

IL PICCOLO MASACCIO E LE TERRE NUOVE. CREATIVITY AND COMPUTER-GRAPHICS FOR MUSEUM EDUTAINMENT

Valentina Zucchi
Museo Terre Nuove
San Giovanni Valdarno

**Antonella Guidazzoli, Giovanni Bellavia, Daniele De Luca, Maria Chiara Liguori,
Francesca Delli Ponti, Federica Farroni, Beatrice Chiavarini**
Cineca
visitlab@cineca.it

Abstract – Since its opening, the Museum of the New Towns, housed in the Palazzo di Arnolfo in San Giovanni Valdarno, has dedicated a particular attention to the relationship with its audiences. In this context, the video “Il piccolo Masaccio e le Terre Nuove” has the purpose of bringing children and young people, in particular, closer to the museum main themes. The video presents a series of very different techniques, such as live shots, taken also by drone, Computer Graphics, 2D drawings executed with a tablet, drawings sketched with traditional techniques, such as India ink and watercolours, and digital videos taken from Google Earth.

INTRODUCTION

The Museum of the New Towns, housed in the Palazzo di Arnolfo in San Giovanni Valdarno (Museo delle Terre Nuove - <http://www.museoterrenuove.it/>), traces the genesis and development of the phenomenon of the New Towns, new settlements founded between the Thirteenth and Fourteenth century in strategic areas of the territory and under the control of a central authority. This phenomenon, widespread in several European areas, is well visible also in the Florentine territory with, for example, the towns of Firenzuola, Castelfranco, Scarperia, Terranuova Bracciolini and San Giovanni Valdarno. The visiting path through the rooms of the museum allows visitors to understand the reasons lying behind the birth of the New Towns, investigating the urban and architectural features (which revolutionized the spontaneous medieval stratification) and the aspects of daily life. The dwellers were migrants from villages, relocated with the promise of tax exemptions, the ownership of a building lot and cultivated lands. The museum dedicates specific attention to Castel San Giovanni (the early name of San Giovanni Valdarno), whose foundation dates back to January 26, 1299, with the aim of ensuring the Florentine power in the area by consolidating the road axis along the Arno river and weakening local lordships. San Giovanni, which as Castelfranco should have constituted an economic, military and demographic center of the upper Valdarno, will succeed in the fourteenth and fifteenth centuries in consolidating and establishing itself in the territory as an important urban reality and as a commercial hub along the route from Arezzo to Pisa.

Since its opening, the museum has dedicated a particular attention to the relationship with its audiences in the belief that only an effective dialogue with visitors can improve the life of museums. Therefore, multiple work-flows have been activated in relation to the different targets - from residents to tourists, from schools to families. In this context the video “Masaccio e le Terre Nuove” has the purpose of bringing children and young people, in particular, closer to the museum main themes thanks to an innovative approach, capable of combining scientific reliability and digital language.

“IL PICCOLO MASACCIO E LE TERRE NUOVE”

“Il piccolo Masaccio e le Terre Nuove” is a short animated educational video explaining the origins and the history of San Giovanni Valdarno, a city of foundation [1].

The protagonist is one of its illustrious citizens: Masaccio, the painter (Castel San Giovanni, 1401 – Rome, 1428) (Figure 1). He is presented as a kid of the early '400, attentive listener to inspiring explanations about the city provided by the Vicar of his time, Giovanni di Forese Salviati. The Vicar is used as a storyteller, capable of inspiring in the young Masaccio the interest for the rational rules that underlie the design of the city of San Giovanni, as well as other urban agglomerations born out of a precise planning. The choice to resort to the figure of Masaccio (the real name was Tommaso) as a kid is dictated both by his bond with the city and by the possibility of being a vehicle of identification for a young audience, to whom the video is mainly addressed.



Fig. 1 – A shot from “Il piccolo Masaccio e le Terre Nuove”: Tommaso and his younger brother Giovanni. A study on lighting.

The story, after a brief contextualization in the present time, takes place in 1409, and ends with a return to the present, reconnecting San Giovanni Valdarno to other still existing cities born from a rational and planned project.

MIXED MEDIA FOR AN EDUCATIONAL SHORT FILM

The video presents a series of very different techniques. It makes use of live shots, taken also by drone, Computer Graphics, 2D drawings executed with a tablet, drawings sketched with traditional techniques, such as India ink and watercolours, and digital videos taken from Google Earth.



Fig. 2 - A reconstruction of San Giovanni Valdarno and its surroundings as it could have been at the start of the XVth century.

The live shots present San Giovanni as it is now. These shots were filmed by hand-held camera in the city streets, to highlight some of their most characteristic historical elements, and have been integrated with drone shots. The aerial view is the best way to understand the geometry of the city and it leads the viewer towards the San Giovanni of the past, which appears immediately afterwards, as a virtual reconstruction.

The digital model reconstructs the city and the landscape surrounding it (Figure 2). For the procedural reconstruction of San Giovanni (with CityEngine - <http://www.esri.com/software/cityengine>) the precise measures and proportions coming from well documented studies on the city were used and some details were realized with photogrammetric techniques (PhotoScan - <http://www.agisoft.com/>). Apart from these two commercial softwares, most of the work has been completed in Blender (<https://www.blender.org/>) and in an Open Source pipeline.

In order to highlight a connection with the artistic nature of the character of Masaccio, the video also makes use of the contribution of traditional techniques such as drawing and watercolour painting, which visually and creatively embellish the film.

