

VIRTUAL ABRIOLA: A PROJECT FOR THE DISTANCE VIEWING OF THE WORKS OF GIOVANNI AND GIROLAMO TODISCO

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Abstract:

This project was promoted about three years ago by the Municipality of Abriola (Potenza, Italy) and the Basento Camastra Local Action Group as part of the “Cammini d’Europa” project (Asse II Cooperazione transnazionale). It was conducted in collaboration with Officina Rambaldi, an international team of professionals headed by Carlo Rambaldi, winner of the Oscar for special effects in the films “King Kong”, “Alien” and “ET”. The objective of this study is basically museographical, i.e. to promote knowledge and virtual exhibition of the works of two great artists of the 16th and 17th centuries, Giovanni and Girolamo Todisco da Abriola. The works painted in Pietrapertosa, Santa Maria di Orsoleo, Senise, Potenza and Rivello, all characterised by an excellent communicative value and a simple and legible figurative style in perfect harmony with the needs and nature of the Franciscan order, testify to the artists’ prolific activity.

The starting point of this knowledge itinerary is the Sanctuary of Monteforte, in Abriola, virtually reconstructed in 3D using image-based technologies with particular reference to photo-modelling which were integrated into a navigation engine for Real Time 3D content. The overall management of the data on a web-based platform enables the distance viewing of works and places, including the Sanctuary and its geographical context. It also gives access to a pool of heterogeneous information (interactive spherical panoramas, texts, videos, Flash and Shockwave animation, etc.). The use of models that are accurate from both the geometric and the textural point of view enables highly realistic three-dimensional navigation, which is made even more convincing and engaging by the adoption of stereoscopic viewing systems.

The project was officially presented to the public only in February 2011, demonstrating the continuing validity and communicative effectiveness of this by-now consolidated technology in terms of both communication and distance viewing of contexts of historical and archaeological interest.

1. HISTORICAL SETTING

1.1 The Sanctuary of Monteforte

The sanctuary of Monteforte occupies a prominent place in the faith and tradition of the Abriola’s peoples. After the earthquake of 1980 and later on the restoration works, the sanctuary was rediscovered as a custodian of superb frescoes hidden for years by layers of lime, which have preserved intact part of the splendor and beauty. The tradition of pilgrimage to Monteforte, according to historical reconstruction, dating from the 16th century when the site, first house by monks hermits, was opened for worship of the faithful then transformed into a chapel. This is confirmed by the frescoes on the walls, commissioned as “*ex-voto*” to the Virgin Mary. The sanctuary was built about nine centuries ago and, as many Marian sanctuaries it was located on the top of the mountain (1316 m a.s.l.) because, uphill along the road to get there, leaving behind the reality of daily life, you had the feeling of going to God. Today Our Lady of Monteforte left his home for security reasons and is kept in the Mother Church of the country where you can admire and worship in all its glory. She was set in seventeenth-century wooden altarpiece that makes up the crown. From several years Monteforte was awarded by the title of diocesan sanctuary became shareholders for the entire diocese. Posted in the spiritual journeys of the Jubilee is a place of pilgrimage for those who wish to pray secluded and receive a plenary indulgence.

The sanctuary of Madonna di Monteforte (1316 m a.s.l.) stands near the top of the Monteforte's mountain (1447 m a.s.l.) in the Municipality of Abriola (Potenza). Adjacent to the calcareous rock that stratify the south versant. It stands alone between depression, border crossings and the surrounding hills surrounded in part (north and south-east) from an area of reforestation of Aleppo pine, topped by a repeater for mobile phones that obscure the scenery. In this mountainous site hidden from ancient forests, ideal for the attendance of ascetics and monks, barely crossed by flocks and shepherds, was built during the Middle Ages, a primitive place of worship, which possible to locate the medieval original structure in the rectangular apse of the sanctuary. During the first quarter of the 16th century this original medieval hall was modified in order to adapt it to the new demands of worship. Other substantial modifications works performed on the original structure were carried out in the 16th century. The demolition of the front wall of the apse hall was performed in order to obtain a single environment that joined the original rectangular hall in the square.



