

Messina 1780: virtual tour in a lost city

A Digital reconstruction for the Sicilian city destroyed by earthquakes

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Introduction

There are not many examples of great historical cities, whose monuments have been described over the centuries by writers and represented by engravers, of which today their trace has been erased forever by the fury of natural and war/human events. One of these is Messina, since historical times a crossroads of Mediterranean traffic and a thriving commercial centre because of its strategic position and its natural port. This city, starting from the end of the 17th century, suffered a long series of destructive events culminating with the 1783 earthquake and the even stronger one, followed by a tsunami which happened in 1908, capable to destroy most of the existing building causing about 86.000 victims. The subsequent reconstruction completely renewed the urban layout following a rigid anti-seismic criterion, effectively suppressing the ancient tracks and rejecting the rare surviving elements, almost erasing the memory of the previous city. In the past various studies has attempted to document or re-organize information about the past asset of the downtown, most of them were oriented to specific subjects (single neighbourhoods or specific kind of buildings). No previous operation was complete in coverage nor any of them tried an extended 3D modelling of the past with a scientific approach and method. In this sense the study presented here is extremely innovative for the state of knowledge about the lost downtown of Messina.



Fig. 1. Plan view of the Messina in 1780 with the documentation quality mapped.

Workflow

The past appearance of the city can be reconstructed through the use of the available archaeological, graphic and descriptive evidence, rearranging and hierarchizing them, focusing on a specific era, avoiding

conflicts of interpretation and random characters. In the case of Messina, the documentation currently available allows the aforementioned crystallization to be carried out around the year 1780, just before the earthquake of 1783 and simultaneously with the main and most reliable graphic *corpus* that allows outlining a vision of a set from the main *facies* of the city of that time. The choice of the areas to be treated in detail is made through two main criteria: the most important areas on a monumental, civil and landscape level, and the areas in which it was possible to find more reliable documentation and sources. Eight sub-funds that were represented in high detail were therefore chosen.

Once the sensitive entities of time and space have been defined, attention shifts to how the memory of the “lost” city can be re-proposed in a sensitive experience: the digital processes of three-dimensional reconstruction and the immersive Virtual Reality (VR) techniques are the most effective and popular way to visit a digitally reconstructed environment. Before dealing with these processes, it is necessary to establish the analytical development of the entire procedure; starting from the sources, sorting them according to their reliability and relevance to the specific historical period, a scene likely to be assimilated to reality can be acquired and it can coincide with historical and bibliographical evidence.

Then the effective reconstruction process begins, operated through 3d modelling programs such as Autodesk 3d Studio Max, and in the case of a direct survey of the existing, through photogrammetry software such as Agisoft PhotoScan. Not all the historical heritage of Messina has been lost: many elements, especially fountains and sculptural elements have been recovered, some of them still arise in the places where they were designed, others were dismantled over the years and transferred in museums or warehouses. The digital photogrammetric technique was conducted through a photographic campaign spread over the area; in addition to the usual Photoscan workflow, the models acquired by the dense clouds have been suitably edited in post-production to obtain a mesh with a relatively low number of triangles in order not to overburden the complex scenes. The models, exported in Filmbox (FBX) format, were imported in 3d Studio Max, reapplying the material element subsequently using the UVW Unwrap modifier.

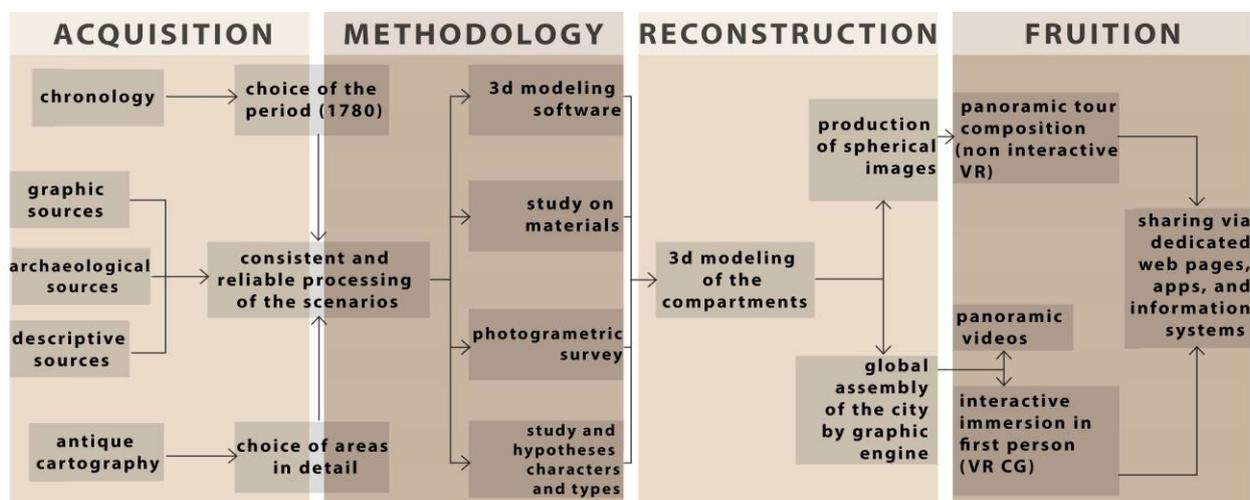


Fig. 2. Logical scheme of the digital reconstruction procedure.

