

# The roman basilicas

## Digital documentation, analysis and communication

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### Abstract

Among the wide range of monuments which compose our architectural heritage, the Roman basilicas are iconic for their great value. This evidence comes from the historical role of their foundation, for their architectural language and for the cultural meaning that they still hold. The contribution here presented aims to share the first results of the research about the use of integrated digital models as a tool for the study of Santa Maria in Trastevere Basilica, Santa Maria Maggiore Basilica and San Pietro Basilica. These monuments, which are all built in Rome, have been studied from diverse points of view, spanning from their structure to their history and architectural characteristics (AAVV 1968, Ciranna 2002). Nevertheless, these specialistic studies lack of an updated documentation of the current state that would allow scholars to archive and manage quantitative and qualitative characteristics. This documentation might be used as a reference to monitor the evolution, in terms of conservation, of structures and surfaces. In addition, it might support the verification process of structural asset and construction phases hypotheses (Coccia, Guidobaldi, Scoppola, 2012).

Given these needs, the starting point of the research has been the architectural survey of the basilicas and the urban context in which they are located.

In the field of architectural survey, the traditional methodological approach has been deeply modified by the well-established massive data capture technologies. They have influenced the construction process of architectural digital models. These models are able to describe the characteristics of the object with an increasingly high level of fidelity. In addition, data capture devices are reaching lower and lower level of uncertainty and their products have become easily accessible and shareable.

The *Basilicas Project* proposes a methodological approach to guarantee the transition from quantitative data, acquired by an integrated 3D survey, to qualitative ones, derived from the interpretation process for the construction of 3D and 2D models (Bianchini, Inglese, Ippolito 2017). The digital models (Fig.1) are the product of the critical processing of the survey operations.

The data capture phase has been conducted by integrating the massive technologies (3D laser scanning) with topographic surveying. The numerical models, obtained from the scans alignment, made it possible to record the spatial configuration and to control the architectural system in metric and geometric terms. However, it does not accurately express the surfaces state of conservation. The reading of the chromatic and material values was therefore delegated to the data capture through digital images. Images were then elaborates using a structure from motion approach to obtain a 3D point cloud. The point cloud was then scaled and adjusted according to laser scanner and topographic references. The entire processes have made it possible to have information about metric and geometric aspects, to evaluate the state of conservation and to document material and chromatic aspects. The interpretation phase consist in the translation of the captured data into heterogeneous models (3D and 2D) that make the survey a critical operation. It is not only linked to the development of increasingly automated procedures software, but it transforms raw data into structured information by its understanding (Fig.2). The models offer a conscious reading of the analyzed buildings, placing themselves as indispensable tools for reflections on the conservation of the architectural heritage, on its meanings centuries after its realization and on the possible interventions.

In addition to the documentation need, the second object of the Basilicas Project concerns the communication of the information through integrated models applied to specific purposes. The research aims at developing the general public knowledge about basilicas by sharing through a communication project their main characteristic (Coccia, A. G. Fabiani, F. Prezioso, F. Scoppola 2000). They are particularly referred to aspects that are difficult to grasp at first glance, or not accessible by users with partial disabilities. In particular, the experimentation on Santa Maria in Trastevere involved visually impaired and blind people, making it necessary to develop different levels of information and different modes of communication (Fig.3). In this case, the use of models, however essential, is adapted to the most varied needs by implementing the quality levels of the space, providing have once again made clear the potential of integrating data for the construction of models of the architectural heritage.



Fig. 1. 1 San Pietro's Square, view of the numerical model resulting from the processing of data acquired by 3D laser scanning.

