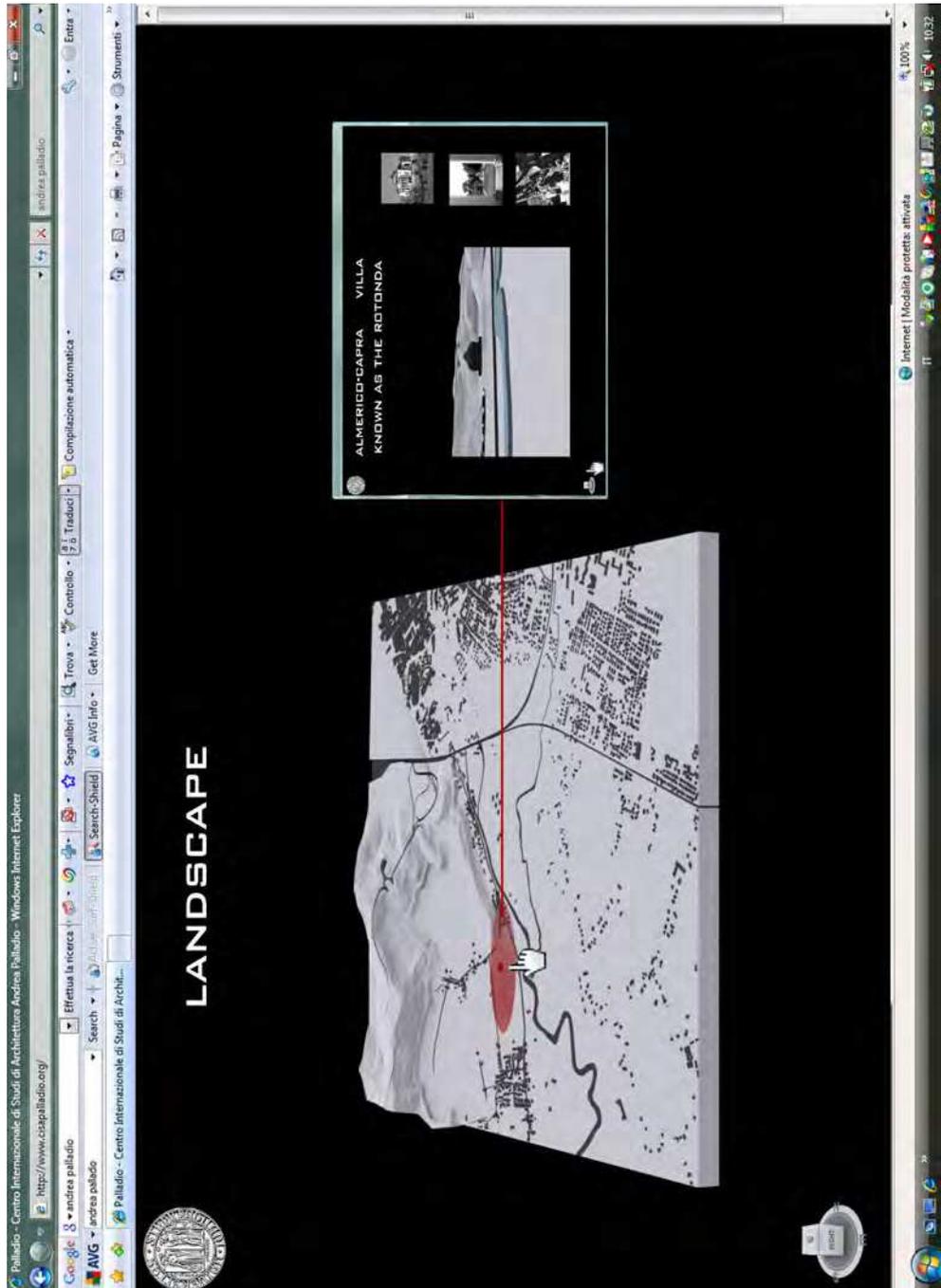Fig. 4. Connection in the Hyper-representation between territory and urban system.

