

Digital Models for the Documentation of the Architecture of the 20th Century

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Abstract—The research, based on the assumptions of the scientific sector and starting from the study of historical-iconographic sources, presents the results of the activity of architectural survey and digital modeling in terms of typologies and morphologies which expose the geometric and structural beauty of the architecture of the Royal Park of Tirana in the 20th century. In the activity of reading the identity issues of the disciplinary drawing identify the relationships between representation and measurement, the graphic aspects and the material and immaterial values of places, intended as traces of the past to be compared to the architectural and environmental conditions of the present. For the documentation of the architecture of the Royal Park of Tirana, digital models of the Royal Villa, the Odeon, the Chapel, the generator house, the gardener's house and the iron and glass greenhouse complex have been created. These models, suitably elaborated and rendered with the use of specific software, have the objective of verifying the integration of the survey techniques through the comparison of the measurements made.

Keywords—Survey, model, documentation, architecture, architecture, Twentieth Century.

I. INTRODUCTION

The theme of digital modeling is of great importance, since it allows to face, according to disciplinary assumptions such as technical-instrumental and theoretical applications, the dynamics of drawing related to both traditional and innovative digital representation. This science is used to determine the aspect concerning visualization, a fundamental element for the documentation of the structure examined, through which it is possible to define the final graphic rendering compatible with the purpose of the survey, both relative to the knowledge of the existing and indicative for the protection and enhancement of the asset.

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Fig. 1: Digital survey aimed at creating the model. Cloud of the points of the structure and the square in front.



Fig. 2: Digital survey aimed at creating the model. Frontal points cloud.



Fig. 3: Digital survey to create the model. Cloud of the points of the structure and of the vegetation system.

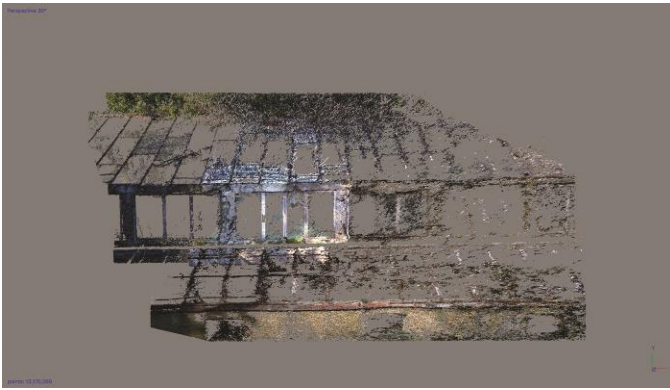


Fig. 4: Digital survey to create the model. Central portion of the point cloud.



Fig. 5: Digital survey for the creation of the model. Frontal point cloud of the projecting body.

The critical description of the architecture, starting from the graphic reading of the typological imprints of the constructions of the past and the morphological configurations, with reference to the discipline of drawing, makes explicit the awareness of the scientific and cultural foundations of the methods of representation aimed at understanding architecture: first of all through the drawing of the plan, the section and the elevation; also through the measurable three-dimensionality of the axonometry and, finally, through the ideal spatiality of perspective. Therefore the new information technologies applied to geometry become an instrument of restitution, analysis, information of the Royal Park of Tirana.

In the illustrated graphic scene, the drawing of architectures, that is the practical one oriented to model the object as a form, covers the main critical and theoretical exercise of method for digital technologies defining the geometric issues necessary for the creation of virtual models. In this sense, the method of orthogonal double projections, parallel projections and central projections constitute the explanation of its scientific features through their intrinsic ability to bring out the thematic and ideal contents of architecture.

For the study of the Royal Park of Tirana, digital models of the Royal Villa, the Odeon, the Chapel, the generator house, the gardener's house and the iron and glass greenhouse complex have been realized. These models, suitably elaborated and rendered with the use of specific software, have the objective of verifying the integration of the survey techniques through the comparison of the measurements made.

II. THE DOCUMENTATION OF THE ARCHITECTURE OF THE 20TH CENTURY

The Royal Park, located on the hill of Mulleti, covers an area of 74 hectares and includes six architectures such as the Odeon, the Royal Palace, the Chapel, the complex of greenhouses, the house of the generator - called the house of light - and the gardener's house and four green areas such as the avenue of cypresses, the avenue of oleanders, the garden with the belvedere and the lake. The first hypothesis of the Royal Garden, presumably commissioned by King Zog, was conceived by the architect Florestano di Fausto (1890 - 1965), later modified by the engineer Giulio Berté and the architect Gherardo Bosio (1903 - 1941) and finally realized by the architect Ferdinando Poggi (1902 - 1986) (Vokshi 2014).

