

The archaeological area of Pieve a Socana (Tuscany - Italy)

Giovanni PANCANI | Marco TOCCHI

University of Florence

Abstract: The survey project of the archaeological area of Pieve a Socana, not far from Arezzo, in Tuscany conducted using laser scanner technology, set out to document the entire site, where an altar and the remains of an Etruscan temple were found, as well as the remains of two Christian churches and a Romanesque church built above them. The survey operation was performed by the acquisition of different point clouds, linked by means of a topographic survey to obtain a single database for further processing. The post production work and data processing performed made it possible to obtain a relief map and an extremely accurate, high quality picture of the metric results. We believe that accurate documentation of our historic and architectural heritage is the necessary starting point for understanding and protecting it; alongside the documentation of the individual artefacts our aim is to create a thematic map of the entire system of Etruscan and Roman finds in the territory.

Keywords: Etruscan altar and remains, Romanic church, laser scanner survey

The historical context of the archaeological area of Pieve a Socana

The archaeological area of Pieve a Socana, with a Romanesque church and Etruscan ruins, is located in the municipality of Castel Focognano, in the southern part of the Casentino valley in Tuscany.

In Etruscan times, and throughout the Middle Ages, Casentino was connected to the city of Arezzo by the "via delle pievi battesimali", so named by Prof. Alberto Fatucchi in his studies, which, from the south-east went through across the valley to the north-west, keeping to the left bank of the river Arno; along the way it branched out with paths entering the various secondary valleys, connecting Casentino to Romagna, Mugello and Fiorentino.¹

A study of toponyms supports such historical research; Etruscans toponyms are very common in the valley, as are artefacts corroborating the presence of the Etruscans there, it is also significant that the toponyms of Etruscan origin are located along the Arno valley and along the secondary valleys of its tributaries, precisely at the point of the ancient roads identified in the territory.²

Two of the most important sanctuaries of central Italy can be placed in this geographical context: one is the Lake of Idols, the other the sanctuary of Pieve a Socana.

¹ about the viability see: BARGIACCHI R. (2007), *Il Lago degli Idoli e la viabilità etrusca del Casentino* and the writings of professor Alberto Fatucchi, particularly FATUCCHI A (1974), *Le strade romane del Casentino*

² about the toponymy see: DIRINGER D. (1933), *Per la storia del Casentino* and PIERI S. (1919), *Toponomastica della valle dell'Arno*; a complete description of the archaeological researches in Casentino see: G.A.C. Gruppo Archeologico Casentino (edited by) (1989), *Nuovi contributi per una carta archeologica del Casentino* e G.A.C. Gruppo Archeologico Casentino (edited by) (1999), *Profilo di una valle attraverso l'archeologia. il Casentino dalla Preistoria al Medioevo*

The Lake of Idols was discovered by chance in May 1838, the accidental discovery of a bronze statue of Heracles was followed by more in-depth investigations in the area and the excavations, which began in June of the same year, brought to light more than 600 figurines and thousands of other artefacts.

The discovery transformed the lake called "della Ciliegeta" on Mount Falterona, in the north of the valley, into one of the most important deposits of Etruscan votive offerings in Italy. Further investigations, performed in the 1970s and between 2003 and 2006, led to new discoveries of artefacts. Almost the entire collection of finds from the nineteenth century was sold and we now know that some of these are exhibited at the Louvre in Paris and the British Museum in London.³

The finds dated from the middle of the VI and the late IV century BC and attributed to production sites of various provenances, such as the Po valley in Etruria or Umbria and Orvieto bear witness to Casentino's important role as a thoroughfare in the Etruscan period.

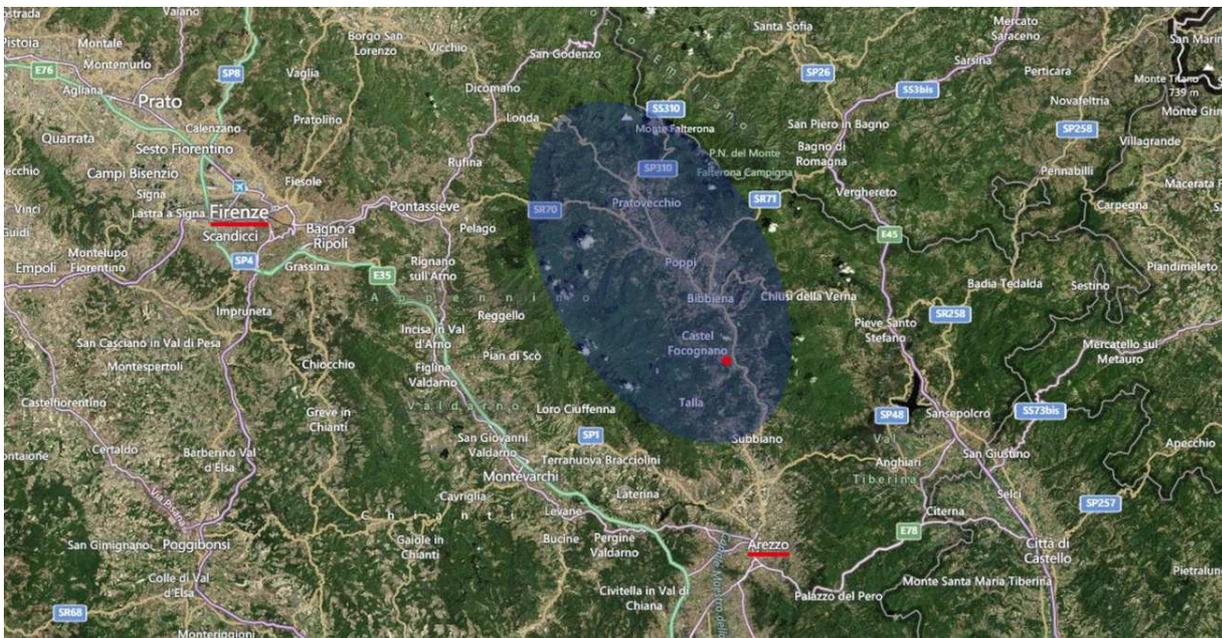


Fig. 1 – The geographical context of the Casentino valley, the red dot marks the site