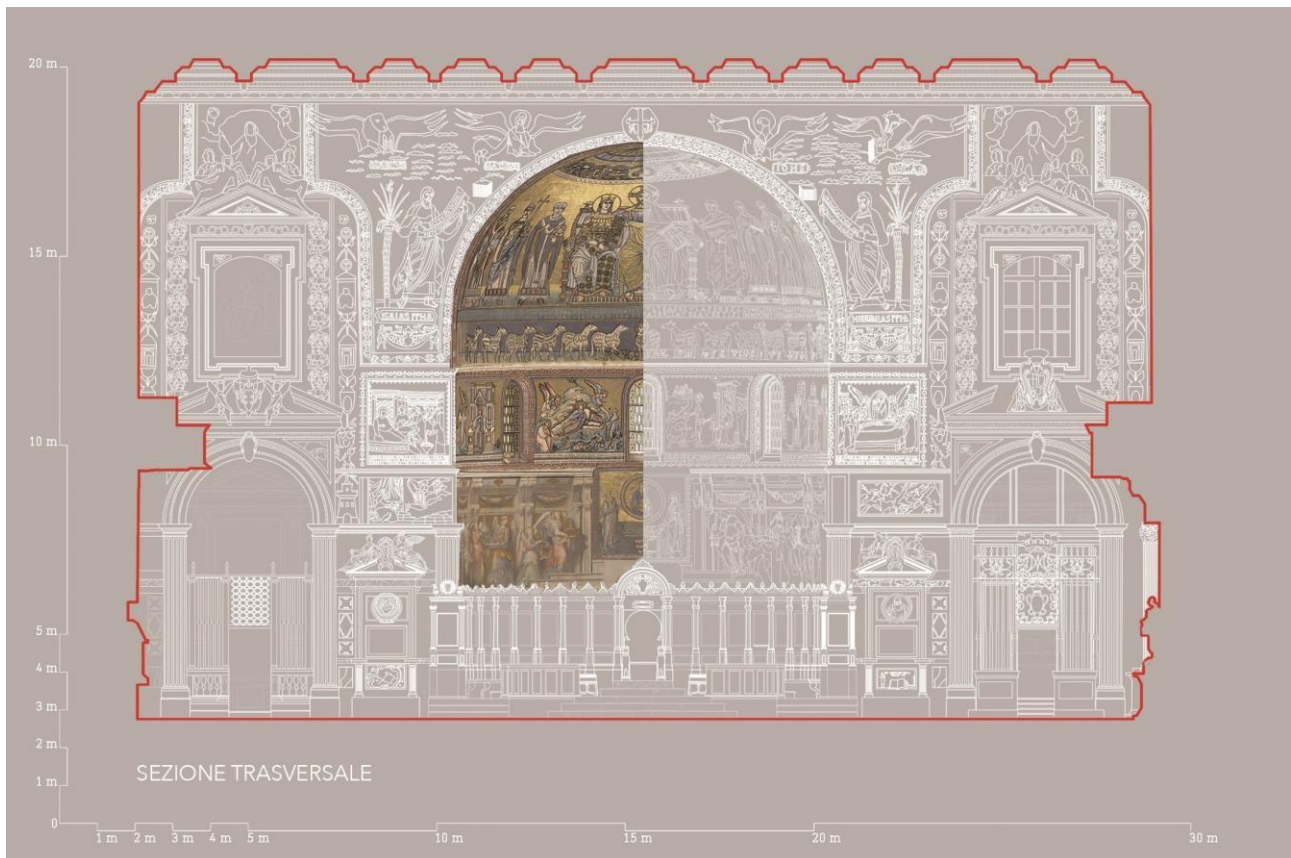


Fig. 2. Santa Maria in Trastevere, construction of integrated models.

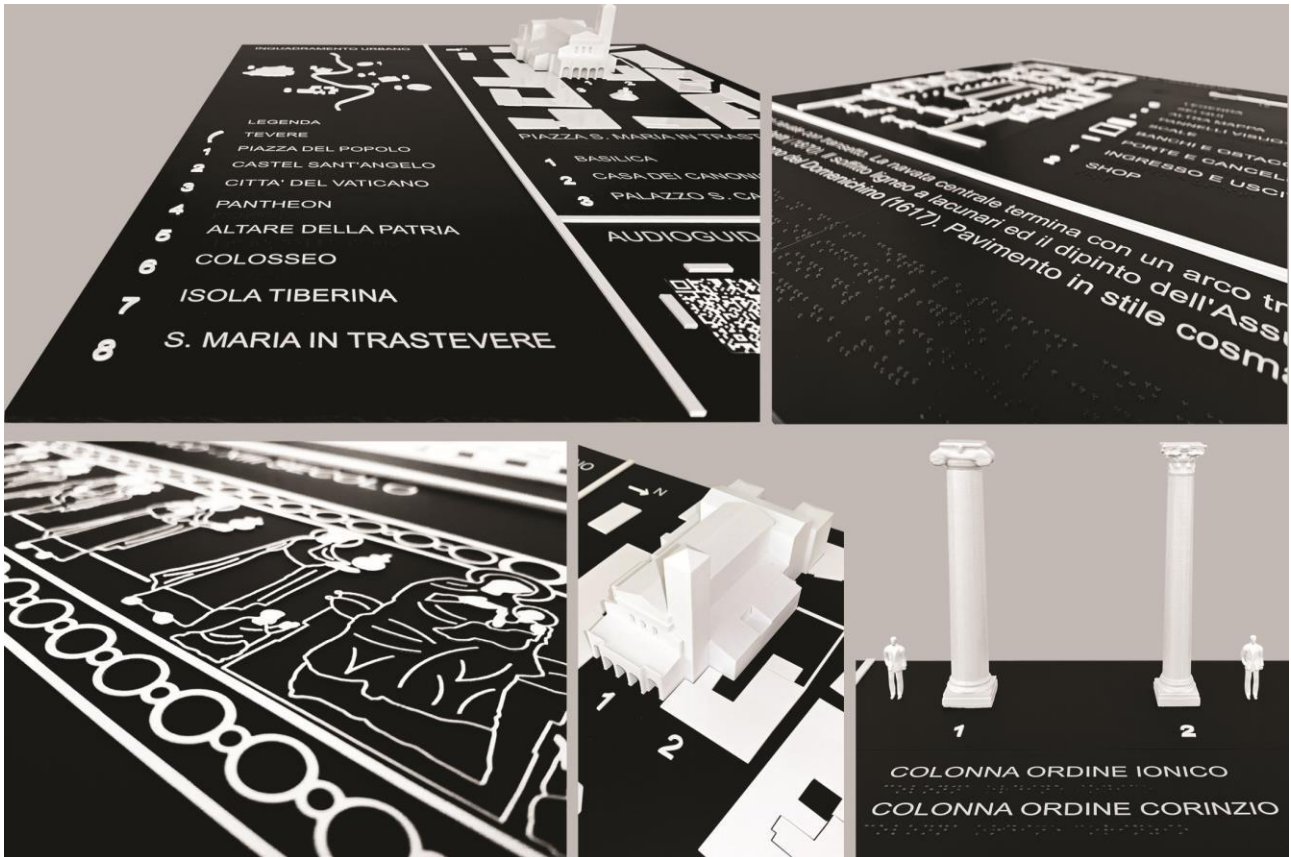


Fig. 3. Communication project of the Basilica of Santa Maria in Trastevere, images of the visual-tactile panels created. Author Contributions

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