Before tackling the modelling process, it was necessary to establish a scale of reliability and completeness of the sources relating to each building block in the rebuilt area: for each district, next to a block reconstructed through sources with a valuable level of detail or even with elements still existing, there could be an organism of which there is no source other than cartographic. The difference between a reconstruction based on sources and an arbitrary one must, therefore, be adequately marked and classified, to avoid imposing on the observer a value of irrefutable reality in cases where it is not. Even these reconstructions, albeit arbitrary, were conducted based on studies on the typological characteristics of that time and the historical architecture widespread in Eastern Sicily, to avoid anachronisms and the use of building characters extraneous to the place.

Results

After completing the reconstruction of the districts, the memory of the ancient city can be re-proposed to the sensory experience through the modern immersive VR or Augmented Reality (AR) techniques, which are the most effective and popular ways of virtual uses for a digital environment. Once the 3D reconstruction of the city has been completed, it only remains to choose the type of media to exploit for allowing the most practical visualization of the scenes. Currently, two modes have been used: the first has been developed through the production of 15 spherical images representing glimpses from the ancient city, these contents are all connected to a general interactive virtual tour of the “lost” city, it can be accessed in Virtual Reality mode. A system of hotspots makes possible getting information about places and monuments, with the option of comparing the reconstruction directly with the available graphic references. The second mode, at the present yet under development, is focused on creating an immersive experience, reassembling the various parts of the city within the Unreal Engine software, to allow the viewer to virtually cross the squares and streets of the city. These modalities can be very useful for didactic and tourist use. The option of moving freely across a full 3D model may allow the users to enter the past places using their virtual equipment or using a public virtual station or even accessing from a billboard set up with a Quick Response (QR) Code. The immersion in the virtual Messina using site-specific solution may allow a better understanding of the present urban asset, appreciating the value of city from the 18th century, now almost completely disappeared.

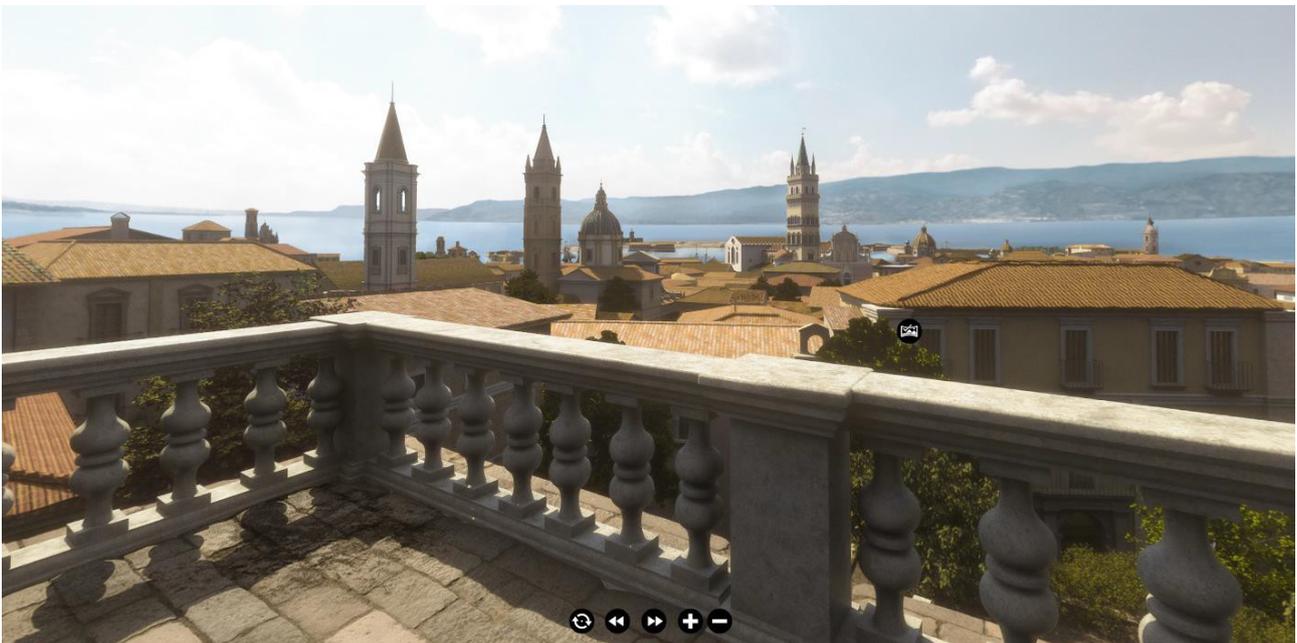


Fig. 3. Screenshot from VR application: panoramic view of the reconstructed city.

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