Fig. 5. Connection in the Hyper-representation between territory and villa.

4. The Hyper-representation of villa Almerico-Capra architecture

When an architectural masterpiece needs to be represented, the initial problem is to collect and integrate all the information suitable for a correct interpretation of the studied case: designing an architecture does not mean only to reproduce faithfully the configuration of its space, through traditional methods of representation – orthogonal projection, axonometry or perspective –, but this act requires a careful and meticulous analysis of the building, achieved through the integration of the most relevant sources and aimed at a rational interpretation of the geometric surfaces, to create an in-depth and exhaustive work in all his aspects. The Hyper-representation of architecture arises from the need to collect a sort of interactive database, all documentation relating to the building, consisting not only of historical, graphic, and photographic elements, but also of the sum of the bibliographical literature on which our research is based. In other words, the purpose of Hyper-representation of an architectural masterpiece is to create a tool for the dissemination of scientific knowledge, useful for an external user: it is possible to start from a wide and general aspect and obtain more detailed information of every kind of element that forms the architecture. The reported example is referred to the Hyper-representation of one of the most celebrated villa of the Paduan architect Andrea Palladio, built near Vicenza: Almerico-Capra villa, known as the Rotonda, about which there are a lot of historical, photographic and literary evidences, focal point of our research, as well as a graphic documentation consisting of direct measurements and metric surveys that allowed to construction of a three-dimensional digital model. The visualization of this digital clone, that orbits in a virtual space, is the main page from which the links of the representative system – similar to those that can be found in the structure of a common hyper-text – depart.

This villa, presumably erected between 1567 and 1569 for the Canon Paolo Almerico, meets all the aspect of an aristocratic Renaissance architecture, i.e. it is a construction that forms the landscape (Assunto, 1990). The Rotonda, located on the top of a hill near the city, is a sophisticated and suburban residence, able to perform the function of representation; it has a central plan, obtained by the intersection of a square with a Greek-cross. The building – rotated 45 degrees in relation to the cardinal points, so that the interiors have a similar exposure to the sun - is completely symmetrical with respect to the two main axes; the four equal façades consist of a porch composed of a pediment supported by six Ionic columns, leading to the central room topped by a dome. Plan, elevation and section of this architecture are depicted in the famous Treaty written by Andrea Palladio and entitled *I Quattro Libri dell'Architettura*, dating back to 1570, but these drawings are different from the actual realization of the building because they had only a symbolic and theoretical meaning, without involving in any way the intentions of the architect. From other studies it is possible to deduce that the Rotonda is clearly to consider a civil building of Palladio concluded and even exalted by the dome, which was usually a peculiarity of the sacred architecture (Semenzato, 1990).

The structure of Hyper-representation is articulated in such a way that the house is located in its landscape (fig. 6) so that the relationship with the nature of the place and the main lines of communication are emphasized and analyzed.

