

# Digital Nolli. 3D representation (digital model) of Giambattista Nolli's Map of Rome "La Nuova Topografia di Roma" (1748)

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Abstract: Giambattista Nolli's Map of Rome – "La Nuova Topografia di Roma" – in its Large Size Edition (12 engraved plates, 1748) (fig. 01a) is universally recognized as the definitive urban plan of historical Rome at the height of its development after the fall of the Roman Empire. It accurately represents Papal Rome at the end of its splendid growth throughout the Middle Ages, the Renaissance and the Baroque, almost exactly up to the period between Rococo and Neoclassicism, i.e. at the edge of the Modern period. A major amputation has been inflicted by modernity on Nolli's Rome: after the unification of Italy, the direct contact of the city with the river was erased. The three-dimensional digital reconstruction of Nolli's Rome promises to be a long-lasting project, a truly ongoing research to be carried out over time: 1. A realization of the complete digital model of Nolli's Rome within the imperial walls in 1:250 scale. Buildings will be represented in their true height and the real or realistic conformation of roofs, coverings, or vaults and domes. Two reference models will be used: the aforementioned model by the French Army (1849) and the plastic model of Imperial Rome in Emperor Constantine's age, on display in the Museo della Civiltà Romana (Museum of Roman Civilization) in Rome (at EUR); 2. To experiment with it all scales of representation, all the way to the more finely detailed ones permitted by a study of the great historical ichnographic heritage and the direct study of the still existing and living parts of Nolli's town.

Keywords: Giambattista Nolli, Nuova Topografia di Roma, digital 3d reconstruction.

*Giambattista Nolli's "La Nuova Topografia di Roma" (The New Topography of Rome)*

Giambattista Nolli's Map of Rome – "La Nuova Topografia di Roma" – in its Large Size Edition (12 engraved plates, 1748) (Fig. 01a) is universally recognized as the definitive urban plan of historical

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This paper collects a research idea which the author has been reflecting on for decades and which hereby it is presented with the typical and demonstrative arguments of a research project. The author is very grateful to Allan Ceen for reading this proposal and sharing ideas and collaboration expecting future developments on these studies.

Rome at the height of its development after the fall of the Roman Empire. It accurately represents Papal Rome at the end of its splendid growth throughout the Middle Ages, the Renaissance and the Baroque, almost exactly up to the period between Rococo and Neoclassicism, i.e. at the edge of the Modern period. Due to the foresight of Nolli, who wanted to grant his Plan of Rome a lasting public success, “La Nuova Topografia di Roma” includes, perfectly defined as already completed, buildings in those years under construction or only just designed. Thus, Nolli’s Plan of Rome faithfully depicts a scientific portrait of the city virtually drawn about the Thirties of the XVIII century; we can say that it establishes the most precise and complete two-dimensional rendering of the “Grand Tour” Rome. After that, the development of Papal Rome marked a slowdown – if not a decisive decline. Thus, when a century later, between 1840 and 1857, the French architect Paul Letarouilly wanted to give, with accurate surveys and drawings, three-dimensional life to the most eminent monuments, churches and palaces of the Papal Rome, he could not help but refer to an only slightly updated edition of “La Nuova Topografia di Roma” – this time edited with the French heading “Rome Moderne” (Fig. 01b) – to produce his monumental record of architectural engravings in five volumes: “Edifices de Rome Moderne” and “Le Vatican et la Basilique de St. Pierre”; quite a logical 3D continuation of Nolli’s work. Despite being a clear copy of the Pianta Grande, Letarouilly gives Nolli no credit at all.

### *Innovative aspects of the New Topography of Rome*

Nolli’s ichnographic map was preceded by a series of famous pictorial maps of the papal city (Figs. 02 a/c). The city of Rome was a destination for pilgrimages from all over Europe. The pictorial maps of Rome presented to visitors its architectural and symbolic wonders to naturally guide the pilgrims during their visit to the city. Those pictorial maps, easy to understand and to carry, were also a means of spreading the city’s fame: center of Catholic Christianity and ancient Roman civilization. In this context, rare were the topographies in two dimensions, among which the most famous by Leonardo Bufalini, in 1551 (Figs.03 a/b). They were rather inaccurate, especially concerning angular measurements. However, they responded to a growing demand

by the Roman ruling class for a reliable geometric view of the city. Almost 200 years after the publication Bufalini's map, Giambattista Nolli, a Lombard architect, well-trained in topographical science, undertook the elaboration of his famous new topography of Rome – begun in 1736 and completed in 1748 – in the spirit of European Enlightenment. The main purpose of his map was not so much to introduce the city of Rome to visitors and pilgrims, as to represent the city as a physical, functional and social whole. In fact, the map was accompanied by an index of all the activities that took place in the city, each individually identified and numbered within the map itself (Figs. 04 a/c). Moreover, Nolli wanted to represent the continuity of the public spaces – consisting of streets, squares, gardens and the river Tiber – of collective meeting areas – the interior of the churches conceived as covered piazzas – and of private spaces – such as entrance halls and courtyards of noble palaces – which could be visited, or looked at, by the public. For this purpose Nolli studied the few, precious remnants of the *Forma Urbis*, the very precise ancient map of Imperial Rome, engraved in marble, which, at the time of Nolli, was brought into focus by the archeologists (Fig. 5 a/d). As a result Nolli's Map, in addition to establishing the exact planimetric form of the city, represents it as a spatial and social *continuum*.