The research included a conspicuous analysis of the archival documentation - such as drawings, photographs, sketches and notes - related to the examination of the project and executive drawings of engineer Giulio Berté carried out in the Arkivi Qëndror Teknik i Ndërtimit (Technical Archive of Construction) in Tirana. The study also covered the project drawings of Architect Bosio including a representation of the Villa Reale at the center of a perspective with an amphitheater at the base to demonstrate the emphasis on the role of representation proposed for the residence by the same drawing (Giusti, 2012). There are also numerous interventions by landscape architects and artists who have left ample documentary evidence of the interventions carried out and proposed such as Pietro Porcinai (1910 - 1986) and Antonio Maraini (1886 - 1963) (Zangheri, 2006).

The original project, dated 1935, was signed by the architect Florestano di Fausto and included the Royal Palace, a Villa for the King and a building for the Princesses. After that date, the work of conception passed to the engineer Giulio Berté who, in 1937, made use of the landscape architect Pietro Porcinai for the drawing of the Park, who developed various solutions to define the drawing of the floors, the monumental staircase and some decorations.

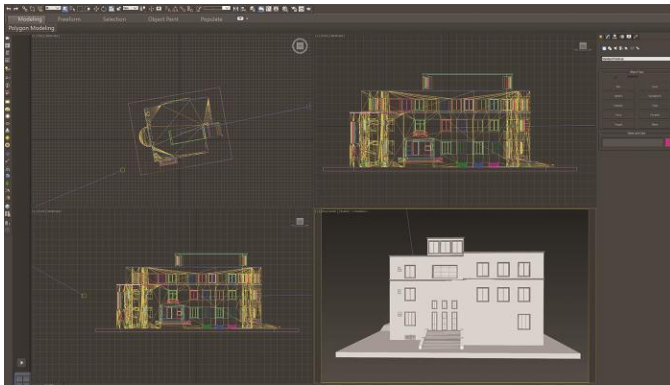


Fig. 6: Digital modeling activity with reference to surfaces with holes.

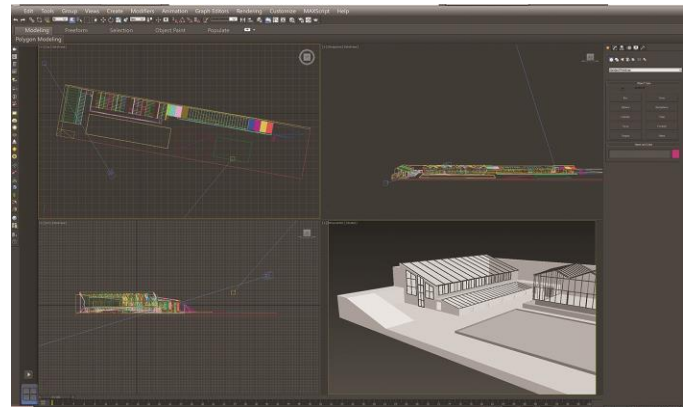


Fig. 8: Digital modeling with reference to glass surfaces.

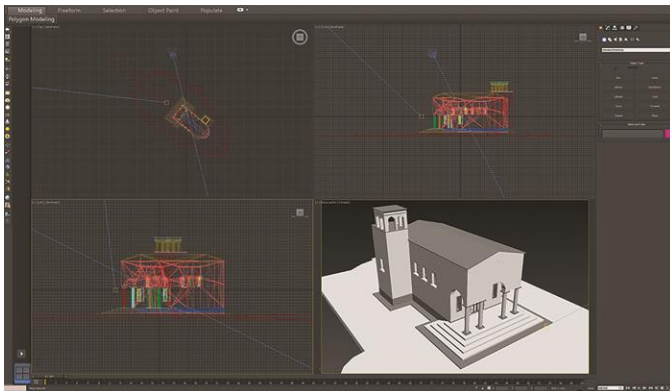


Fig. 7: Digital modeling activities with reference to vaulted surfaces.