Figure 1. The little city of Abriola from the Monteforte sanctuary

1.2 The medieval frescoes

In the apse and on the north wall of the medieval hall, oldest paintings are presents. They dating from the second half of the 13th and the first quarter of the 14th century. On the left side of the front wall of the apse is painted a red cross license placed inside a circle. Refers to the presence in the same site of some "cross-permanent" member of the Order of the Knights of the Temple. There has to be considered in this regard that a province is already attested in Puglia Templar around 1170. Monteforte may be, therefore, a private chapel or oratory used by clerics and chaplains Templars, whose presence is still needed to identify and document the whole area of the Apennines and, specifically, in the territory of Abriola. A precise reconstruction of their *domus*, jobs and possessions, help to outline the internal road guidelines traveled by the knights leaving for the crusades from the various fiefdoms of Basilicata.

Studies performed on the viability have highlighted the importance of the Herculea's way that allowed a cross connection between the Appia's road and the Popilia's road. On the road system linking Venus, Melphe, Potentia, and Grumentum through the station of Anxia engage more branches over time for political, religious and military reasons to garrison and to dominate a territory disputed between different powers. A core group of knights was entrusted, almost certainly, also the garrison of the section of Herculea's road that, passed the point of the Sellata, the curves of the Maddalena and Piano del Lago, led to Marsico Nuovo and Grumentum through the forest of Arioso beloved to Christianity because was found the body of St. Giano (1000 b.C.).

The news of the presence of the Order *Militiae Templi* in the territory of Lucan suggest a location of the Order *Militiae Templi* along some crucial points of crossing roads, in relation to the necessity, religious and military, to ensure a widespread control of movement of the troops, men and things. In the territory of Abriola is difficult to prove the presence of Order *Militiae Templi*. Now we would like to highlight only the

existence, in the medieval chapel of Monteforte, of fresco depicting a templar cross license, dating from the second half of the 13th century, and a previous font in Romanesque style with a bowl added.



Figure 2: The entrance of the Monteforte sanctuary

Along the bottom of the north wall of the medieval hall appear also fragments of a fresco dating back to the same period. They decorate, with insisted graphics, the bottom of a blue cape with gold embroidery skilfully draped, which was to cover the red tunic, which rest just a hint, that covered the figure identified with the Virgin Enthroned. One can see her shoes and recognize the leafy vegetables and inlays. On the right side, in a small box, is painted the tiny figure of the customer with the principal features of the face still visible and hands crossed on his chest as a sign of devotion. This confirm the original root of the devotion to the Lady on the mountain, in a renewal of religious fervor fed by the generosity of the family that owned the portion of the not healthy feud. The cover depicts the *Deesis* (Christ between the Lady and St. John the Baptist in prayer) dated to the first quarter of the 14th century, which also occupies part of the space of the hemicycle. The Savior, blessing and halo, sitting on the chair holding with the left hand the board on which runs, interspersed with a few letters of the greek, the following Latin inscription: "EGO / (IHCOV) SV S (M) / LVX / MVNDI / Q (VI) / SE / Q (VI) T (VR) / N ME (ON) A (M) BVLA (TRUTH) I (N) T (ENE)BRIS). On either side of Christ aura appear a greek monograms "IHS" = IH (VOCs) and S "XPS" = XP (ICTO) S, to underline the unity of the Church of the Orient and Occident in the faith Jesus Christ.

1.3 The sixteenth century frescoes by Giovanni Todisco

The murals depicting scenes the life of Mary on the main vault was the genealogy of Jesus on the walls of the medieval hall were built in the early years of the second half of the 16th century.

Boxes and compartments on both sides by pilasters that are grafted onto a fake backbone with floral motifs appear, in the south and north of the vault with a skylight, two scenes and two narrative fragments still intact representing in a mirror mode, on the south side, the presentation of Mary in the Temple and the Annunciation; on the north side, the Purification of Mary and the Marriage of Joseph and Mary. Other fragments are separated and spaced, one with a narrative passages referring to the Dormition of the Holy Mother of God (North side). The frescoes are characterized by a bright plasticity, framed in perspective views of simple and classic architecture. The pictorial features are well defined and detailed in which dominates a figurative culture updated, which mediates the late gothic narrative and naturalistic taste with the conquest of perspective.