### *Three-dimensional reconstruction*

The New Topography of Rome by Giambattista Nolli established a new standard in the field of urban topography and became a reference for other famous capitals – for instance, the King of Naples, Charles the Second in 1750, just two years after the publication of the Nolli's Map of Rome, ordered the Duke of Noja to preside over and lead the publication of a new topographical map of Naples, (Fig. 06 a/b) that was eventually edited in 1775 following the scientific and rendering standards established by Nolli. But above all Nolli's Map remained an unsurpassed, complex and synthetic representation of the city of Rome at the pinnacle of the papal period. It continues to be studied and investigated not only by historians of architecture, city and Renaissance and post-Renaissance culture, but also – and deeply – by economic historians (Fig. 07A/c). Work has also been carried out from a purely topographical point of view, redrawing it with reference to

the modern GPS system. But its virtual three-dimensional rendering was never attempted apart from some schematically simple extrusion of the volumes without any reference to the architectural features of the buildings (Fig.08 a/b). Yet copious and extraordinary ichnographic material for the architectural reconstruction of *New Topography* by Giambattista Nolli in all its parts has existed since its publication. In fact, in the same years of its publication, two great illustrators of the architectural aspects of the city were working in Rome. The first to be remembered is certainly Giovanni Battista Piranesi who, while Nolli was drawing the city topographically, executed his wonderful drawings of the monuments, squares and antiquities of the city. Actually, Piranesi co-signed with Nolli a smaller and more portable edition of the famous Nolli map (Fig. 09 a/b and Fig. 10 a/b). The second is certainly Giuseppe Vasi, a contemporary of Nolli and Piranesi, who illustrated the city's significant sites and monuments in hundreds of pictorial drawings that with lively realism represent the buildings and spaces of the city topographically drawn by Nolli (Fig. 11a/b). Not only: Giuseppe Vasi himself drew with great precision a global pictorial view of the city of Rome as seen from the top of the Gianicolo hill, set on a perspective reproduction of Nolli's Map (Fig. 12a/b). Thus, with the traditional means, the Nolli's *New Topography* of Rome was immediately understood as an opportunity for a renewed and scientifically updated three-dimensional representation of the city.

#### *Other sources for a three-dimensional reconstruction*

Moreover, the aforementioned, very thorough architectural representation of the city's monuments executed by architect Paul Letarouilly, one hundred years after publication of Nolli's Map, further enriches the material available for the three-dimensional architectural reconstruction of Nolli's city; which, as mentioned, after the last decades of the eighteenth century, entered a period of significant stasis in urban and architectural development apart from the extraordinary exception of the realization of Valadier's project for Piazza del Popolo. (Fig. 13a/c) But not only; in the calm papal city of the nineteenth century a multitude of Italian, and even more, foreign painters devoted an important part of their activity to the representation of the spaces, views and life that

animated the city of Rome. Two names above all, Pinelli (Bartolomeo and Achille) (Fig. 14a/d) and Ettore Roesler Franz (Fig. 15a/d), whose illustrations are known as representations of “Disappeared Rome”, that is, of the city that the works of modernity would erase; Nolli's city. But under the title Disappeared Rome are also gathered the precious photographs of the last decades of the nineteenth century, which constitute a precious part of the documentation of the premodern city (Fig. 16a/d). But not all subsumed under the title – Disappeared Rome – is really gone; this is true but partially. Because Nolli's city is still largely alive in the modern city and her buildings, the houses of ordinary people, palaces, squares and streets are still an integral part of the Historical Center of the Capital of the Italian State. Despite the great changes in the urban fabric that occurred after the unification of Italy, about 70% of the buildings represented in Nolli's Map are still present, still in use and form a large part of the fascinating urban space of the central part of the city, therefore ready to be reproduced in a three-dimensional, realistic, historic reconstruction of the city (Fig. 17a/b).

### *The city and its river*

Nevertheless, a major amputation has been inflicted by modernity on Nolli's Rome: after the unification of Italy, the direct contact of the city with the river was erased. This is undoubtedly the biggest loss of the urban landscape of Rome. Rome was born and developed over time as one of the most typical river towns. The river brought her into contact with the Mediterranean Sea, hence with the entire civilized world then. Two were the largest ports along its course through the city, Ripa Grande and Ripetta and at least two beaches where local fishermen and ferrymen transporting the inhabitants from one side of the river to other docked the smaller vessels (Fig. 18a/d). Few, at the time of Nolli, were the bridges still standing after the fall of the Roman Empire, only one, the “Ponte Sisto”, was newly built between the Middle Ages and the Renaissance. The Tiber Island, long since a place of worship linked to the founding of Rome, was, in Nolli's time, still the main gradual passageway from the main part of the city to Trastevere, that is to those living on the opposite bank of the Tiber (Fig. 19a/e). Today it is still a fascinating place, but closed and very secluded from the rest of the

urban fabric. But the entire city has lost direct contact with the river, which was forced to flow between two high walls at the bottom of a truly artificial canal. In the three-dimensional reproduction of Nolli's topographical map, the reconstruction of the ancient layout of the banks of the Tiber will be fundamental. It will thus be possible to realistically understand the complex relationship that used to bind the city to its river not only from a scenic point of view, but also from a functional one – the many mills on the river bank, for example – as well as from a hydraulic point of view. It will be possible to appreciate the changes of the relationship with the river water in seasons of shallow and of overflow, as well as evaluate with great realism the dramatic nature of the major floods, of which there are precise memories engraved on still existing special stone columns (Fig.20a/h).

### *The Urban Countryside*

Another loss that needs to be reconstructed is the Nolli city's relationship with the landscape of the surrounding countryside. The New Topography of Rome was drawn by Nolli, extending the drawing to the whole area included within the ancient Roman imperial walls, the so-called Aurelian Walls, built in 275 A.D. But Rome, in Nolli's time, occupied a minor portion of the territory enclosed within the ancient walls. The rest of the imperial city's ancient area had been transformed into a special farmland marked by the great ruins of the major abandoned antique monuments, certainly including those of the Great Terme (Imperial Baths), but also the Colosseum and the many ruins of the Roman Forum, Palatine, and the other hills on which ancient republican and imperial Rome lay. It was a heavily cultivated countryside, favored by its proximity to the urban center of the papal city, but also partially occupied by large princely villas, by the most ancient Christian basilicas – San Giovanni, Santa Maria Maggiore, Santa Croce in Gerusalemme – by numerous convents, overlaid by a network of small watercourses and embellished by the imposing and mysterious remains of ancient monuments (Fig. 21a/c). The New Topography of Rome, drawn by Nolli, shows faithfully, though somewhat schematically, the view of the special farmlands enclosed between the imperial walls and papal city of Nolli's time. It will be important to interpret the somewhat

symbolic design that Nolli used to draw the farmland, comparing it with other documents and maps of Rome following Nolli's, but based on it throughout the nineteenth century. Equally important will be consulting specialists in the history of the Italian agrarian landscape to infer from the signs and symbols used by Nolli the most realistic layout on the ground of vineyards and fields. In this respect of great documentary interest is the plastic model that in 1849 – the same era in which Paul Letarouilly scientifically drew the monuments of Rome – the French Army realized when they besieged the fleeting Republic that Italian patriots, led by Garibaldi and Mazzini, had instituted in Rome, having chased out the Pope. It is a very detailed plastic model, built for military purposes on a scale of about 1:250 with precise observations from life. It is located in Paris in the “Musée des plans – reliefs – Hotel National des Inavalides”. Although it is a partial model, it does, however, concern a significant part of the city, from which it is possible to understand how to interpret Nolli's map in three dimensions regarding its relationship with the river Tiber – the model includes the area of Tiber Island – as well as a representation of the “urban countryside”, which the French model extremely realistically realized down to single trees (Fig. 22a/d).