The ending, with the sequence created in Google Earth, brings the audience back to the present day by recalling a technological tool of common use. Through this solution, it is possible to offer a suggestive and direct evidence of the persistence over time of urban structures organized around precise geometries and shapes.

Mixed media were very effective in order to optimise the production pipeline. The reconstruction of the city started from a .DWG file delivered by the administration and reproducing the current version of San Giovanni Valdarno. The procedural modelling rules were devised using the information given by Puma [4], Bertocci [2] and Bianchini [3] on the road axis coming from the .DWG file. The programming rules of procedural modeling fitted particularly well the rational spirit underlying the original creation of the city, conceived as a set of regular modules distributed in urban space according to a precise logic.

For the chromatic choices, for the buildings and for street furniture, the inspiration was found in the frescoes painted inside the Brancacci chapel, in Santa Maria del Carmine, in Florence [5]. In particular the fresco *Guarigione dello storpio e resurrezione di Tabita* delivered quite a few hints about the colour of the facades of the buildings, the typology of windows and doors and other details, deeply inspired by the curtain of buildings lying on the background of the opera and strongly resembling Masaccio's hometown.

The central part of the video is focused on a communicative effort for explaining the historical origins of San Giovanni and the architectural rules underlying its urban design. In order to improve the effectiveness for an audience of youngsters, we chose a narration relying on different techniques according to what we considered as the best way for presenting the different concepts.

For highlighting the so called "matrix of Arnolfo", that is the geometrical developmental patterns coming from Arnolfo di Cambio urban design, a mix of 2D and 3D is used. As a matter of fact, all the urban elements in San Giovanni, from the design of the defensive walls to the articulation of the four different building lots up to their hierarchy, follow the "ad quadratum" proportioning methodology based on a rectangle whose sides are in relation to each other, equal to the root of two. This system allows to reconstruct in a simple and direct way, starting from a single element in which these laws are codified, the whole design of the city [2].

The rules of proportionality are shown with animations over a simplified version of the procedural 3D model of the city.

A different choice, but always in line with the logic of mixed media, was made for the sequence in which the Vicar illustrates to Tommaso the historical events that characterized the city. The Florentine political and socio-economic strategies that had led to the creation of Castel San Giovanni are presented using 2D graphics realised, in this case, with watercolor and ink drawings (Figure 3). The 2D elements were animated and integrated in Blender with a 3D background, simulating a parchment [6].

To better represent this complexity, the topic has been introduced by the sequential use of different techniques including: 2D digital stylizations, realistic 3D representations and satellite visualizations, such as those coming from Google Earth. The scene down the staircase, in particular, when Tommaso elaborates the information received by the Vicar and "dreams" sketches of ideal cities, combines the animated 3D model of the character and stylized geometries of ideal cities. The latter have been realized stylizing photographs, paintings and images of architectural references in order to highlight the geometries that originated cities such as Grammichele, Avola or Palmanova, in a way that can hopefully impress the mind of a young audience (Figure 4).

After Masaccio's reverie, a brief come back to his time closes the video before displaying satellite images from Google Earth of some of the cities already presented as geometric skeletons. The aim is to underline the importance and persistence over time of urban settlements designed as rational systems. The Google Earth sequence shows how many cities around the world have retained their original structure and how it is visible even today.

The choice to use this technique for the final part and to keep it even during end credits makes the message more lively. Google Earth is a tool familiar to young people and with an effective visualisation style, very useful for highlighting how ideally designed urban landscapes actually affect the whole world, from Italy, to France and Germany, but also Brazil or India.

CONCLUSIONS

The variety of contents presented in "Il piccolo Masaccio e le Terre Nuove" is a starting point for further educational applications, which can be developed for different media.

For example, the rationale laying behind the educational part of the video can be considered as a lesson in itself about ideal cities: the case study of San Giovanni Valdarno can be a sort of paradigm that, integrated with further explanations about other cities that underwent the same kind of development, can clarify this historical process.

ACKNOWLEDGEMENTS

The authors wish to thank Fausto Forte, San Giovanni Valdarno City Council; Simona Caraceni, Silvano Imboden, Cineca; Parrot Films; Gianpaolo Fragale.

References

[1] F. Cardini, "Dalla "Terra Nuova" alla città contemporanea. Storia di San Giovanni Valdarno", Pacini Editore, 2009.

[2] S. Bertocci, "Castel San Giovanni ai tempi di Arnolfo", in M.T. Bartoli, S. Bertocci, Città e architettura. Le matrici di Arnolfo, Edifir, Firenze, 2003, pp. 81-93.

[3] L. Bianchini, “La fortificazione delle Terre Nuove: le mura”, in M.T. Bartoli, S. Bertocci, *Città e architettura. Le matrici di Arnolfo*, Edifir, Firenze, 2003, pp. 95-106.

[4] P. Puma, “Geometria, misura e facies urbana”, in M.T. Bartoli, S. Bertocci, *Città e architettura. Le matrici di Arnolfo*, Edifir, Firenze, 2003, pp. 107-109.

[5] J. T. Spike, “Masaccio”, Rizzoli libri illustrati, Milano, 2002, ISBN 88-7423-007-9

[6] K. Keech, R. Bibb, B. Whited, and B. Achorn, “The role of hand-drawn animation in Disney's *Moana*”, in *ACM SIGGRAPH 2017 Talks (SIGGRAPH '17)*. ACM, New York, NY, USA, Article 3, 2 pages, 2017. DOI: <https://doi.org/10.1145/3084363.3085079>