Figure 3: The frescoes of Giovanni Todisco

2. PROJECT TO DISTANCE VIEWING

2.1 Presentation of the project

This project was launched about three years ago (2008), from the City of Abriola (Potenza, Italy) and the GAL Basento Camastra, Axis II transnational cooperation project "Cammini d'Europa". It was produced in collaboration with Officina Rambaldi, an international team of professionals led by Carlo Rambaldi, the special effects Oscar award for the film "King Kong", "Alien" and "ET". The project proposes the use and enjoyment of the works of Giovanni and Girolamo Todisco through virtual musealization forms obtained using primary and integrated information technology. The particular location, with the consequent difficulty of access, together with the quality of preserved evidence and the state of conservation of the paintings in the sanctuary, make it particularly challenging search for new strategies of communication and development for this site, which is located at about 1400 meters high above sea level. Just to respond to these needs, the Information Technologies Lab IBAM CNR of Lecce has launched, from many years, a research line with the aims to propose a virtual visit of ancient contexts with problems of access, obtained through desktop-class technology that respond to three basic requirements: good usability, extreme verisimilitude and great technological appeal. In order to satisfy these features it was necessary to draw on technologies of various types, each known to respond to specific needs. Within a unique use and compact environment, the set of these technologies is not totally perceived by the user, which finds himself to interact with 3D models and sensitive points in a very simple and "natural" manner, receiving information of three-dimensional nature, historical information, artistic and topographical information.

Moreover for those which do not wish to enable in-depth itineraries, was made a video summary, incorporating the main results of this work, seeking to narrate the contents in a concise and passive way, i.e. without any intervention required from the user. The technological tools used to therefore respond to the requirements of precise documentation and communication, and have been identified not only for their high innovation, but their effectiveness within the overall project. The virtual tour runs from the survey of three-dimensional structures inside and outside the sanctuary, obtained with the methods and techniques described below. The monument was subsequently contextualized in the surrounding area and integrated with an interactive navigation based on high-resolution spherical panoramas and OpenGL realtime 3D navigation.