The other important Etruscan sanctuary in this valley is the Pieve a Socana, it is geographically located at the opposite end of the valley from the Lake of Idols, just before the Apennines open up towards Arezzo, in a strategic point for Etruscan roads where the *via delle pievi* crossed the routes, one extending along the course of the Rassina stream and the other two into the secondary valleys leading to the villages of Castel Focognano and Talla.

Its location and the fact that the Etruscan sanctuaries were not only centres of religious life but also social and commercial, made Socana an important centre for the Etruscan occupation of the valley.

³ in addition to the just quoted texts see: FEDELI L. (2007), *La stipe votiva del Lago degli Idoli: risultati dello scavo archeologico 2003-2006*

As already pointed out, toponyms plays an important role in reconstructing the systems of roads, providing information on the distribution of the various Etruscan and Roman settlements in Casentino territory. Pieve a Socana and the area surrounding the survey site are rich in references; Socana seems to derive from the Etruscan name of person *Saucni*, while a short distance away is the village of Rassina and the river of the same name, flowing through the valley that leads to Chiusi della Verna. The name Rassina can be traced back to the Etruscan *Rasena*, *Rasna* or *Rasini*, the term used by the Etruscans to indicate themselves.



Fig. 2 – The back of the church with the archaeological area, the altar and the Etruscan walls. Photo by Claudio Sassoli (www.fotodalparapendio.eu)

The Etruscan presence in Socana has been known of since the 1920s and '30s, when a number of artefacts were found in the land behind the church.

The Etruscan altar and other artefacts were discovered during renovation work on the church between 1969 and 1974, when, during excavation, the remains of the altar and some Etruscan walls, along with the remains of two side apses came to light behind the church.

The altar is made of sandstone blocks, connected by lead clamps, with moulding on the profile and is believed to have been built in the second half of the V century BC. It is positioned within a sacred enclosure, consisting of large squared blocks and was partially rebuilt by reassembling parts found in the surrounding walls, which came to light during the excavations. The altar measures 3.75 m by 5 m and is in an excellent state of preservation; in terms of shape and geometry it recalls the altar of the temple C in the Etruscan city

of Misa, near Marzabotto, showing the relationship existing at that time between these territories and the Po valley in Etruria.



Fig. 3 – The back of the church, during the 2012 survey, with the altar and the two stage bell tower, on the left of the image the iron door, behind which there is the steps of the Etruscan temple

Of the Etruscan temple, located behind the sacrificial altar and in the opposite direction to the church, only a part of the stairway that led to the podium which the building probably stood on is now visible, it may be presumed that more remains are located under the structures of the present-day Christian church.



Fig. 4 – The Etruscan altar and the steps of the temple

The steps are situated behind the remains of the left apse, but as regards the shape of the temple we have only the description that Vitruvius makes of the Tuscan temple in Chapter VII of the fourth book of *De Architectura*, to rely on.

The finds discovered near the altar provide important information on the various stages of life of the sanctuary; the most important and significant are two pairs of antefixes, two stinkstone votive wheels with inscriptions and a vase in black *bucchero*.

The two pairs of antefixes found on the site are further indication of the presence of artistic influences from outside the valley and a different style can be traced back to different historical periods, reflecting the presence of different architectural phases in the life of the temple. The two with polychrome decorations, the most archaic, called "head of Maenad", date back to the V century B.C. and mark the influence of southern Etruria, while the two "head of Minerva", date to the II century B.C. and are attributable to the Hellenistic phase of the temple.

The two stinkstone votive wheels, 13 to 18 cm thick and 87 and 112 cm in diameter, were found during the restoration of the rectory next to the church and bear inscriptions, suggesting a date of the V century B.C. for the smaller one and the IV century B.C. for the other.

The discovery of a vase in black *bucchero*, dating to around the VII century B.C. would seem to support the theory that the Etruscans were present in the area as much as two centuries prior to the construction of the altar and the temple.

Casentino is thickly scattered with medieval pievi and religious settlements among which, according to Fatucchi⁴, the first ten original pievi in the diocese of Arezzo can be identified: Sant'Antonino a Socana, Saints Eleuterio-Rustico and Dionisio in Salutio, Saints Ippolito and Cassiano in Bibbiena, Santa Maria in Partina, Santa Maria at Buiano, and in the diocese of Fiesole San Pietro in Vado at Strada, Santa Maria in Montemignao, Santa Maria in Stia and San Pietro at Romena, to these the pieve of Arcena, near Bibbiena, present in the documents of the X century and now destroyed, must be added. .

At that time the pievi represented the centre of civil and religious life for the entire community, they were the only churches with baptismal fonts and cemeteries and many smaller churches referred to them.

During the Middle Ages the roads followed those existing previously, some pievi are located in Etruscan named sites, those ending in *-ena*, and aside from the pieve of Socana built on the ruins of an Etruscan temple, there is other evidence of continuous settlements in those places. The foundations of a building and remains dating to the Roman period were found near the pieve of Buiano, while in Romena, at the end of the nineteenth century, during the restoration of the church, fragments were found possibly belonging to a Roman building.