### *Objectives and Multidisciplinary dimension of the Project*

From this overview it is easy to see that the three dimensional reconstruction of the New Topography of Rome by Giambattista Nolli involves multidisciplinary work involving art historians, architects and Roman city historians, geographers and topographers, Italian agriculture historians and experts. The connection will be essential with those who, such as Professor Nancy Clark of the Consortium for Hydro-Generated Urbanism, has tackled the study of the complex, critical and vital relationships of cities with water. Collaboration with software companies specializing in three-dimensional architectural representation will also prove essential.

The three-dimensional digital reconstruction of Nolli's Rome promises to be a long-lasting project, a truly ongoing research to be carried out over time. It will be research at various scales of representation, made possible by digital drawing lending itself to be extremely detailed and highly scalable. But it is essential to define the first step, which is

establishing the research group, the relationships among the different skills, the contribution of the various experts. The first objective may be selected following two different strategies discussed below:

1 – A realization of the complete digital model of Nolli's Rome within the imperial walls in 1:250 scale. Buildings will be represented in their true height and the real or realistic conformation of roofs, coverings, or vaults and domes. Two reference models will be used: the aforementioned model by the French Army (1849) and the plastic model of Imperial Rome in Emperor Constantine's age, on display in the Museo della Civiltà Romana (Museum of Roman Civilization) in Rome (at EUR) (Fig. 23a/d). In both models, the main monuments, temples, churches, or palaces are in greater detail, especially when they define characteristic features of the urban profile. The model will include a preliminary planivolumetric reconstruction of soil morphology, the course of the riverbed and of other smaller watercourses, and a convincing reconstruction of the agricultural landscape and fabric within the walls. This digital model can be proposed to the City of Rome to be produced with 3D printers to create a model, after additional handwork, to be placed alongside the wooden model of Rome in Constantine's era, in the same Museo della Civiltà Romana. It will allow a comparison of two images of Rome in two periods marking the summit of its two fundamental historical cycles. The wooden model of Rome at the time of Constantine captures the ancient city at the moment of its greatest urban and monumental expansion within the walled city. The physical-digital model of Nolli's city would capture the – medieval, Renaissance, baroque and rococo – papal city at the moment of its urban and monumental completeness, represented within the same ancient city walls. These then, would constitute the geographical and dimensional reference to evaluate, and compare, the two cities, the two “glories” experienced, one after the other, on the same terrain.

2 – The second strategy, on the other hand, considers choosing a limited section of Nolli's New Topography of Rome to experiment with it all scales of representation, all the way to the more finely detailed ones permitted by a study of the great historical ichnographic heritage and the direct study of the still existing and living parts of Nolli's town.

Such experimentation would make it possible to perfect the methodology,



the technical tools and the selection of staff to extend, in future phases of the research, the work to the whole extent of Nolli's city. Both the first and the second strategy would allow us to create a website on the Internet dedicated to the digital exploration of Nolli's Rome by sectors, by itineraries, functions and problems.

### Bibliography

Jessica Maier, *Rome Measured and Imagined: Early Modern Maps of the Eternal City*, University of Chicago Press 2015.

Ian Verstegen, Allan Ceen (eds), *Giambattista Nolli and Rome. Mapping the City before and after the Pianta Grande*, Studium Urbis, Rome 2014.

Antonino Saggio, *Roma ininterrotta*, In Ian Verstegen, Allan Ceen (eds), *Giambattista Nolli and Rome. Mapping the City before and after the Pianta Grande*, Studium Urbis, Rome 2014.

C.M. Travaglini – K. Lelo (eds), *Roma nel Settecento. Immagini e realtà di una capitale attraverso la pianta di G.B. Nolli*, Croma 2013.

Victor Plahte Tschudi, *Plaster Empires. Italo Gismondi's Model of Rome*, "Journal of the Society of Architectural Historians", Vol. 71 No. 3, September 2012; (pp. 386-403).

James E. Packer, Italo Gismondi and Pierino Di Carlo: "Virtualizing" Imperial Rome for 20th-Century Italy, *AJA* July 2008 (112.3).

Allan Ceen, *Rome 1748 Roma. La Pianta Grande di Roma di Gianbattista Nolli*, Publisher J.H. Aronson, Highmount, New York, 1991.

### Web sources

- 2d Digital Nolli: University of Oregon on the 2D digital interactive Nolli map; reference person: Jim Tice, Erik Steine: details available on (<http://nolli.uoregon.edu/>). Outcome: Martin Koppenhoefer: (<http://nolli-app.com/index-it.html>).

- Aquae Urbis Romae. The Waters of the City of Rome: University of Virginia, reference person: Katharine Wentworth Rinne. The research is about a cartographic history of water infrastructure and urbanism in Rome the one (<http://www3.iath.virginia.edu/waters/>) funded by NEH Collaborative Grant (2005-2007).

For the French Maps of the Rome Siege of 1840: <http://comitatogianicolo.it/2013/3209/3209>

- For the French Models of 1840: <https://www.napoleon.org/histoire-des-2-empires/iconographie/vue-densemble-du-plan-relief-du-siege-de-rome-realise-a-partir-des-relevés-effectués-sur-le-terrain-par-les-officiers-du-genie-du-corps-doccupation-francais/>

- For the Rome pictures and watercolors. <https://www.romasparita.eu/foto-romasparita/81181/trastevere-4>



Fig. 02a



Fig. 02b

The pictorial maps of Rome were very much requested by pilgrims and well-read visitors not only before the Nolli's New Topography of Rome. Here Fig. 02a shows a typical general view of Rome (by Probst and Werner - 1728) produced before Nolli's Map. But fig. 02b shows a pictorial view of Rome drawn by Sachsischer-Postillon for Frederick the Third, King of Prussia, in 1796, almost fifty years after the publication of the Nolli's Map of Rome. But even the most famous maps of Rome drawn before Nolli's Plan, as the Falda Plan of 1676 shown in fig. 02c, were rather pictorial in spite of their more reliable appearance.