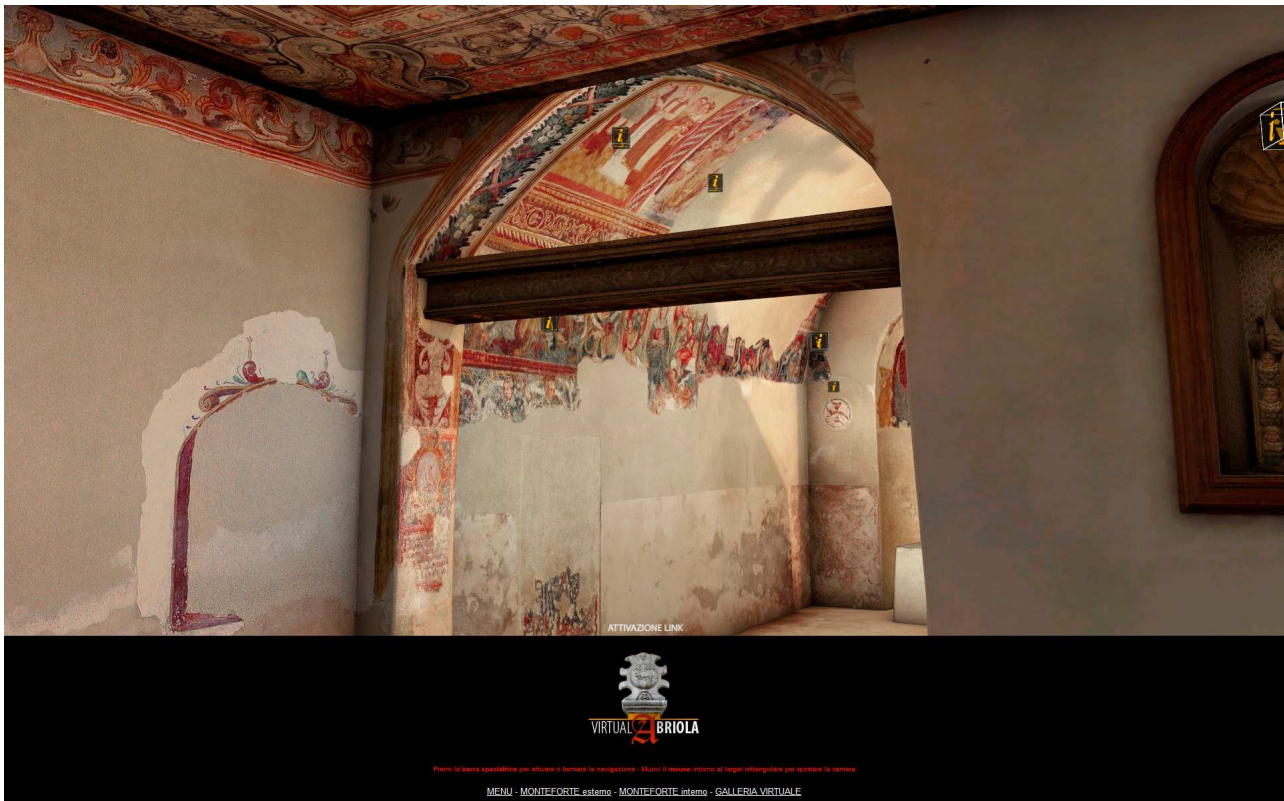


Figure 4: Interiors of Monteforte sanctuary, screen shot of real time 3D platform

2.2 Survey and contextualization of the Sanctuary

Starting from these assumptions the intention was to create a multimedia platform, developed in a hybrid environment, html, Flash, Shockwave and realtime 3D, characterized by an interface providing access to the information that was able to meet the following requirements:

1. Make available methodologies based on web techniques for the navigation of knowledge;
2. Collocate the knowledge acquired of the historic building in an environmental context, highlighting the possible relationship between the building and the surrounding area;
3. Integrate the 3D models of the historic buildings into three-dimensional digital models of the terrain, correlating the historic and documentary information.

Starting from this premise, in the initial phases the work addressed itself to the acquisition of basic photographic documentation and the search for techniques that were suitable for creating a restitution of the sanctuary at a high level of detail and precision. Considering the aims of the communication project (and the products that will result from it) and the specific surveying problems, these basic requirements were met by restitution techniques based on digital photogrammetry, particularly photo-modelling. The reasons for this choice lie in its greater flexibility and ease of use with respect to other passive techniques, but above all in the possibility it offers of obtaining three-dimensional models of great precision at a reasonable cost. In this specific case, it is important to stress that the surveying difficulties resulting from the height of the buildings, together with the problems of accessibility, mean that traditional photogrammetric surveying techniques would almost certainly have entailed considerable effort, as well as additional costs in terms of the equipment required. Furthermore, the aims and premise of the project ruled out the adoption of any system based on laser scanning. There are two main motives for this: the first is the currently high cost of long-range laser scanners, the second lies in the excessive number of polygons produced automatically by a normal scan, clearly superfluous for the description of the regular polygonal surfaces that characterise the external geometry of the architecture under study here. In contrast, in architectural surveys conducted with a specific purpose, a fundamental role is played by the person conducting the survey, who must identify, by means of a careful analysis of the architectural features, only the main points necessary for the restitution. The task of identifying and matching corresponding points on the structure appearing in photographs taken from different angles is also a fundamental part of surveying with photo-modelling. In operational terms it is sufficient to identify the vertex of each architectural detail, or insert some targets into the poorly

characterized areas of the facade, in order to obtain complete three-dimensional models of the textures mapped in UVW projection. The complete survey of sanctuary entailed the use of about twenty oriented photos and the intervention of a mid-level surveyor for about 10 days. The use of commercial software and a simple digital camera for the production of the basic medium (digital photography), necessary for the creation of the various contributions (3D models, QTVR), also represents a useful methodology in small to medium-sized operational situations. From the methodological point of view the 3D restitution is not only a system of documentation of the current state of the monitored monument, both morphological and textural (colours and conservation of the surfaces), but also the basic structure on which to build the communication product. Thanks to the three-dimensional survey, it is possible activate a full enjoyment of the monitored structure: the user have the opportunity to visit the sanctuary and to observe it from any spatial point of view, inside as well as outside, from top to bottom.