The first mentions of the presence of the church date to immediately after the year 1000 in a document drafted in 1004 in the *Regesto Camaldolese*⁵ and another in 1008 in the *Annali Camaldolesi*⁶; it is worth

⁴ G.A.C. Gruppo Archeologico Casentino (edited by) (1999), *Profilo di una valle attraverso l'archeologia. il Casentino dalla Preistoria al Medioevo* p. 121

⁵ SCHIAPARELLI L. e BALDASSERONI F. (edited by) (1907), *Regesto di Camaldoli*, Vol. I, p. 6, doc. 8

⁶ MITTARELLI G. B., COSTADONI A. (1755), *Annales Camaldulenses Ordinis Sancti Benedicti*, Tom. I, p. 301

mentioning that the *Regesto Camaldolese* speaks of a further document⁷, which during the examination of the Florentine Archives was dated as 1089, but which indicates the year 989 in the text, the church is also mentioned in such document, thereby dating its first mention to an even earlier period.

In a document dated 1085 referred to by Ubaldo Pasqui⁸, relative to a donation to the abbey of S. Fiora of Arezzo, the church is mentioned as being called St. Peter's. In such regard Alberto Fatucchi notes that, as a result of the Frankish occupation, taking over from the Lombards, many churches in Casentino were re-dedicated to saints revered in France. This may be the case of the pieve of Socana, which changed its name, in an anti-Lombard spirit, from that of the popular Lombard saint, to that of a saint dear to the Franks, such as the martyr S. Antonino of Apamea⁹.

In the case of Socana, no manifest traces or signs of the presence of an early Christian church have emerged and, without excluding that further investigation may produce new results, it is more than reasonable to assume that there was a continuity of worship and settlement from the Etruscan-Roman period to the Middle Ages, bearing in mind the central role played by churches in local government.

The registers of the payment of tithes show that in the XIII century the pieve of Socana XIII, in its role as the baptistery church, exercised its jurisdiction over twenty-eight smaller churches¹⁰.

Restoration work on the church, begun in 1967 and concluded in 1972¹¹, in addition to repairing the roof and consolidating the construction, also removed all signs of the many works which had changed its original appearance over the centuries; while this was correct as regards the removal of the facade with arches and plaster and the mock internal masonry made by cement mortar drafts, rebuilt during the restoration work carried out in the 1930s by the architect Giuseppe Castellucci¹², the same may not be said of the removal of the baroque altars inside.

⁷ SCHIAPARELLI L., BALDASSERONI F. (edited by) (1907), *Regesto di Camaldoli*, Vol. I, p. 264, doc. 3A

⁸ "in comitatu aretino infra plebem Sancti Petri sita Socana" PASQUI U. (1899), *Documenti per la storia della città di Arezzo nel Medioevo*, p. 362, see note 1

⁹ see: FATUCCHI A. (1977), *Aspetti dell'invasione longobarda nel territorio aretino*, p. 317, FATUCCHI A. (1980), Note sui Longobardi e la diocesi aretina, p. 402 nota 4 and FATUCCHI A. (edited by) (1977), *Corpus della scultura altomedievale*, p. 92-93

¹⁰ GABBRIELLI F. (1990), *Romanico aretino*, p. 166

¹¹ referring to the documents of the Soprintendenza per i Beni Architettonici e per il Paesaggio, per il Patrimonio Storico, Artistico ed Etnoantropologico per la Provincia di Arezzo

¹² VERIANI (1934), Pieve di S. Antonino a Socana, in *Arte sacra nella diocesi aretina (1920-1934)*, p. 123-124



Fig. 5 – The facade of the church and on the left of the image the wall of the previous phase of the building

During the works, in addition to the altar and the Etruscan walls, traces of previous architectural phases of the church came to light; along with the remains of two side apses at the back, the bases of four columns and the base of an altar were found in the square in front of the church, under the ground and are now visible inside the building.

These are the signs, according to studies by the Superintendence, of a different and larger layout, of which a portion of the perimeter walls can be seen today, to the left of the façade.

The church, to which the XI century documents mentioned above refer, is probably the one with three naves and three apses, like other churches in the area of Arezzo and Casentino. Romena and Buiano are two examples, with the space divided by columns into nine spans. The next church was to be built on the same layout, a small and modified portion of which remains today, and which can be dated as having been built in the XII or XIII century; this church, with the same dimensions as the previous, had the space divided into three naves with pillars instead of columns and six spans.



Fig. 6 – The remains of the right apse and the basement of a column of the first church

The present-day structure is thus the result of transformations and reconstructions performed over the centuries and the church is now less than half the length of the original building with only one apse. Confirming this are the reports of the various pastoral visits¹³ to the diocese of Arezzo in the XVI century, recounting that the church was very ancient, built of squared stones, once with a large structure, while at the time of the visits it was in need of repair in many parts and on account of the ruins smaller than it had been originally.