Fig. 02c



The only non-pictorial map experimented in the centuries before Nolli's work was the Leonardo Bufalini's Map (1551), Fig. 3a - which was clearly drawn with a prevalent attention to the topographical layout of the streets, of the main ancient monuments and of the geomorphology of the roman hills, yet approximately rendered. It is interesting that Nolli, before tracing his own, scientific topography of Rome, re-edited the Bufalini Map (Fig. 3b) without any topographical correction, a part the re-orientation of the map toward the Magnetic (not the Astronomic) North. The new Nolli edition of Bufalini's map shall be considered a cautious approach to the scientific

Fig. 03a

topographical work Nolli had in mind; actually some features of the Nolli's New Topography of Rome are already present in this approach - for instance the black rendering of the urban fabric and the Magnetic North orientation.

Fig. 03b





Fig. 04a

Fig. 04b



The Nolli's New Topography of Rome wanted to represent the city as a physical, functional and social whole. In fact, the map was accompanied by an index of all the public and private spaces and buildings in the city (Fig. 4a), each individually identified and numbered within the map itself (Fig. 4b, Via Condotti in the Nolli's Map). The final edition of Nolli's Map includes places and activities numbered from 1 to 1320. But in the original preparatory drawing (fig. 04c) the numbers go from 1 to 10.472, including the references to a long series of descriptions that should have been published in a separate book. A part of these description survives to demonstrate the documentary purpose of Nolli's work.



Fig. 04c





Most probably Nolli took the decision of drawing all the open-to-public-spaces (i.e. streets, squares, churches, palaces and other accessible monuments) as part of a continuous city, by

observing the precious remnants of the *Forma Urbis Romae* since in 1742 he was given the task of mounting the surviving *Forma Urbis* fragments in the pal. The *Forma Urbis* is a huge marble Map of Imperial Rome at the age of the Severan Emperors (II/III Century A.D.) Only few parts remain of it (Figs. 5 b/c). However in Nolli's time, the *Forma Urbis Romae* represented a fascinating, unavoidable example. Fig. 5 d shows a detail of Giovan Battista Piranesi's famous drawing of some of the relics of the *Forma Urbis Romae*.



Fig. 05c

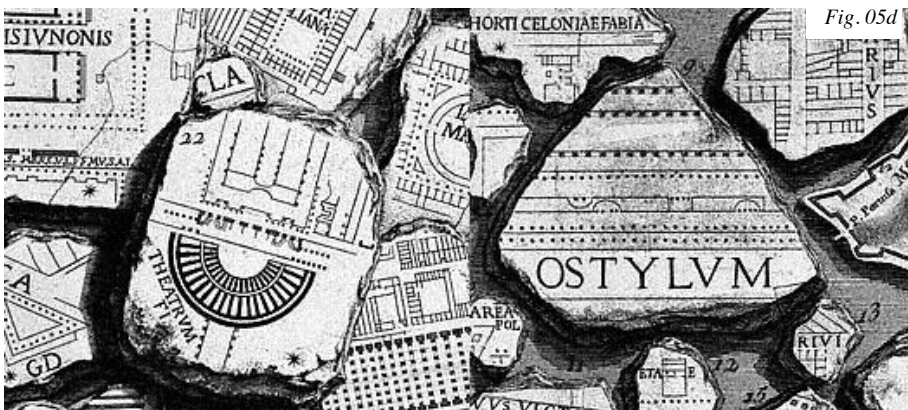
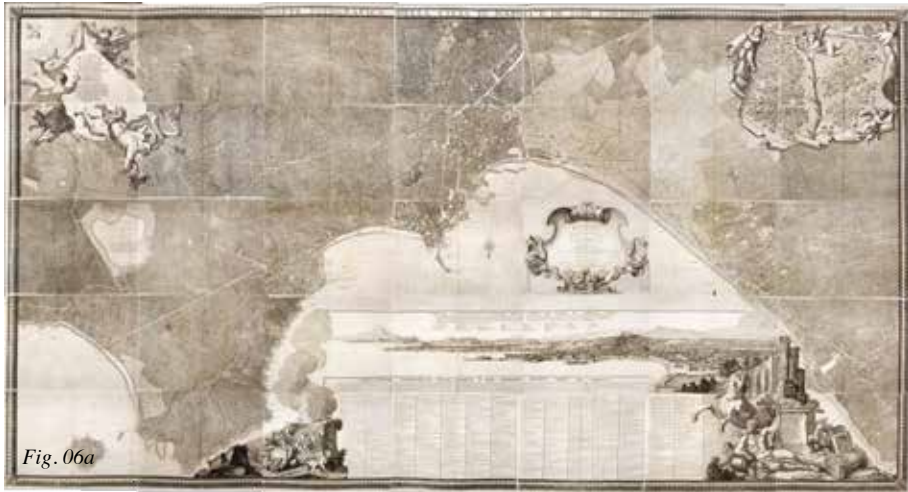


Fig. 05d



*Fig. 06a*  
The influence of Nolli's Map was great; it established the modern standard for the new topographical maps of the major European towns. Only two years after the publication of the Nolli's New Topography of Rome, i.e. in 1750, the first Bourbon Family's King of Naples, Charles the First, engaged in an important yet fleeting reformation endeavour, wanted to have a scientifically map of his Capital town, Naples. The "Consiglio degli Eletti" (the City Council) appointed Giovanni Carafa, Duke of Noja, responsible for the realization of a general map of the town and the territory of Naples. The map was finished in 1775 (Fig. 06 a). In a detailed view clear is the reference of the Duke of Noja's map to the drawing norms and standards of Nolli's Map of Rome (Fig. 06 b).