Figure 5: Exteriors of Monteforte sanctuary, screen shot of real time 3D platform

The building seen from above will give the opportunity to view the planimetric structure, including non-usual angles, to understand its relationship with the town and the surrounding area. The first expected result will be its contextualization within a region rich in history, with the natural characteristics not yet fully exploited. For this purpose, the virtual tour of the sanctuary extends to a very large portion of territory, embracing not only the town of Abriola, but proceeds to lick the town of Potenza at the North side and the town of Calvello at South-East side. The technology on which the virtual tour system was based is now widely known and used, it uses the VirTools engine distributed by France's Dassault Systems, as the main development environment. The most interesting characteristic of this family of applications is the possibility to manage all programming phases through block diagrams (building blocks), without requirement to write any code. The use of 3D models based on photogrammetry survey, the low number of polygons and textures with good resolution has allows to obtain ultra-realistic scenes, a necessary prerequisite for effective virtual tour, which will reclaim the real space in extremely precise mode relatively to the visible colours and metrically accurate from the geometrical point of view. Particular attention has also been yield to the realistic reproduction of the conditions of indoor and outdoor lighting, simulated in three dimensions environment with the same key of light and the same scattering characteristics that visitors can enjoy during a visit in situ. For this purpose were the widely used radiosity simulation algorithms in conjunction with HDRI maps to a colour depth of 12 bits per channel, through which is possible to illuminate the 3D scenes with the same characteristics as the real scene. The subsequent rescue of the models with bake texture has produced maps

complete with shadows and radiosity bounces, which of course are applicable in real time, also on low quality computers.

The virtual tour will be not limited only to the aesthetic vision of the architectural aspects of the sanctuary. The virtual platform also aims to inform the visitors about all aspects that characterize the historic and environmental asset. The clearly heterogeneous data-set collected and generated can be received directly into three-dimensional environment, in a comprehensive framework and multi-scale, where are not exclude teaching aids useful to the understanding the covered topics, especially to advantage of the general public.

Since near to classical and didactic form of pictorial cycles description, it is possible to navigate inside 3D scenes depicted on the vault of the main hall. Thanks to camera mapping techniques, the frescoes have been subdivided according to plans and their vision is made with an approach of scenic dramatization, in which individual figures are isolated and separated from each other, pointing out the meaning, symbolism, work critical aspects that can be captured and focused more effectively.

With this technique, through which a pictorial scene can also be explored in the third dimension, is it possible to enhance the artist's intentions, which in this case sees the use of perspective a means to involve and to direct the perception towards a more plastic rational sense.

A widely shared attitude, constantly pursued in our work on Computer Graphics, which we define as "attempt to realism".