¹³ "parrochiam ecclesiam sub titulo constructam sancti Antolini, plebem nuncupatam de Sochena magne quo(n)dam structure confectam; hodie vero ad parvam redactam ecclesiam" visit of June 15, 1521 [c 27v] p. 38; "Quod vero ad structuram dicte ecclesie invenit ipsam reparatione multis suis partibus indigere ac ruinam minari, et ob ruinam redactam fuisse in formam brevioram quam fuerit antiquitus." visit of July 9, 1534 [c 59v] p. 71; "Ecclesia autem antiquissima est et quadrato lapide constructa, hodie tamen a medio supra est cohoperta et (muro) divisa." visit of October 20, 1557 [c 278v] p. 318 in PIERI S., VOLPI C. (2008), *Visite Pastorali dal 1521 al 1571*, Servizio Editoriale Fiesolano, Fiesole



Fig. 7 – The plan of the site, with the church, the Etruscan altar and walls (parallel to the direction of the altar) and the remains of the two lateral apses, traced on CAD software on the ortho-image

Of the possible reasons that led to these changes, it is currently difficult to say, but it is conceivable that one of the causes may be one or more earthquakes that occurred in the area¹⁴.

Inside, the church today has three naves divided by three round arches resting on pillars having a rectangular cross-section, with the span to the presbytery smaller than the others and resting on pillars with an almost square cross-section.

The presence of different types of masonry, both inside and outside, in terms of material and the size of the elements, suggests the need for a careful stratigraphic reading of the walls and thus of the architectural vicissitudes of the church, which cannot be traced back to two architectural phases alone, but which appear much more complex.

The bell tower dates back to the XI century and was inspired by those of Ravenna, it is located to the left, rear side and has a cylindrical, lower part marked by six pilaster strips made of sandstone blocks and a hexagonal upper part.

The lower part shows similarities with that of the Abbey of St. Veriano, near Arezzo, dating to the XI century and to that of the church of Corsignano, near Pienza, dating to the late XI and early XII century, to mention some similar examples in the diocese of Arezzo, known to have been closely connected with Ravenna during the XI century.

¹⁴ we know that a strong earthquake struck Bibbiena in 1504; information on historical seismology can be drawn from ROVIDA A., CAMASSI R., GASPERINI P., STUCCHI M. (edited by) (2011), *CPTI11, la versione 2011 del Catalogo Parametrico dei Terremoti Italiani*, and from catalogue of strong earthquakes in Italy on the site <http://storing.ingv.it/cfti4med>

Notes on the survey campaign at Pieve a Socana

The laser scanner survey of the Parish church of Socana was carried out in December 2009, thanks to an agreement between the University of Florence and the Municipality of Castel Focognano¹⁵, on whose territory is located the village with the complex of the Parish church of Socana, composed by the church itself, by the parish houses and its small but interesting archaeological park.

The survey was carried out in a workshop, within the course of Survey of Architecture of the degree course in Technology for Conservation and Restoration. The first campaign was conducted through a laser scanner equipment (phase difference), in particular a Leica HDS 4500.

This type of device, although it turned out to be quite dated at the time, was considered appropriate for this project. In fact, despite having to connect to a personal computer to run the scans (in that moment the most advanced devices did not require it anymore), the speed of instrumental shooting, approximately 600,000 points per second, was enough to perform many scans in the short time available.

Although the range of the maximum distance of acquisition was limited to about 40 meters, this did not adversely weigh on the survey, and on the contrary the scope was more than enough to cover the whole site.

The survey project was carried out by means of well-established procedures, developed by our research team in the course of various surveying campaigns, from 2002 onwards.

For this reason, I would like to highlight how important the methodological procedures can be for a survey and in particular, in case of a 3D laser scanner survey. In fact if they are sufficiently tested and developed, therefore they allow an efficient organization of the activities, by providing the necessary and proper certainty for the surveying operators to be operative, and after, to control on the occasion of the testing.

The laser scanner survey, in fact, being a product of high-tech equipment and software, entails some hidden zones, both during the survey campaign and after during the control phase, that is possible to locate and prevent, only through the knowledge of proper procedures.

The activities carried out in the early 2000s by our research team, directed by Stefano Bertocci, has focused primarily on two-dimensional representation and on the development of methodological protocols for survey. These are in continuous evolution, both for the improved and increased knowledge in the field, and for the rapid technological development of equipment and software.

It is worth therefore to pay attention to the two-dimensional representation. Although it seems an almost ordinary aspect of the problem, it has been the purpose of the research on procedures developed for years through very accurate practice, aiming at finding solutions that firstly could be adopted for the conservation and restoration.

However, it is right and proper to highlight that in the earliest experiences of surveying campaigns with laser scanner on buildings, among which it is worth remembering the survey of the Baptistery in the Piazza dei Miracoli in Pisa, when an unsuitable two-dimensional representation of the building, despite the quality of the gathered data, caused a misunderstanding with the client. In effect, they found the point cloud something

¹⁵ For this purpose an agreement was concluded between the Municipality of Castel Focognano and the Department of Architecture of the University of Florence

very interesting and pleasant as displayed, but they could not completely understand its practical utility and its potential.

The survey of the Parish church in Socana, instead, was carried out when the study team had reached a good level of maturity, thanks to the numerous activities on 2D drawing of 3D objects.

Therefore the whole process of representation has been developed with definite rules of methodological reference, improved and upgraded with long-lasting practice.

As previously said at the beginning of this short paper, the survey started in December 2009 and concerned the church and the square in front of it, and also the archaeological area where the beautiful Etruscan altar stands out.

Two-dimensional drawings of the church and the facing square were exhibited at the conference “Between East and West: Transposition of cultural systems and military technology of fortified landscapes”, held in Poppi (AR) from the 9th to the 10th May, 2012¹⁶.

The above-mentioned drawings were obtained from a point cloud obtained with a traditional process that is with scans performed both inside and outside of the building and of the surrounding area, paying attention to limit the hidden areas¹⁷.