The homepage of the Rotonda, alludes to the structure of a common website so that the usability is more simple and immediate, because it offers the virtual model of the house including the large surrounding park and the agricultural annexes, provided in Palladio's planning (fig. 7); they can be individually questioned by the user as they orbit into the space.
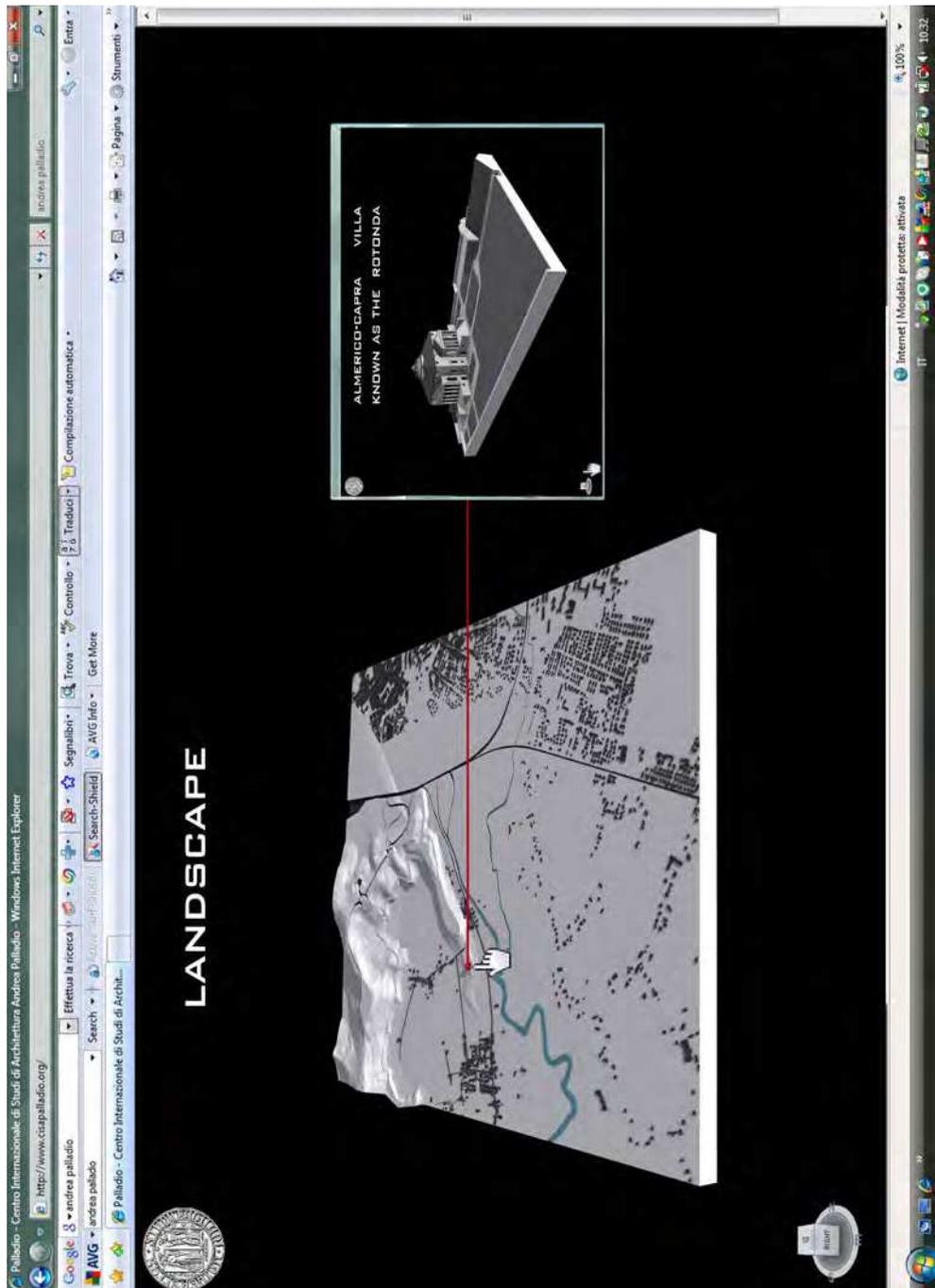
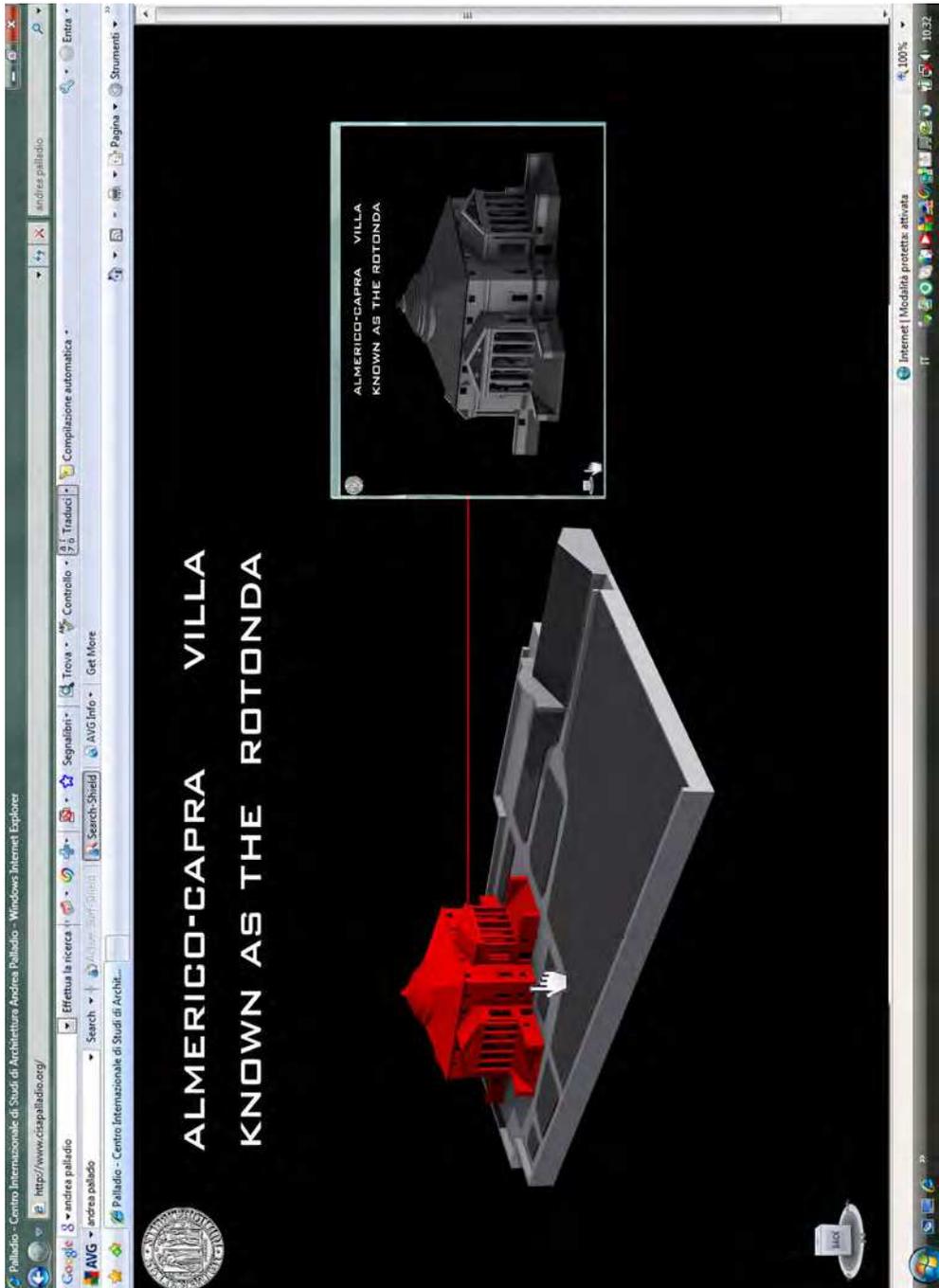Fig. 6. Connection in the Hyper-representation from landscape to villa.