*Fig. 06b*



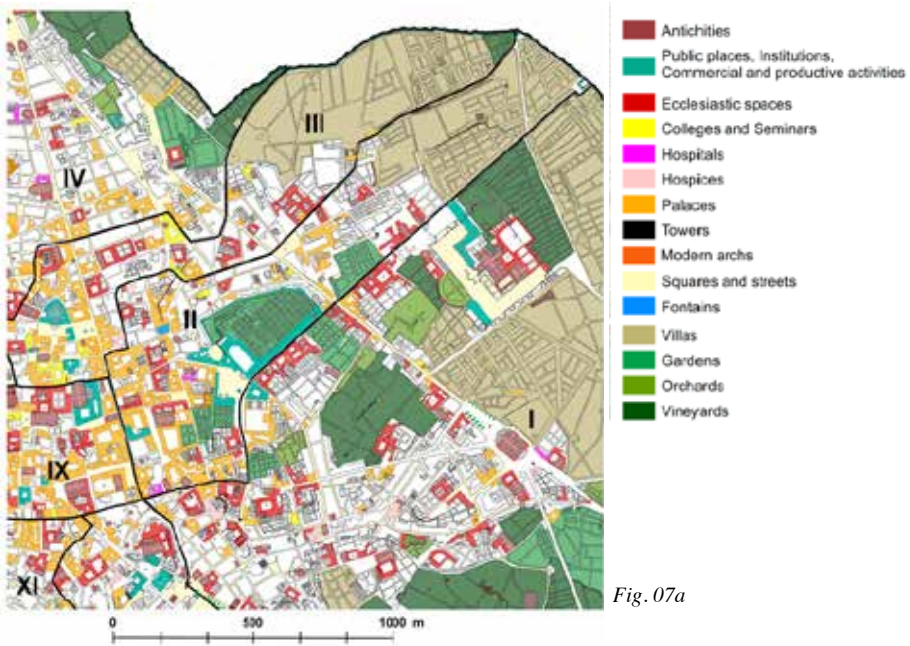


Fig. 07a

Fig. 07a is published in the article "A GIS Approach to Urban History: Rome in the 18th Century" by Keti Lelo, (Centro di Ateneo per lo Studio di Roma dell'Università Roma Tre)



Fig. 07b

The Nolli Map is studied, not only in Italy, as a precious source for investigating the social and economic life of XVIII Century Rome as a basis for a wider study on the modern development of the town.

Fig. 07a, showing the North-East sector of the Nolli's Rome, presents the recognition of the different functions of the urban fabric and the agricultural "Urban Countryside" included in the ancient city walls.

Fig. 07b presents the same sector as it appears in the original Nolli Map. For a clearer reference between the two illustrations the ancient city walls are traced in red. Note the rotation given by the authors of Fig. 07a to the map for orienting it to Astronomical North; in fact the Fig. 07a is part of series of historical surveys made on a transcription of the Nolli Map traced following the GPS procedures.

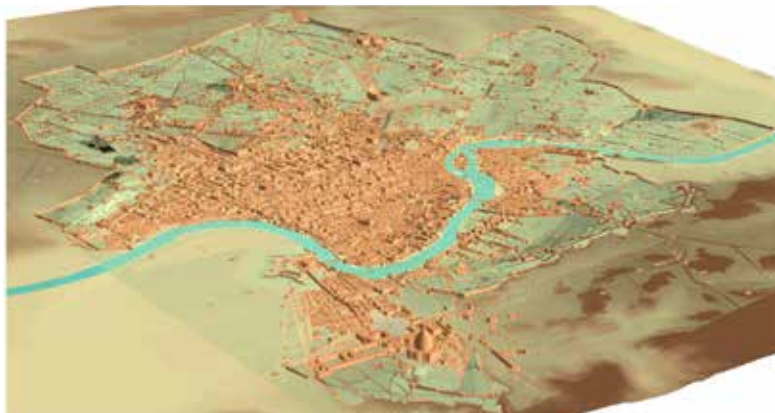


Fig. 08a

Notwithstanding the great, permanent interest for Nolli's New topography of Rome, a virtual, or real, three-dimensional rendering of it was never attempted, apart from some schematically simple extrusion of the volumes without any reference to the architectural features of the buildings (Fig. 08a). More interesting, but not completely fulfilling our aim, is the model of fig. 08b. It represents only a small, but important, sector of "Disappeared Rome", i.e. the central part of the archeological areas of Rome as it was before the profound modern transformations. The model was realized in the year 1981. Its features remind of the reader the monumental wooden model of the Imperial Rome (see fig...). The monumental buildings are treated with a certain detail while the urban fabric is represented with rather exact volumes, including the approximate roof shapes.

Fig. 08a is published in the article "A GIS Approach to Urban History: Rome in the 18th Century" by Keti Lelo, (Centro di Ateneo per lo studio di Roma dell'Università Roma Tre). Fig. 08b presents a wooden model produced by professor Vanna Fraticelli and Giorgio Ciucci in 1981, showing the central archeological sector of Rome as it was before the modern excavations. The model is based on the Catasto Gregoriano (1835) an updating of the Nolli Map of Rome. The model is on exhibit in the "Museo di Roma", Palazzo Braschi, Rome.



Fig. 08b



Fig. 09a



Fig. 09a

In the same years of the publication of Nolli's Map, two great illustrators of the architectural aspects of the city were working in Rome. The first to be remembered is certainly Giovanni Battista Piranesi who, while Nolli was drawing the city topographically, executed his wonderful drawings of the monuments, squares and antiquities of the city. Actually Piranesi co-signed with Nolli a smaller and more portable edition of the famous Nolli Map (Fig. 09a), as it was engraved at the bottom of the table (Fig. 09b).