¹⁶ The surveys of the pieve of Socana were shown in the exhibition in the Castle of the Counts Guidi from Poppi during the international conference “Between East and West: Transposition of cultural systems and military technology of fortified landscapes”, 9 to 12 May 2012. The congress was organized by the University of Florence, the University of Pavia, the Municipality of Poppi, the Rilli-Orsini Library and ICOFORT. Some of the drawings were published in the conference proceedings volume collection: S. PARRINELLO, S. BERTOCCI G. Pancani (ed.), *Between East and West, transposition of cultural systems and military technology of fortified landscapes*, Florence, Edifir, 2012.

¹⁷ Hidden areas or shadow zones: “*the laser scanner, for each station point (...), scans the object with a series of laser pulses from the instrumental center as in a conical projection (just as in the case of a photographic camera). The pulses beat the visible parts of the object starting from the point of the station; so any protuberant part such as frames, pitched roof, balconies, creates more or less significant shadow zones (gaps), in relation to the dimension of the projection from the bottom plane*” in DOCCI M., MAESTRI D. (2010), *Manuale di rilevamento architettonico e urbano* p. 222

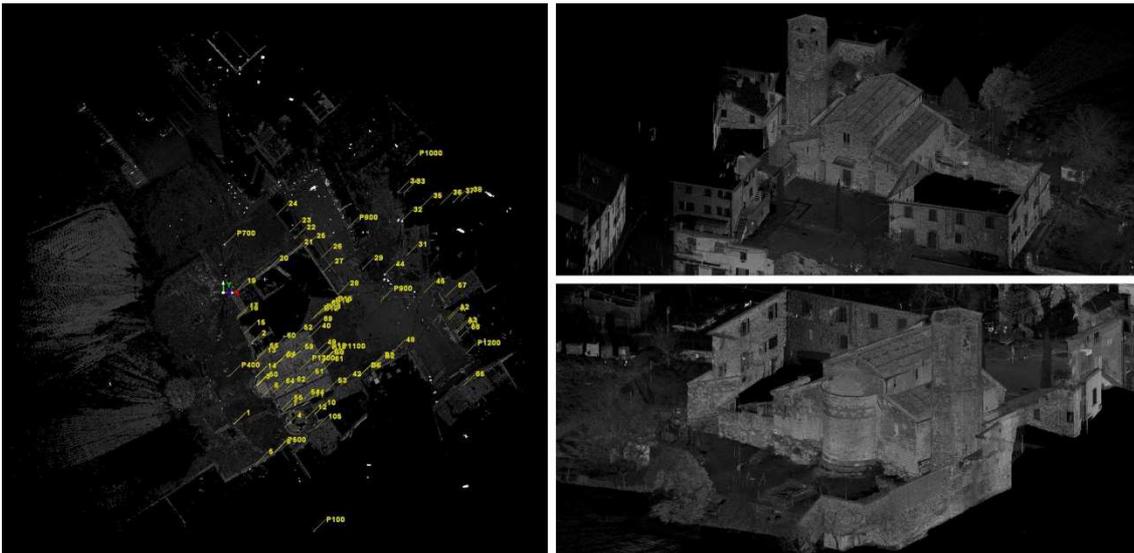


Fig. 8 – Three snapshots of the point cloud obtained during the first survey; in the left one there are the numbers of the targets used for the registration process

For the constraint¹⁸ of the various scans was used as support a topographic survey, carried out through a closed polygonal returning to its starting point.

The density of the morphometric data of the point cloud was set with a detailed mesh, often approximately smaller than 1 square centimetre, then with quantitatively high data, even if it was still present a considerable digital noise.

However, as a whole, the laser scanner survey was definitely satisfactory.

The processing of point clouds made it possible to obtain the snapshot or the ortho-images¹⁹ of cross-sections and front views, always with an high grade result and showing a correct and detailed representation even of bricks or stones.

¹⁸ "The term 'constraint' means the rotation and translation of all scans into a single reference system" in RINAUDO F. (2003), *La tecnica laser scanning: applicazioni architettoniche e urbanistiche* p. 134-136

¹⁹ A "snapshot" is an image, a screen shot of the video. If the purpose is to use it for the computerizing of the front views, it must be obtained by a cylindrical projection (orthogonal) of the required view. The "snapshot" to be imported in a CAD software must be obtained in a proper way, so as to be able to properly scale the vector in a graphics software. To perform such a scaling, a grid of fixed dimensions must be inserted, or the image must be exported in a "ortho image" format, which consists in a file "Tif" and a text file containing the reference coordinates for the insertion in a correct scale in CAD software. These concepts are quoted from the chapters 5.3.1, 5.3.2, 5.3.3 of BERTOCCI S., BINI M. (2012), *Manuale di rilievo architettonico e urbano*



Fig. 9 – The restitution process from the point cloud to the deterioration map

For the tracing of the outline of fronts and sections using a computer-aided design software, it was preferred the technique of importing the snapshot in vector graphics programs, instead of using a plug-in for the processing of point clouds directly into CAD software.

This choice is due to the consideration that, in order to draw front views characterized by the presence of textures, blocks and complex decorative patterns, the snapshot better provided help to the operator for the interpretation of the build architecture. In fact it was possible to determine the different materials by their intrinsic reflectance, or even changing the image contrast.

In addition, the snapshots could also be used for the calibration and the realization of the ortho-image and picture. Finally, once obtained the snapshot, it was no more necessary to have additional expert operators for the processing of point clouds.

The snapshot or ortho-image, have been realized using a definition of at least 2 pixels per centimetre, in order to display accurately all the details existing and characterizing the walls.