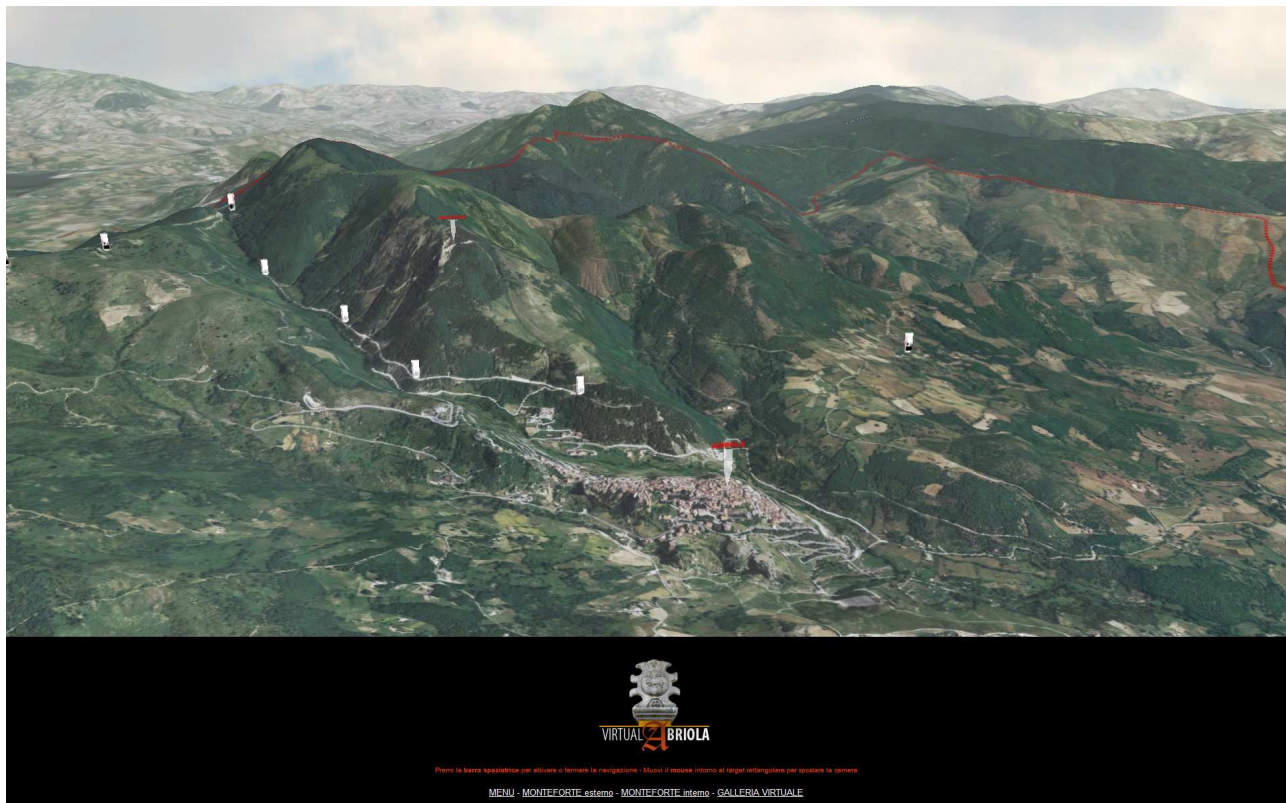


Figure 6: The territory near Abriola within the real time platform

3. CONCLUSIONS

The described case study in this paper is part of a wider research of CNR ITLab, aimed at the use of virtual reality for the distance visiting of ancient contexts characterized by difficulty of access.

The used technologies and methodologies, from the photo-modeling survey to the lighting systems by HDRI maps, are designed to ensure the maximum accuracy and realism as possible in an attempt to achieve maximum emotional involvement of the visitor.

As stated repeatedly, these modes of use are not intended to substitute the visit in situ, or keep out away the tourists from the historical and artistic contexts. Contrary, through their correct use is possible addressed heterogeneous information, both on morphological and architectural features and on the historical and cultural aspects related to the surveyed structure, allowing the visitor to prepare itself for the visit in situ or to investigate certain content. The increased visibility of the monument, created through the dissemination of these "knowledge platforms" should, therefore, expected as a result, encourage new tourism and contributing

to the valorisation of the same monument, indispensable for its true capitalization.