Fig. 09b





Fig. 10a



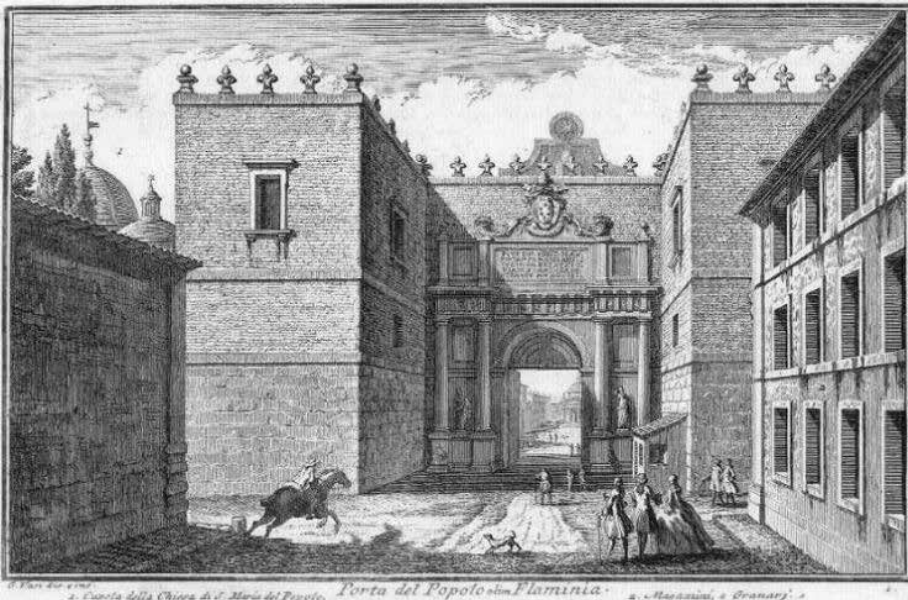
Fig. 10b

While Nolli was drawing the city topographically, Giovan Battista Piranesi executed his wonderful drawings of the monuments, squares and antiquities of the city. In these famous drawings more interesting for the 3D virtual rendering is the precious information about the normal urban fabric of the city, that shapes the scenarios in which the monuments and the monumental spaces of the town are placed. In the Fig. 10a, around the famous Piazza di Spagna staircase Piranesi precisely describes rather important residential buildings, while in the background of the Pantheon square he depicts with human sympathy a much more popular residential urban fabric. In both illustrations the buildings are drawn with plenty of details: not only volumes, windows and roofs, but also the shops' window styles, the chimneys and the small roof-terraces scattered among the shingles: great material for a much more lively and realistic 3D rendering of Nolli's Rome.

Fig. 11a



Fig. 11b



The second illustration, fundamental for the 3D rendering of Nolli Rome, is certainly Giuseppe Vasi, a contemporary of Nolli and Piranesi, who portrayed the city's significant sites and monuments in hundreds of pictorial drawings. Fig. 11a shows a corner of the city that was deeply transformed by the modern modifications of the city; Fig. 11b shows Porta del Popolo, the city gate from North; any modern visitor of Rome can easily detect what remains and what was changed in the two centuries since Nolli's time.





Fig. 12a



Fig. 12b



Fig. 12c

Moreover, Giuseppe Vasi drew with great precision a global pictorial view of the city of Rome as seen from the top of the Gianicolo hill, set on a perspective reproduction of Nolli's map (fig. 11a). With reference to our aim, Vasi's general view is a very important document both for its very realistic and detailed style (Figs. 11b/c, details of the Vasi's general view of Rome) and for its perfect perspective correspondence with Nolli's Map.



Fig. 13a

The architectural representation of the city's monuments executed by architect Paul Letarouilly one hundred years after publication of Nolli's map, further enriches the material available for the 3D architectural rendering of Nolli's city; Letarouilly edited an updating of the Nolli's Map (Fig. 13a; in black the monumental complexes studied by Letarouilly) with reference to all the monuments he precisely measured and represented in hundreds of drawings always accompanied by scientifically traced pictorial views.



Fig. 13b

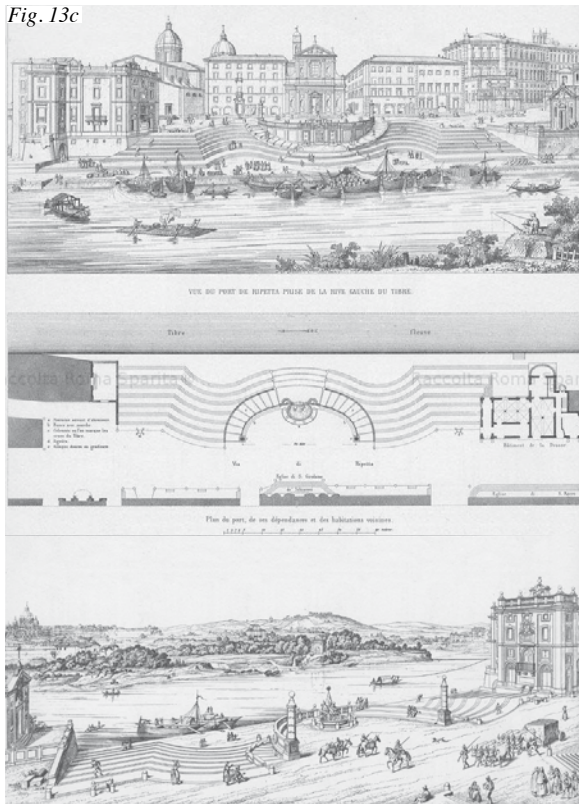


Fig. 13c

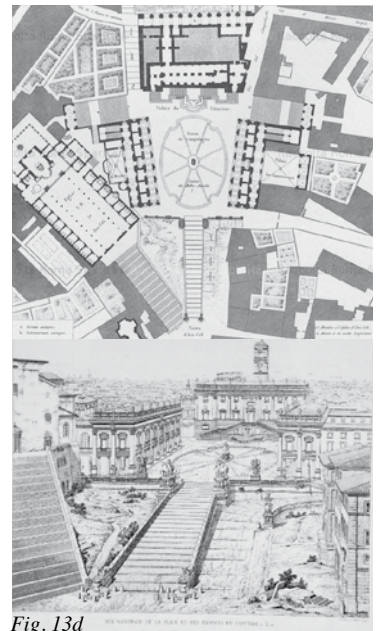


Fig. 13d

Some specimens of Letarouilly's drawings: fig. 13b, the gardens of the Orti Farnesiani (disappeared) on the Palatino Hill; fig. 13c, the Porto di Ripetta (disappeared); fig. 13d, the Capitol Hill (only partially modified in modern times).