The outline of the snapshot is therefore an easy product to visualize, thanks to the raster file with a correct ratio between pixels and dimension of represented surfaces.

The availability of correct drawings, associated to good snapshot, allowed the creation of ortho-images with pictures, perfectly matched²⁰ both on projections of flat walls, and on projections of on curved walls, such as those present in the apse.

²⁰ To this end, for the complete description of the calibration procedure of the ortho-images for curved surfaces, please refer to PANCANI G. (2011), *Lo svolgimento in vera grandezza delle volte affrescate delle sale dei quartieri al piano terreno di Palazzo Pitti a Firenze*

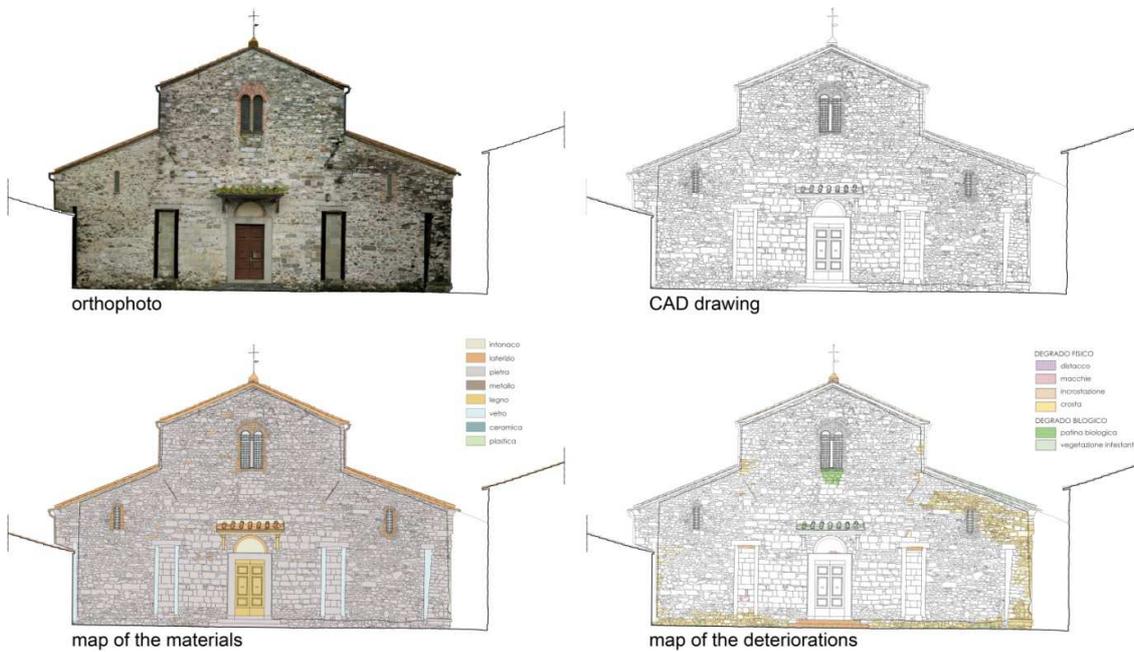


Fig. 10 – The graphic restitution: the thematic drawings of the facade (the survey's restitution was realized by the students: Sara Cappelli, Eugenia Cecchetti, Greta Del Signore)

Once realized the basic graphic outputs, as outlines and ortho-images, it was possible to develop different thematic maps. In particular we focused on two topics necessary for restoration and conservation, ie the mapping of degradation and of employed materials. Many others can be developed, as the stratification map or the even more peculiar mapping of the marks left on the stone walls by the earthquakes, that often took place during the long life of the church.



Fig. 11 – The orthophoto of the back of the church and the CAD drawing

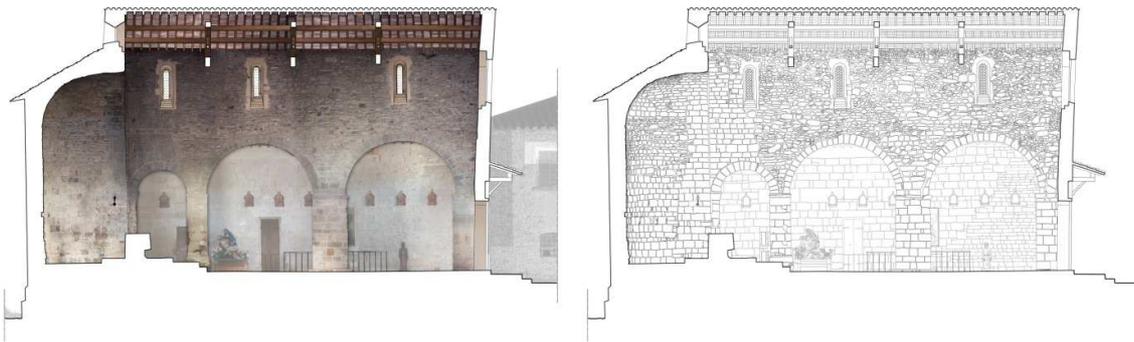


Fig. 12 – The orthophoto of the longitudinal section of the church and the CAD drawing

Finally, it is worth remembering that recently, in summer 2012, in order to gather additional data from the area of the apse, and in particular of the Etruscan altar, a further survey campaign was carried out. This time the equipment was composed by a latest generation laser scanner, the “Faro Fucus 3D”, still a phase difference device but extremely light and easy to handle, with a highly simplified command interface, and also able to obtain a full-color photographic image by the same centre of the laser sensor.

