

## A crypt in the wood

### Digital survey of the ruins of St Salvatore's Abbey in Giugnano, Italy

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#### Introduction

This study was conducted in a research project about the current state of the Abbey of St Salvatore in Giugnano, using cutting-edge methodologies in the field of architectural survey. The ruins are in the middle of a grove of holm oaks, on the property of the Agriturismo San Guglielmo, along the Bai river in the Bruna valley. The location, close to a stream and in an area rich in raw materials, is not to be considered casual, in fact, besides being a place of prayer, it was also the site of intense metallurgical activity. The relationship between the viability and the position of the monastery is close, in fact, near the abbey, an important crossroads was situated where the two main routes of the Grosseto plain passed towards the hinterland.

#### Historical Analysis

The monastery has had a rather troubled history. Founded under the Benedictine order in the XIII century, it became a grangia of the Cistercian abbey of San Galgano in Monte Siepi. The hermits of Saint Augustine acquired its jurisdiction at the beginning of the XIV century. However, within a few years, it was deemed a losing bargain and put back on the market (Farinelli and Marrucchi, 2005). From this moment on there are few information about San Salvatore a Giugnano, probably due to a gradual decline of the religious and metallurgical activities after the abandonment by the monastic order. Today the crypt and the gothic Aula are badly deteriorated, so it is necessary to secure the structures and build a new entrance to the crypt.

#### 3D Documentation

After having acquired the historical knowledge, the work proceeded with a contactless 3D acquisition survey: a measurable 3D model of the remains has been obtained using a laser scanner (model Faro X330). The data acquisition was carefully designed to avoid shaded areas or loss of information. The survey was completed by a photogrammetric campaign performed with Reality Capture software.

The result of the laser scanner survey is a 3D discontinuous model that comes from a progression registered scanning by specific software (AutodeskRecap\_Pro) creating a point cloud. The 47 acquired scans have been processed in this semi-automatic software that recognizes and collimates the target and homologous points into a single 3D measurable model. The next step was to merge the dimensional Recap model with the photogrammetric Reality Capture's one, to finally provide a highly detailed – chromatic textured representation of the ruins. That has been achieved with the following process:

- using *Align Images* on the photos obtained during the photogrammetric campaign, it has been created a dense cloud of coloured aligned points.
- build a triangular mesh.
- apply a coloured texture to the mesh, obtaining a continuous and textured 3D model (Fig. 1).

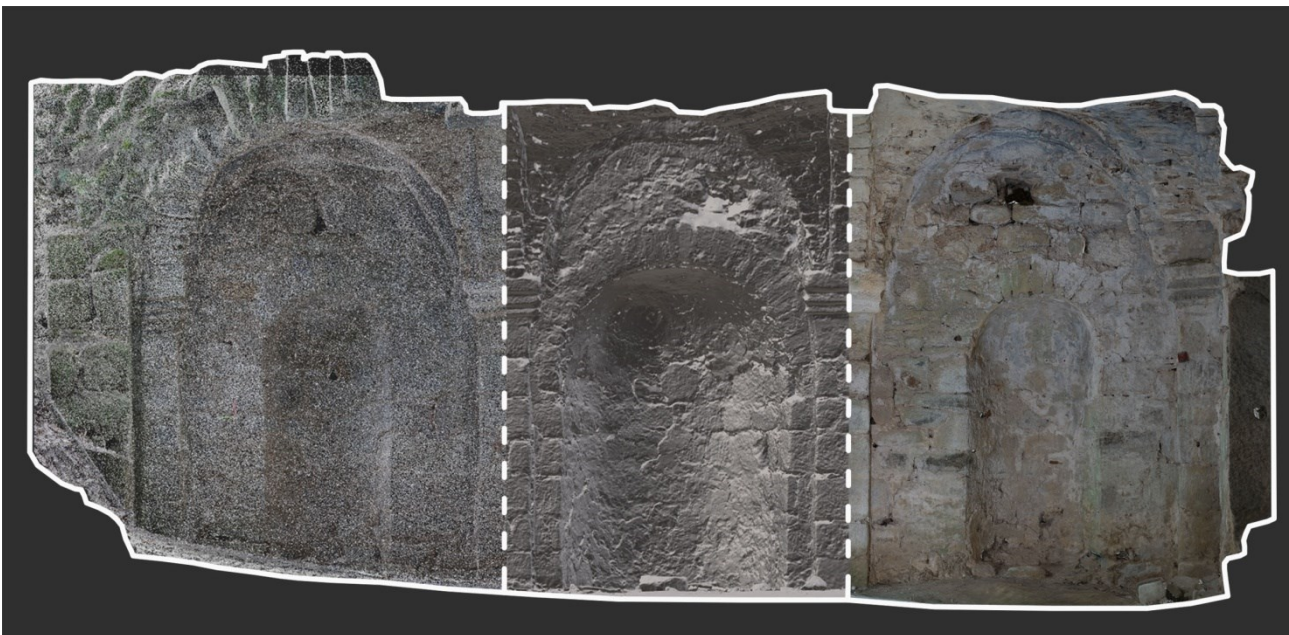


Fig. 1. Transition from the pointcloudmodel to a mesh textured model (© S. Maggi)

Alongside the 3D survey an in-depth study about the historical and territorial context has been carried out by consulting various indirect sources preserved both in private and public archives. This was followed by an in-depth study of the materials and technologies applied in the construction phase, seeking the unit of measurement applied to the construction of the abbey and comparing it with other similar cases both at regional and extra regional level (Rutishauser, 1993). It was therefore possible to infer that the reference unit of measurement for the construction of the Roman crypt and of the Gothica aula was the Florentine arm (0,5858 m) and its half both (Fig. 2).