Fig. 7. Connection in the Hyper-representation between villa and its parts.

A reference system properly oriented on the cardinal points, is able to refer, clearly, the whole structure of Palladio not only with its immediate surrounding, but also with the landscape related to the entire territory. The main elements, and the secondary ones, can be further questioned, selecting them, one by one, with a simple click of the mouse, broken up into their individual components, that are so broadened from the whole architecture. A multimedia journey leads the user to examine every single aspect of the residence: a sort of matryoshka of representation, the representation within the representation, constantly evolving and constantly updated; it can be implemented within the architectural structure of the Hyper-representation. The following organization chart (fig. 8) identifies the four major sections which form the structure of our Hyper-representation, which is the continuous reference from a series of links to the available documents.
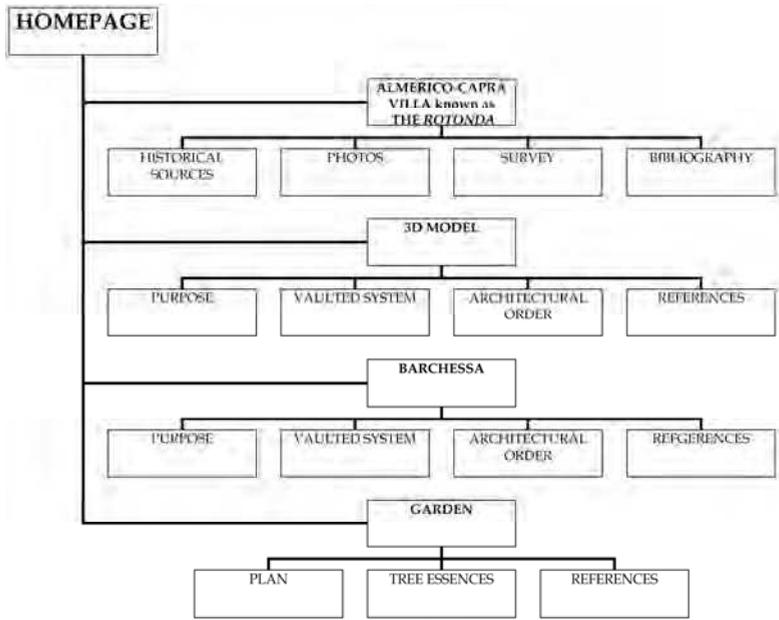

Fig. 8. Structural system of the Hyper-representation in the architecture.