The new scans were performed both for more details of the Etruscan altar and to thicken the previous mesh of the wall in the apse portion, moreover to scan areas impossible to access during the first survey campaign, such as the small room under the main altar of the church accessible from the apse.

At a later stage, all the scans obtained during the survey of 2009 and the most recent of 2012, were combined in a single complete point cloud.

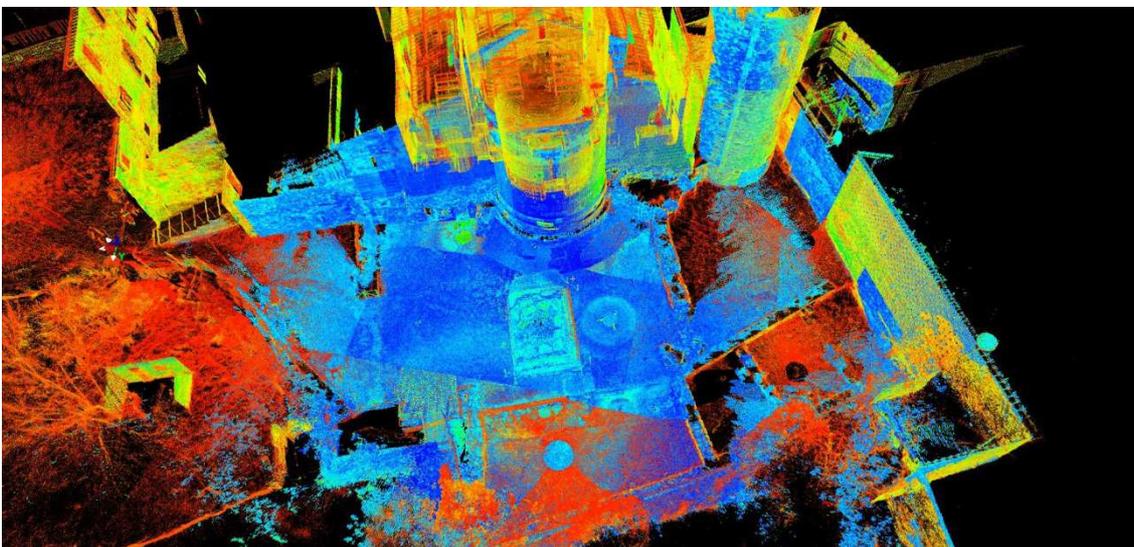


Fig. 13 – A comparison between the clouds of points obtained during the two different surveys, in yellow and red the point cloud of the 2009 survey and in blue the one of the 2012 survey

This is a common process, since it is a quite recurring event to survey the same site after a few years. Almost always, due to the technological progress, the new survey is carried out with a different equipment in respect to the previous one, and with the acquisition of a more dense mesh. This condition allows us to make some considerations, proved to be valid as regards the parish church of Socana. Indeed, thanks to the

record including both surveys, we could observe that the point clouds overlap perfectly with very limited allowance, always below a single centimetre.

The mesh is much more dense and the digital noise much more limited; moreover the manageability of the new equipment made it possible to acquire some scans that were impossible during the first survey.

A final observation that it is appropriate and related to the possibilities offered by laser scanner devices and by the management of their outcome, that is, the point cloud.

These have proved to be working databases, liable to be updated and improved even after many years, without any problem due to the development of the devices and they rather allowed the seamless integration of data gathered by means of different equipments and in different times.

References

- Alla scoperta dei luoghi del Casentino* (2000), Octavo. Franco Cantini Editore, Firenze
- ARMANDI M. (1995), *Architettura e scultura romanica*, in *Il Casentino*, Octavo. Franco Cantini Editore, Firenze
- Arte nell'Aretino. Recupero e restauri dal 1968 al 1974. Catalogo della mostra (1974), Editrice Edam, Firenze
- BARGIACCHI R. (2007), Il Lago degli Idoli e la viabilità etrusca del Casentino, in *Atti sulla giornata di studio su Gli scavi e le indagini ambientali nel sito archeologico del Lago degli Idoli*, edited by Simone Borchi, Stia
- BENI C. (1983), *Guida del Casentino*, Nardini Editore, Firenze
- BERTOCCI S., BINI M. (2012), *Manuale di rilievo architettonico e urbano*, Città Studi Edizioni, Milano
- BERTOCCI S., PARRINELLO S., PANCANI G. (edited by) (2012), *Between East and West, transposition of cultural systems and military technology of fortified landscapes*, Edifir, Firenze
- Brigata Aretina Amici dei Monumenti (1967), *Bollettino d'informazione* n. 6, Arezzo
- BOCCI PACINI P. (1973), Ager Arretinus: Pieve a Socana, in *Studi Etruschi, vol. XLI (serie II)*, Leo S. Olschki, Firenze
- BRACCO M. (1971), *Architettura e scultura romanica nel Casentino*, Editrice Edam, Firenze
- DIRINGER D. (1933), *Per la storia del Casentino*, in *Studi Etruschi, vol. VII*, Firenze
- DOCCI M., MAESTRI D. (2010), *Manuale di rilevamento architettonico e urbano*, Laterza, Bari
- DUCCI M. (2004), *Santuari Etruschi in Casentino*, Comunità Montana del Casentino, Ponte a Poppi
- FEDELI L. (2007), La stipe votiva del Lago degli Idoli: risultati dello scavo archeologico 2003-2006, in *Atti sulla giornata di studio su Gli scavi e le indagini ambientali nel sito archeologico del Lago degli Idoli*, edited by Simone Borchi, Stia
- FATUCCHI A. (1974), Le strade romane del Casentino, in *Atti e memorie dell'Accademia Petrarca, Nuova serie, Vol. XL, Anni 1970-72*, Arezzo
- FATUCCHI A. (1977), Aspetti dell'invasione longobarda nel territorio aretino, in *Atti e memorie dell'Accademia Petrarca, Nuova serie, Vol. XLI, Anni 1973-75*, Arezzo
- FATUCCHI A. (edited by) (1977), *Corpus della scultura altomedievale, IX: La diocesi di Arezzo*, Centro Italiano di Studi sull'Alto Medioevo, Spoleto
- FATUCCHI A. (1980), Note sui Longobardi e la diocesi aretina, in *Atti del VI Congresso Internazionale di Studi sull'Alto Medioevo: Longobardi e Lombardia. Aspetti di civiltà longobarda. Milano, 21-25 ottobre 1978*, Centro Italiano di Studi sull'Alto Medioevo, Spoleto
- FATUCCHI A. (1985), Gli Etruschi e il Casentino, in *Atti e memorie dell'Accademia Petrarca, Nuova serie, Vol. XLVII, Anno 1985*, Arezzo