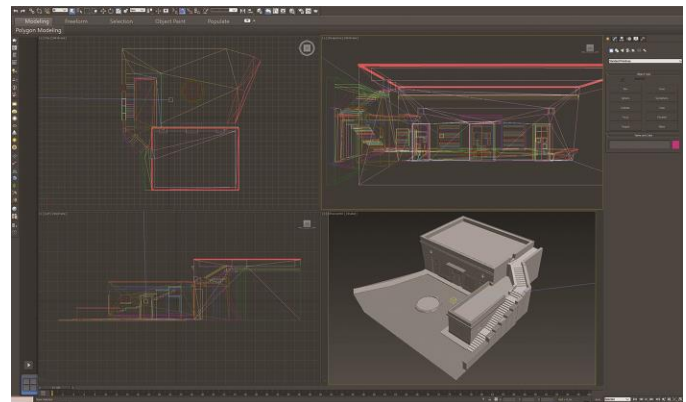


Fig. 9: Digital modeling activities with reference to complex surfaces.

The engineer, very successful in Tirana, had created numerous residences for local aristocrats following the rationalist style and far from the classic forms of the European Royal Villas. The works, following the indications of Berté himself, began in 1938 but were interrupted in 1939 with the Italian invasion in Albania. In 1939 the intervention of the architect Gherardo Bosio was decisive.

He reinterpreted the project by redesigning the geometries of the Villa and producing the executive drawings of the internal furnishings, the external and internal finishes and the final drawing of the garden with clear references to the European Residences.

In 1942 the architect Ferdinando Poggi, after Bosio's death, revised again the project of the Villa, the gardener's house, the Chapel and the barracks and completed the works in a short time. The Villa Reale (Giusti, 2012), is revised in the interior decoration (previously drawing by Bosio both in the drawing of the building materials and in the choice of the workers, materials, artists of reference of the time) and in the architectural composition with asymmetrical geometries in plan and elevation as well as with volumes facing west. The current morphological layout of the Villa is on four levels, one of which is underground, and flat roofing. The load-bearing structure is in reinforced concrete with brick paving, the facades plastered and perforations bordered by travertine jambs and closed by wooden frames.

The main facade, exposed to the south, is characterized by an entrance with 11 steps leading to the travertine portal and wooden door.

The Chapel inside the Royal Park, called Palatina, stands on a promontory and was built in 1939 at the behest of Vittorio Emanuele III. The current layout has a single hall with a semicircular apse and stone paving. The main facade is preceded by a portico with four columns plastered and painted grey: the elevations are painted white and have four holes in the west and five windows in the east, one of which is on the bell tower.

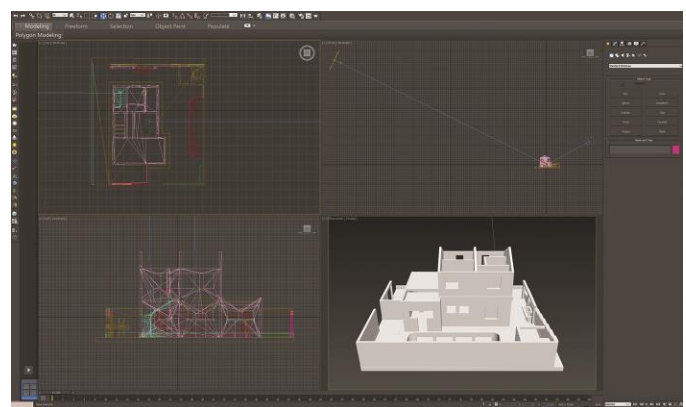


Fig. 10: Digital modeling with reference to damaged surfaces.



Fig. 11: Digital modeling aimed at knowledge for minimum protection interventions.