Of the monastery, to date, only the underground Romanesque crypt have been preserved, together with some portions of perimeter walls of a rectangular Gothic Aula of later date. On the surface, hidden by vegetation, there are faint traces of walls that can be traced back to the church. The crypt today appears as completely underground space, which can be accessed only through an open breach on the ceiling of the vault (Fig. 3). The plan has a rectangular design extended by a large semicircular oriented apse, with three niches, now obstructed. The room is divided in three naves

and the ceiling is realized by a system of cross vaults which is supported by four columns. Every column capital has a different decoration.

The Gothic Aula has a rectangular plan, but only two outer walls still exist. Probably the entrance of this church was in the East wall, some traces of an arch springer are visible in this area (Brogiolo and Cagnana, 2012).

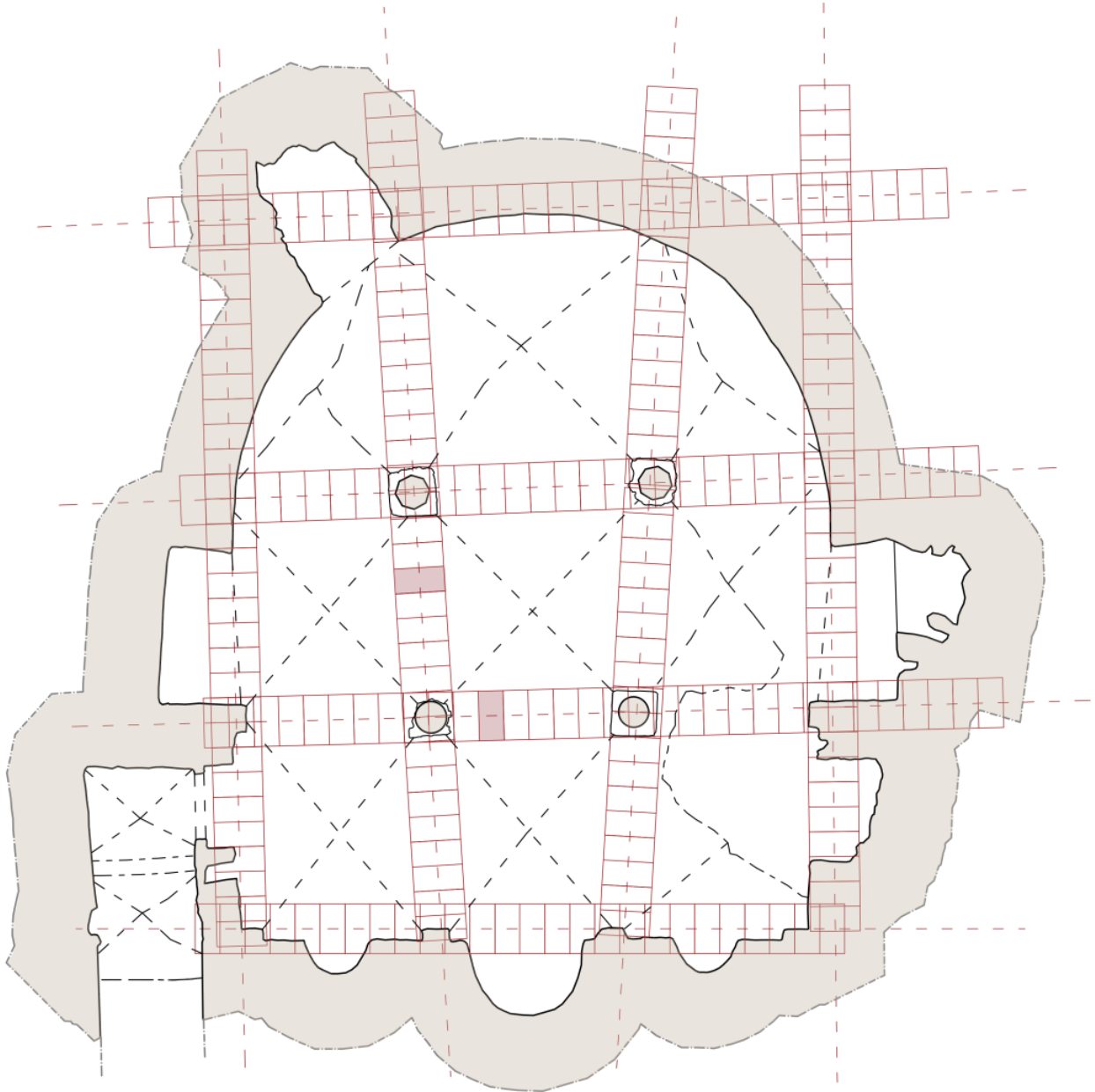


Fig. 2. Study of the unit of dimensional layout of the crypt (© S. Maggi)

## Conclusion

After a sound knowledge was acquired the study moved on to analyse the strengths and weaknesses that affect the building and the place where it is set, trying to propose solutions on a critical issue scale. The work was completed by defining some design guidelines for the future protection and a possible new use, supported by smart and modern communication strategies.



*Fig. 3. View from the inside of the crypt (© S. Maggi)*

## References

- Brogiolo, G.P. and Cagnana, A. (2012). *Archeologia dell'architettura: metodi e interpretazioni*, Florence.
- Farinelli, R. and Marrucchi, G. (2005). *Roccastrada e il suo territorio. Insediamenti, arte, storia, economia*, 2005, Florence.
- Rutishauser, S. (1993) *Genèse et développement de la crypte à saie en Europe du Sud*, in "Les cahiers de Saint-Michel de Cuxa", Vol 24, Paris.