*Bartolomeo Pinelli and his son Achille, are among the most eminent illustrators of the life that populated the streets of Rome in the first half of the XIX Century. Bartolomeo was especially interested in the spirit of popular life, often depicted in an urban scenery rich in details, as in Fig. 14a (where in the background we can see the obelisk of Piazza del Popolo and the high point of Porta del Popolo). Achille, his son, a charming watercolorist, painted about two hundred and fifty coloured sketches regarding the everyday life that took place in front of the minor and major churches of the town (many of which don't exist any more) drawn with realistic precision, (Figs. 14b/d). A living source of architectural and colour hints for a detailed 3D rendering of papal Rome.*







Fig. 15a



Fig. 15b



Fig. 15c

The most illustrious of the painters of Rome before the impact of the modern times is certainly Ettore Roesler Franz, an Italian (Roman) of German origin, who dedicated almost his whole artistic activity to the representation of the old town on the verge of its irreversible transformation. Roesler Franz was so aware of the impending urban metamorphosis as to give the collection of his paintings the title of "Roma Sparita" (Disappeared Rome). Thus his watercolours form probably the most precious and realistic documentation of papal Rome as it was at the moment of the institution of the new Italian State. Up to that time the city had remained almost completely still in its eighteenth-century appearance. Fig. 15a represents the top of the Capitol Hill before the transformation of Piazza Venezia. Fig. 15b represents Piazza Barberini, recognisable only



Fig. 15d

by the famous fountain; Fig. 15c and 15d represent the environments of Portico d'Ottavia before the demolition of the Jewish neighbourhood.



Fig. 16a



Fig. 16b



Fig. 16c

*Under the title Disappeared Rome are also gathered the photographs of the last decades of the nineteenth century, which constitute a precious part of the documentation of the old city, a powerful source for the 3D rendering of the papal Rome . In fig. 16a the Porto di Ripetta before the demolition; Fig. 16b the Spina dei Borghi, i.e. the*

*entrance to St. Peter's Square before the realisation of Via della Conciliazione; Fig. 16c the surroundings of Teatro di Marcello before the complete urban reorganisation of the area. This photo dates from the 1930 (Temple of Apollo is already reconstructed).*





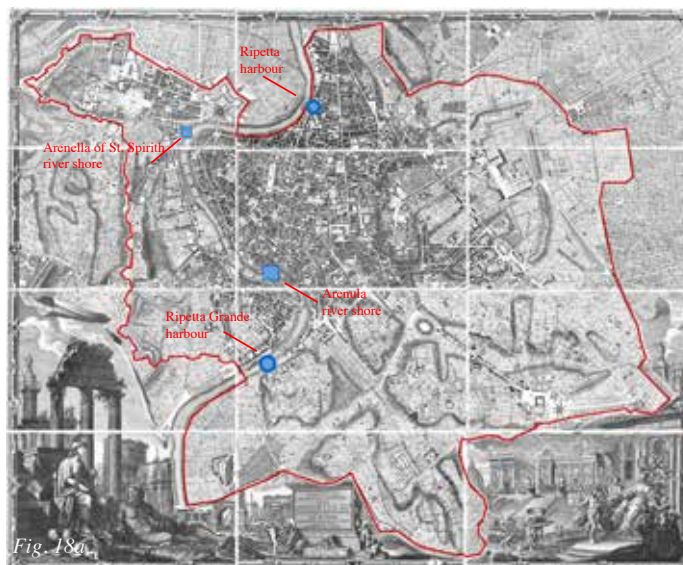
Fig. 17a

But the most important source for the 3D rendering of the Nolli's Rome is Rome itself. Despite the great changes in the urban fabric that occurred after the unification of Italy, about 70% of the buildings represented in Nolli's map are still present, still in use and form a large part of the fascinating urban space of the central part of the city, therefore ready to be reproduced in a three-dimensional, realistic, historic reconstruction of the city. Naturally this implies a very careful and documented comparison between each living historical building with its presumable state at the end of the XVIII century. But the historical documentation presented in the previous pages (i.e. the many pictorial views of the city and the hundreds of realistic paintings and sketches of its more fascinating corners) and the cadastral archives will certainly help. Fig. 17a identifies the main areas of the historical urban fabric still living in the center of the modern city. Fig. 17b shows the main demolitions of the historical urban fabric and helps appreciate the dimension of how much remains of Nolli's Rome in the modern Rome.

Fig. 17b



- The Imperial city Walls ————
- Areas transformed in modern time ————
- Demolished river harbours ●
- Cancelled main river shores ■



Rome was born and developed over time as one typical river town. Two were the ports along its course through the city, Ripa Grande and Ripetta and many were the beaches where local fishermen and ferrymen transporting the inhabitants from one side of the river to the other docked the smaller vessels. Fig. 18a presents the locations of the two old river harbours and the two main river banks. In Fig. 18b a Roesler Franz watercolor represents the features of Porto di Ripetta, while the dramatic Piranesi's engraving (fig. 18c) shows those of Ripa

Grande harbour. Fig. 18d, a painting by Van Wittel, gathers in one view the mixed landscape of the Tiber of Nolli's time: low river banks, floating mills, poor boatmen all dominated by fatal monuments in the background.



Fig. 18b



Fig. 18c



Fig. 18d





Fig. 19a



Fig. 19b



Fig. 19c



Fig. 19d



Fig. 19e

Few, at the time of Nolli, were the bridges still standing after the fall of the Roman Empire, only one, the "Ponte Sisto", was newly built between the Middle Ages and the Renaissance. Fig. 19a (unknown artist) shows three of the four ancient Roman bridges still present in the Nolli'Rome. In the foreground the Ponte Rotto, in ruin. In the back ground the two bridges linking the Tiber Island to the city on both sides of the river: the Ponte Fabricius and Ponte Cestio. Fig. 19b (Van Wittel) presents a view of the Ponte Elio, the forth ancient Roman bridge (see also fig. 18d). Fig. 19c (Van Wittel) shows Ponte Sisto, the only bridge built during the papal times. But the Tiber Island was, in Nolli's time, still the main passageway from the main part of the city to Trastevere, that is to the opposite bank of the Tiber. (Fig. 19d - from Vasi's pictorial Map of Rome - and Fig. 19e - Van Wittel).



Fig. 20a



Fig. 20b

The entire city has lost direct contact with the river, which was forced to flow between two high walls at the bottom of a truly artificial canal. Figg. 20a and 20b compare the same section of the Tiber before and after the construction of the massive walls that press the river into its riverbed. In the three-dimensional reproduction of Nolli's topographical map, the reconstruction of the ancient layout of the banks of the Tiber will be fundamental. It will thus be possible to realistically understand the complex relationship that used to bind the city to its river not only from a scenic point of view, but also from a hydraulic point of view. It will be possible to appreciate the changes of the relationship with the river water in seasons of shallow and of overflow, as well as evaluate with great realism the dramatic nature of the major floods, of which there are precise memories engraved on still existing special stone columns. Fig. 20c shows the areas invaded by the flood of 1870 (light green) and 1598 (light blue). Fig. 20d shows Piazza del Pantheon during the flood of 1870. Figg. 20e, f, g, h show the scattered presences of the flood memories on the walls and in the public spaces of the Historical Center of Rome.