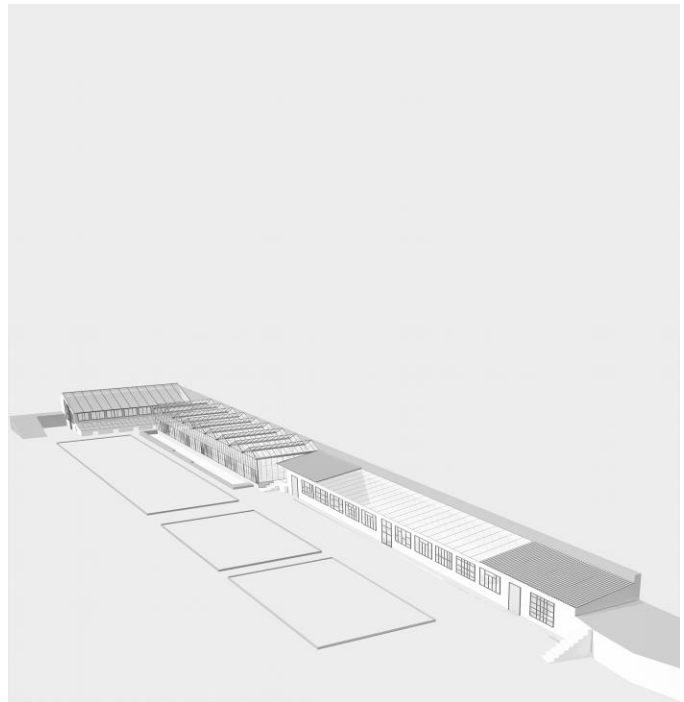


Fig. 13: Digital model aimed at knowledge for necessary conservation interventions.

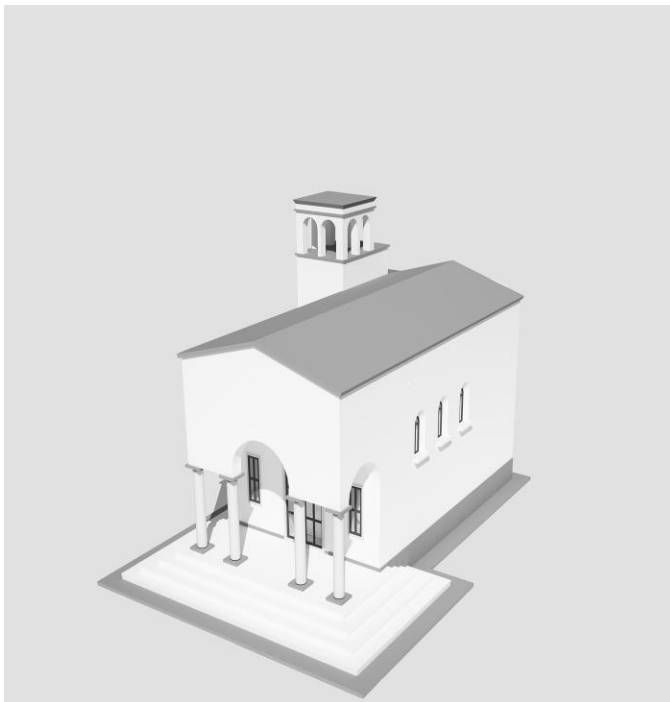


Fig. 12: Digital model aimed at knowledge for minimum protection interventions.



Fig. 14: Digital model aimed at knowledge for necessary conservation interventions.

In the part below the flower garden to the west of the Villa Reale, instead, is built the house of light, a basement structure with flat roof from which, through a scenic ramp, you can access a first terrace, covering a technical volume of the same architectural organism and, through a subsequent flight of stairs, the square below with a central water tank.

The western facade, which encloses the diesel generator for the production of electricity in the entire complex, is characterized by a central portal with canopy and two side entrances closed by wooden windows; the two windows that intersect laterally with the portal, square in shape, are characterized by retractable shutters.

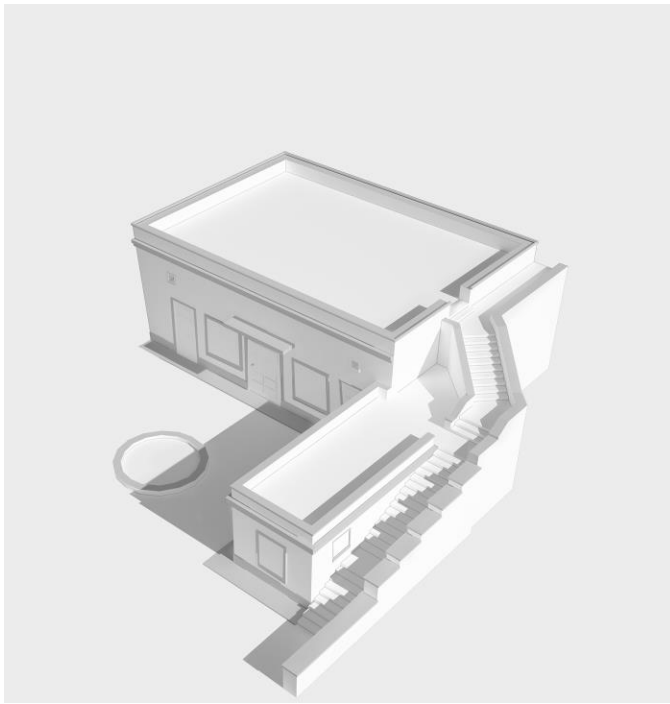


Fig. 15: Digital model aimed at knowledge for necessary conservation interventions.