Questioning, for example, the digital model, consulting directly the surfaces of Almerico-Capra villa, it is possible to go through a clear visualization of the vaulted system overlying the rooms, highlighting the geometric genesis of surfaces that compose the building. The vault, taken out of context, is linked to the historical references of the territory, from which the architect may have taken inspiration during the planning of the masterpiece (figg. 9-10). This process, easy to read, applied to all elements of the clone, highlights the formal and forming aspects of the represented object. Furthermore, it is an example of the Hyper-representation, valid and extensible to all the buildings in the territory: the virtual journey into the Andrea Palladio's architecture embraces all the concepts that concern both the architect and his project, but there are also some intrinsic information relating to other subject that go beyond the design of architecture, also if the representation can not fail to consider them.
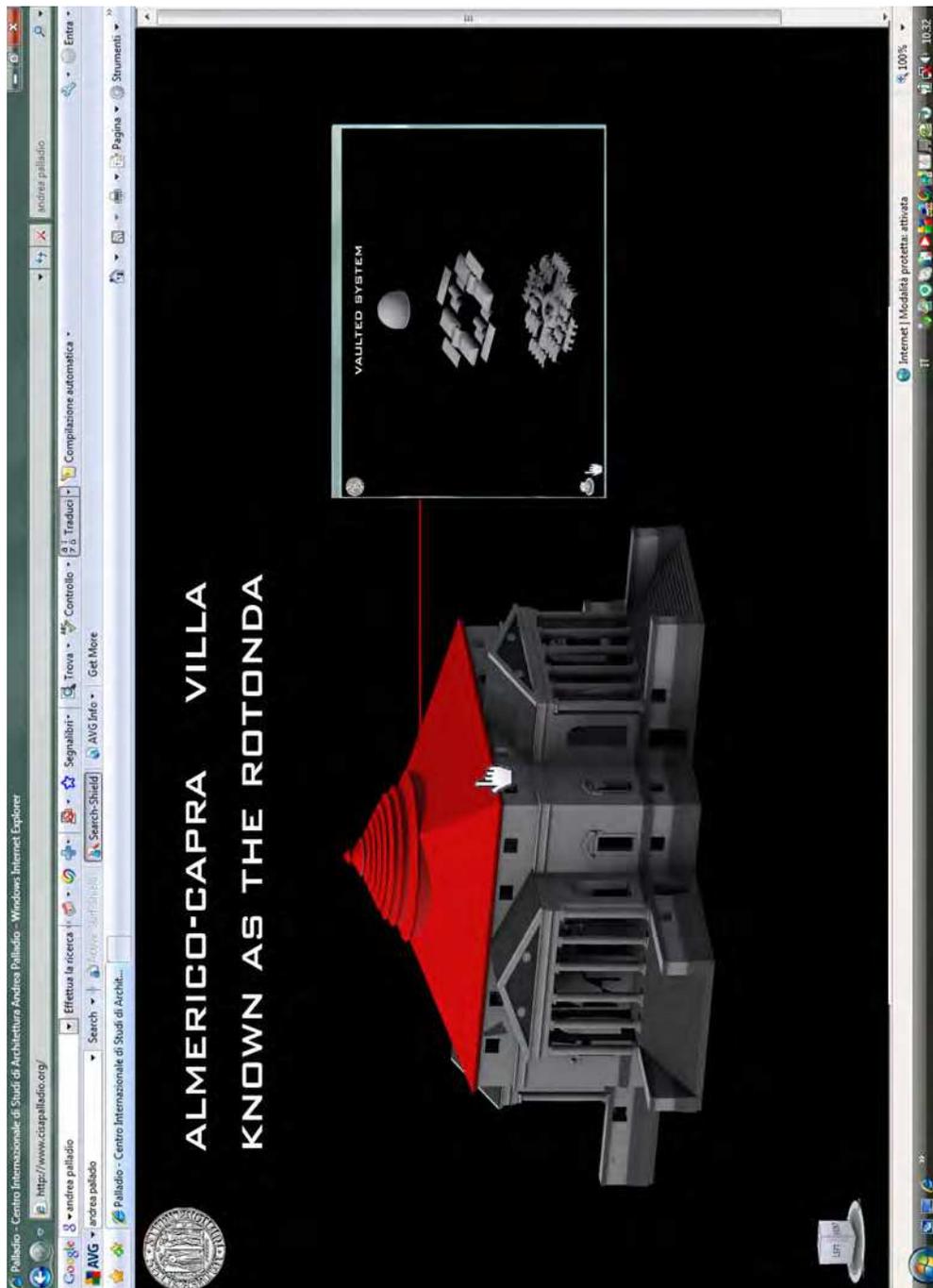
Fig. 9. Connection in the Hyper-representation between villa and vaulted system.
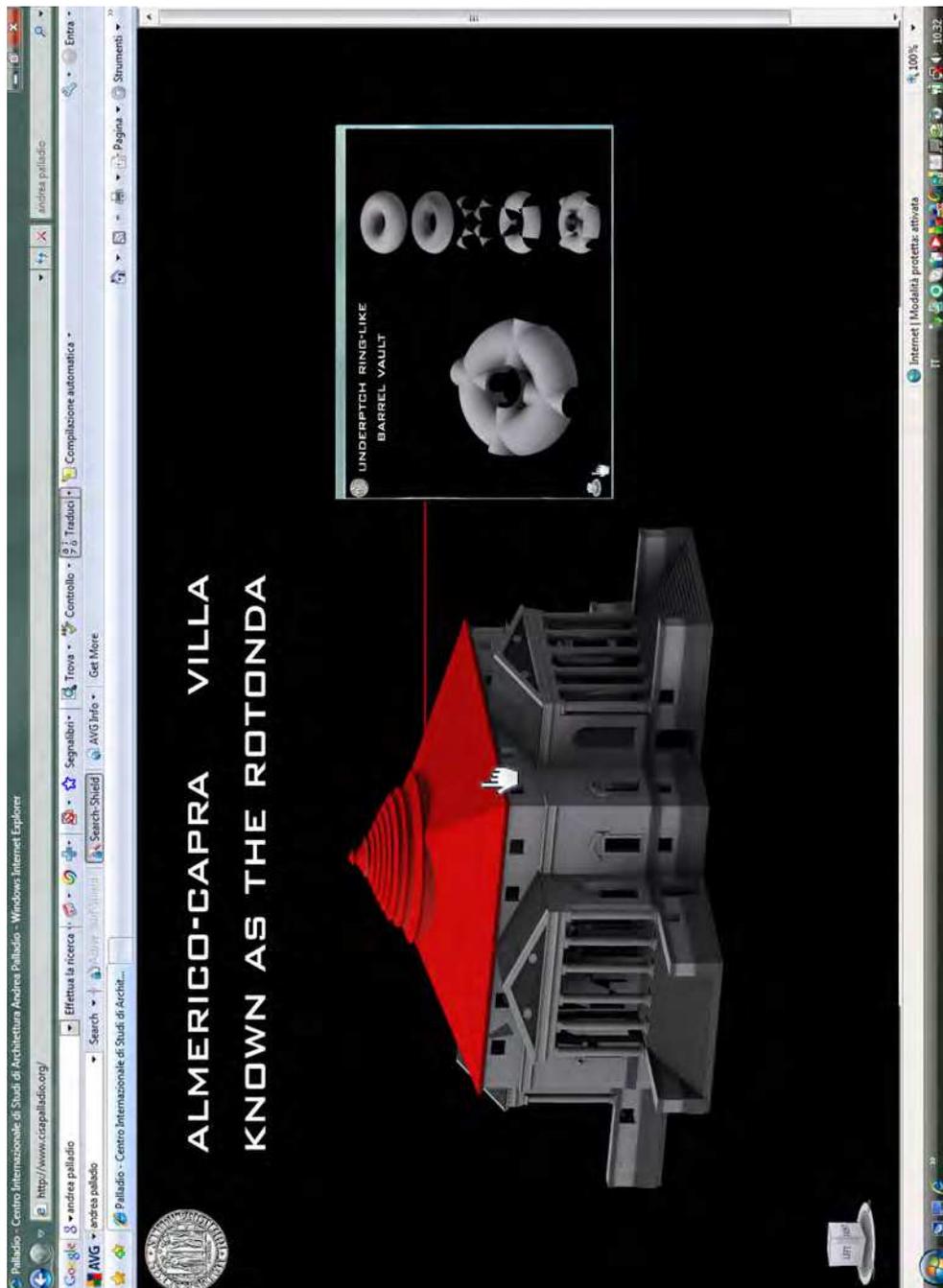
Fig. 10. Connection in the Hyper-representation between vaulted system and its geometrical genesis.