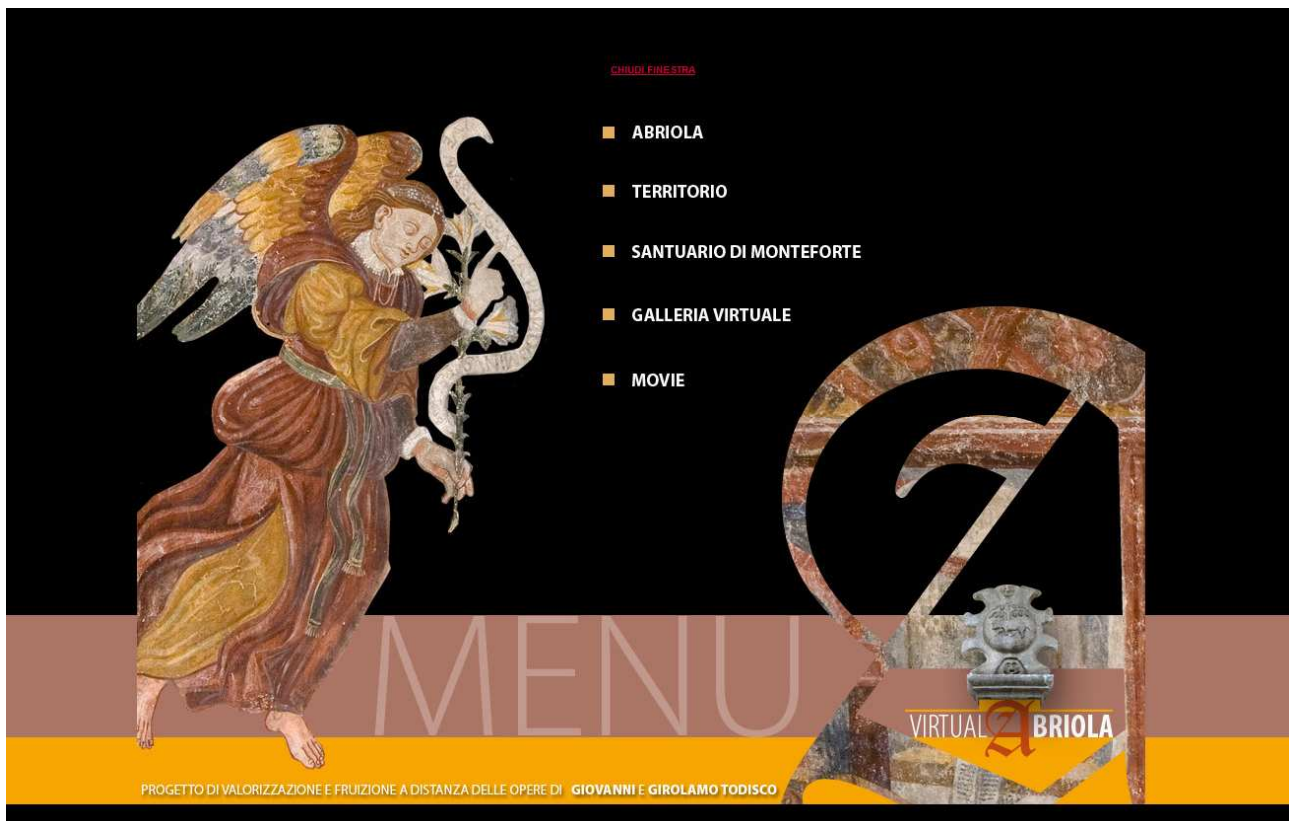


Figure 7: Graphics Interface of the platform

4. REFERENCES

- [1] Gabellone, F., *Virtual Cerrate: A DVR-based knowledge platform for an archaeological complex of the Byzantine age*, in CAA 2008, Computer applications and quantitative methods in Archaeology, Budapest 2008.
- [2] Gabellone, F., *Metodologie integrate per lo studio ricostruttivo e la conoscenza dello stato attuale dei Beni Culturali*, In: Il dialogo dei Saperi, metodologie integrate per i Beni Culturali, a cura di F. D'Andria, D. Malfitana, N. Masini, G. Scardozzi, Edizioni Scientifiche, 2010.
- [3] Gabellone F., Monte A., *A virtual thematic museum of the Terra d'Otranto lighthouses based on a low cost methodology*, XX CIPA International Symposium, International Cooperation to save Cultural Heritage, Torino 2005.
- [4] Chalmers, A., Very realistic graphics for visualising archaeological site reconstructions. In Proc. 18th spring conf. on Comp. graphics '02 (2002), pp. 43-48.
- [5] Gabellone, F., Giannotta, M.T., Realtime 3d multimedia system for the distance visiting of cultural heritage. A case study on the chamber tombs in via Crispi, Taranto, XX CIPA International Symposium, International Cooperation to save Cultural Heritage, Torino 2005.
- [6] Debevec, P. E., Taylor, C. J. & Malik, J., *Modeling and Rendering Architecture from Photographs*, Proceedings of SIGGRAPH Conference, Los Angeles 1996.