In the southern part of the avenue of cypresses, sheltered from the north winds, there is the complex of greenhouses, built between 1941 and 1942 at the same time as the gardener's house. The drawing idea came from the landscape architect Pietro Porcinai who, as can be found in the archive documentation, outlines not only the geometrical shape but also the layout of the interior vegetation, the seasonal planting of vegetables and flowers, as well as the strategic layout of the forest behind it. The greenhouses follow the path below the avenue of oleanders separated from it by a vegetation system with a protective function against north winds and a reinforced concrete containing wall on which the iron and glass structure rests. The complex is composed of four distinct identifiable volumes: the first to the west with a masonry base and glass roof, the second, raised 50 cm above the floor, in iron and glass, the third in masonry, with an opaque roof and large openings exposed to the south and, finally, the fourth, a service building with the function of storage for equipment, vases and for the storage of seeds.

In 1943, the architect Ferdinando Poggi defined the current configuration of the Park according to the new needs of the client and the guidelines coming from the styles of the European Gardner (Giusti, 2012).

The avenue of cypress trees, a driveway that leads from the entrance on Elbasan street to the Villa Reale, characterized by a regular geometric mesh of two trees interrupted by seats, the central fountain in front of the Villa with parterre, water chain and sculptural group. From the same period as well as the work of the same architect are the avenue of oleanders, a pedestrian path of 46 meters, and the sequence of Italian gardens, flowers and the belvedere.

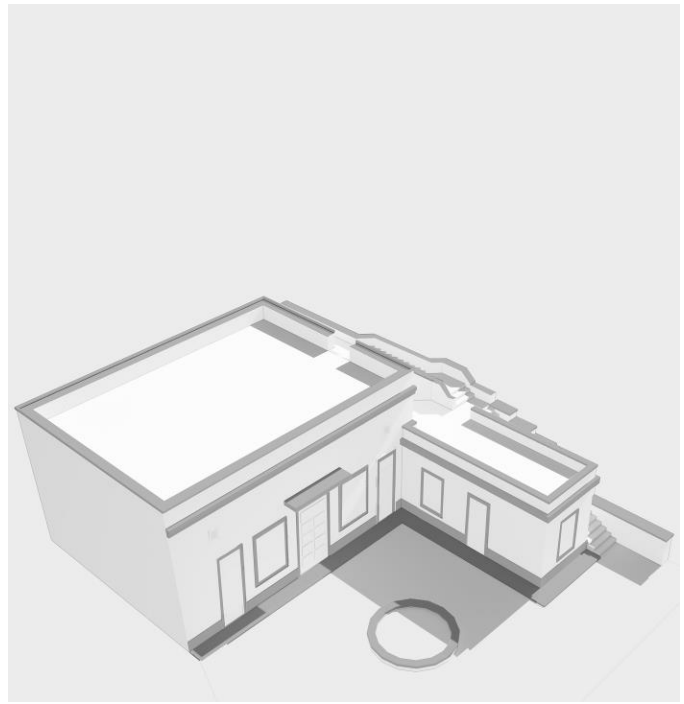


Fig. 16: Digital model aimed at knowledge for necessary conservation interventions.

The Italian garden is characterized by two polygons of squared vegetation placed in axis with the flower garden, the oasis of the entire park, where tree species with seasonal flowering are planted. The path ends with the raised system of the belvedere which is accessed through two symmetrical spiral staircases that follow the mound containing masonry from which you can admire the entire planting of the gardens and glimpse, through the thick vegetation, the underlying city of Tirana. Through a pedestrian path sloping westward and away from the representative scenic system, stands the gardener's house, a building on two levels with adjoining external services such as ovens and storage.

The structure, now in a state of total abandonment, is invaded by weeds and presents the total collapse of the roof: it preserves the flight of stairs leading to the second floor and the supporting walls of the same level.

The Poggi, redefines, moreover, the paths in the Park and the bordering of some parts of the lake. The original basin had 3 small lakes in succession, two of which have disappeared and can now be identified only through the identification of the marsh vegetation. Today's stretch of water has a concrete border in the southern part of the lake, while in the northern part a wall of boulders, taking advantage of the natural slope of the land, prevents water from escaping.