- GABBRIELLI F. (1990), *Romanico aretino. L'architettura protoromanica e romanica religiosa nella diocesi medievale di Arezzo*, Salimbeni, Firenze
- G.A.C. Gruppo Archeologico Casentino (edited by) (1989), *Nuovi contributi per una carta archeologica del Casentino*, Provincia di Arezzo, Arezzo,
- G.A.C. Gruppo Archeologico Casentino (edited by) (1999), *Profilo di una valle attraverso l'archeologia. il Casentino dalla Preistoria al Medioevo*, Stia
- MITTARELLI G. B., COSTADONI A. (1755), *Annales Camaldulenses Ordinis Sancti Benedicti*, Tomus Primus, Venetiis
- PASQUI U. (1899), *Documenti per la storia della città di Arezzo nel Medioevo*, Coi tipi di U. Bellotti, Arezzo
- PANCANI G. (2011), Lo svolgimento in vera grandezza delle volte affrescate delle sale dei quartieri al piano terreno di Palazzo Pitti a Firenze, in *Il Disegno delle trasformazioni*, congress proceedings, Napoli, 1-2 december 2011, Clean Edizioni, Napoli
- PIERI S. (1919), *Toponomastica della valle dell'Arno*, Tipografia della R. Accademia dei Lincei, Roma
- PIERI S., VOLPI C. (2008), *Visite Pastorali dal 1521 al 1571*, Servizio Editoriale Fiesolano, Fiesole
- PIERI S., VOLPI C. (2009), *Visite Pastorali dal 1574 al 1584*, Servizio Editoriale Fiesolano, Fiesole
- PIERI S., VOLPI C. (2011), *Visita Apostolica alla città e diocesi di Arezzo 1583*, Tomo I, Servizio Editoriale Fiesolano, Fiesole
- PIERI S., VOLPI C. (2011), *Visita Apostolica alla città e diocesi di Arezzo 1583*, Tomo II, Servizio Editoriale Fiesolano, Fiesole
- REPETTI E. (1843), *Dizionario geografico fisico storico della Toscana*, Vol. 5, Coi tipi di Giovanni Mazzoni, Firenze
- RINAUDO F. (2003), La tecnica laser scanning: applicazioni architettoniche e urbanistiche, in *La tecnica del laser scanning: teoria e applicazioni*, edited by Fabio Crosilla and Riccardo Galetto, Dario Flaccovio Editore, Udine
- ROVIDA A., CAMASSI R., GASPERINI P., STUCCHI M. (edited by) (2011), *CPTI11, la versione 2011 del Catalogo Parametrico dei Terremoti Italiani*, Milano, Bologna, <http://emidius.mi.ingv.it/CPTI>
- SCHIAPARELLI L., BALDASSERONI F. (edited by) (1907), *Regesto di Camaldoli*, Vol. I, E. Loescher e C., Roma
- SCARINI A. (1996), *Pieve a Socana: arte storia sacralità*, Calosci, Cortona
- SALMI M. (1926), *Architettura romanica in Toscana*, Bestetti e Tumminelli, Milano
- SALMI M. (1958), *Chiese romaniche della campagna toscana*, Federazione delle Casse di Risparmio della Toscana, Electa Editrice, Milano
- SALMI M. (1971), *Civiltà artistica della terra aretina*, Istituto Geografico De Agostini, Novara
- TAFI A. (1998), *Le antiche pievi: madri vegliarde del popolo aretino*, Calosci, Cortona
- VITRUVIO M. P. (1829), *Dell'architettura*, edited by Carlo Amati, Coi tipi di Giacomo Pirola, Milano
- VERIANI (1934), *Pieve di S. Antonino a Socana*, in *Arte sacra nella diocesi aretina (1920-1934)*, a cura di Ferruccio Bigi, Regia Accademia Petrarca Editrice, Arezzo

Imprint:

Proceedings of the 17th International Conference on Cultural Heritage and New Technologies 2012 (CHNT 17, 2012)

Vienna 2013

<http://www.chnt.at/proceedings-chnt-17/>

ISBN 978-3-200-03281-1

Editor/Publisher: Museen der Stadt Wien – Stadtarchäologie

Editorial Team: Wolfgang Börner, Susanne Uhlirz

The editor's office is not responsible for the linguistic correctness of the manuscripts.

Authors are responsible for the contents and copyrights of the illustrations/photographs...