5. Conclusion

This research dealt with the organization of a particular hyper-textual code, the Hyper-representation, which, according to the rules of representation, allows knowledge, understanding and communication of architectural and urban spaces. The aim is, thus, to provide a tool for organizing an act as information and transmission system not only of the evidential reality, the physical place, but also, a more hidden reality, not easy to read, which contributes to the creation of an architecture or a city (the designed place of research, of knowledge and testing, where there are traces of processes, theories, and cultural links). Our proposal is to establish a Hyper-representation, through which to develop a "form" of innovative display, to facilitate analysis and testing a large amount of complex evolving data, in an accurate and rapid way. Hyper-representation considers as one can more easily understand a 3D geometric model and wants to map the evolving data and their properties on three-dimensional objects, to obtain changing objects related to their dynamic and effective changes. In other words, this special view allows the user to understand, also intuitively, every kind of change: geometric, positional, dimensional, chromatic properties and so forth, contributing to a profound learning, even more intuitive, of the represented reality. As mentioned, methodologies and technologies of the Hyper-representation must involve interacting, organized inputs and multi-disciplinary efforts, not only expert people in representation, but also in history. sociology, architecture, computer science, communication, etc. all these figures have to produce their contribution, but representation has the main task to transmit in the proper manner knowledge.

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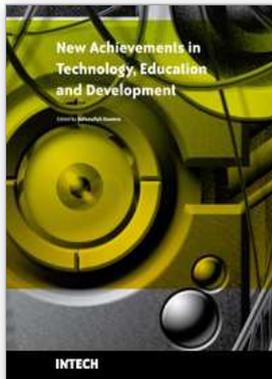
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Elaboration of drawings: Flavio Chiementin, Tommaso Soldà, Isabella Friso, Cosimo Monteleone, Andrea Giordano

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Edited by Safeeullah Soomro

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