III. CONCLUSION

The digital representation, as well as the implicit realization of models, besides playing a graphic role of three-dimensional reproduction of the object, is an instrument to verify the congruence of conventional representations, such as plans, sections and elevations.

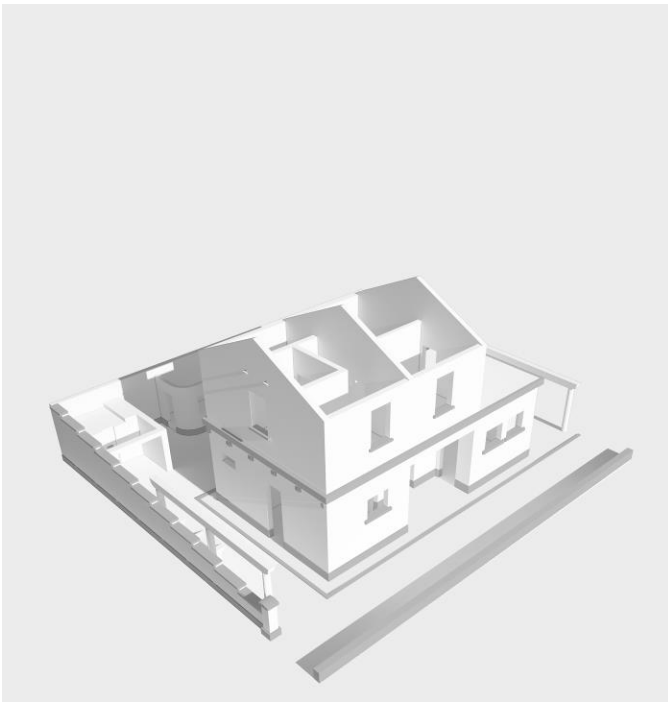


Fig. 17: Digital model aimed at knowledge for urgent conservation interventions.

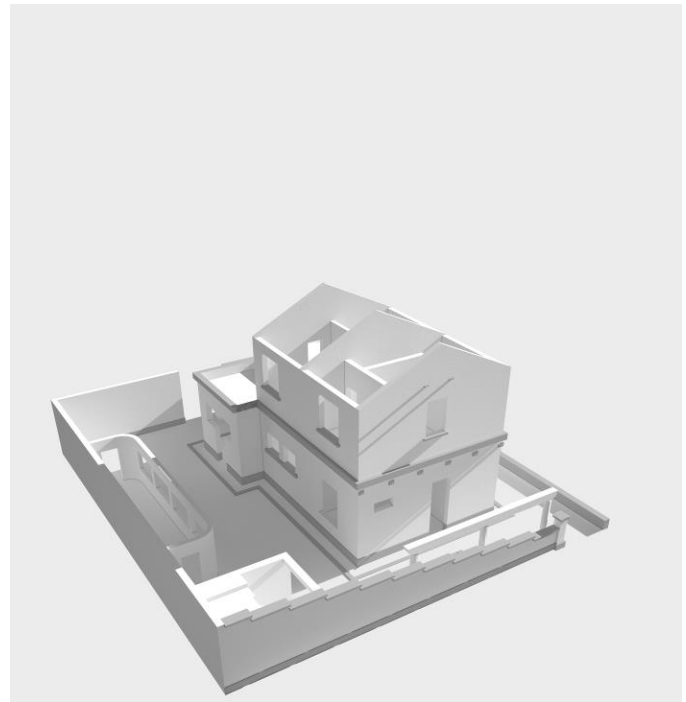


Fig. 18: Digital model aimed at knowledge for urgent conservation interventions.

The model is an ideal icon of reality and, as far as morphology is concerned, it shows all the characteristics indicated by the drawing, specifying in the best way possible its shape and particularities, representing and manipulating real elements through complex simulations. These computer activities determine a dynamic representation of three-dimensional data using articulated visualization techniques and using materials, lights, colors, tends to reproduce the characteristics of the real world.

Of great interest is the primitive phase of modeling, that is the activity of three-dimensional transformation of two-dimensional graphs, which allows an immediate visualization of geometric shapes and basic volumes. These physical models constitute both geometric configurations to determine the volumes and the bases with which to interact through photo-modelling.

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