Fig. 20c



Fig. 20e



Fig. 20d



Fig. 20f

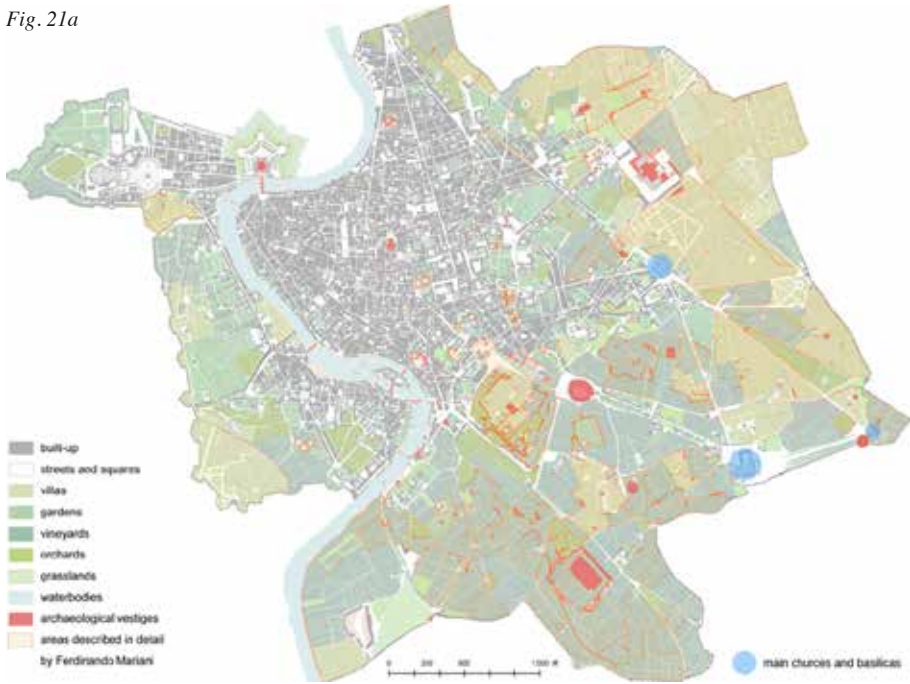


Fig. 20g



Fig. 20h

Fig. 21a



Rome, in Nolli's time, occupied a minor portion of the territory enclosed within the ancient walls. The rest of the imperial city's ancient area had become a special farmland marked by the great ruins of the major antique monuments and by the most ancient Christian basilicas. Fig. 21a shows a typological and functional zoning

Fig. 21b

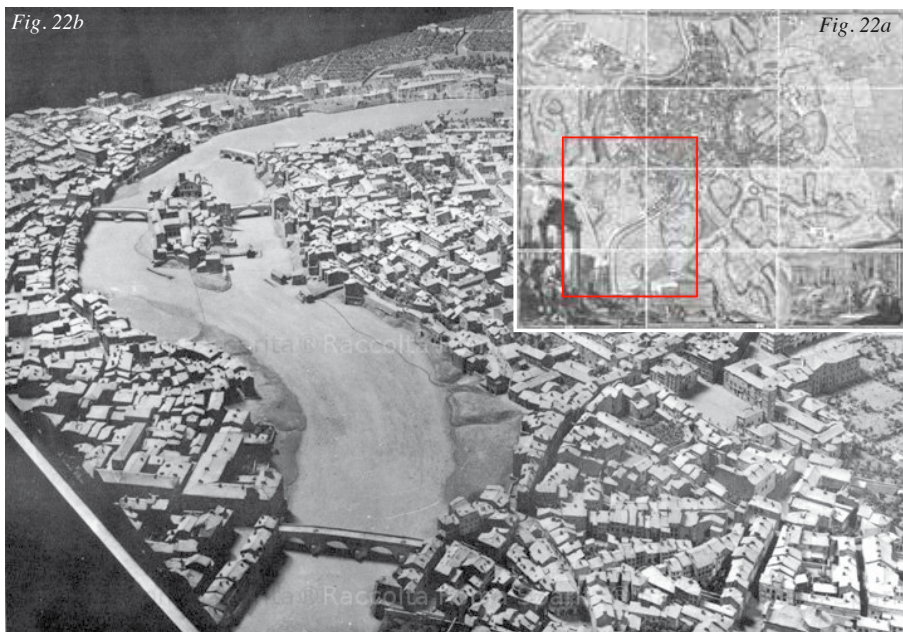


Fig. 21c



of the whole Nolli Map with special reference to the agricultural areas included in the imperial walls (from "Rome in the 18th Century" by Keti Lelo with an elaboration of our group). It was a fascinating background of the papal city very much appreciated by artists and poets. Fig. 21b shows a view of the basilica of St Croce in Gerusalemme from the steps of the St. John in Lateran Basilica (Arthur John Strutt). Fig. 21d presents Lord Byron meditating in front of the Colosseum and the agricultural landscape of Rome (Arthur or James Tibbets Willmore).





To interpret the somewhat symbolic design that Nolli used to draw the “urban countryside” of great interest is the plastic model that in 1849/1852 - the same years in which Paul Letarouilly scientifically drew the monuments of Rome - the French Army realised soon after the victory against a fleeting Roman revolutionary Republic, to celebrate the glorious performance; therefore it was based on a precise direct survey. Although it is a partial model regarding only the area involved in the siege (Fig. 22a), it does, however, concern a significant part of the city, from which it is possible to understand how to interpret Nolli’s map with reference not only to the river (Fig.22b), but especially to the “urban countryside”, which in the French model is extremely realistically realised down to single trees (figg. 21c/d). The model is in Paris, at the “Musée des plans-Reliefs - Hotel National des Invalides - Paris”.



Fig. 23a



Fig. 23b

*A possible immediate aim: to start the realisation of the complete digital model of Nolli's Rome within the imperial walls in 1:250 scale. Buildings will be represented as simple volumes in their true height and the real or realistic conformation of roofs, coverings, or vaults and domes. Two reference models will be used: the aforementioned model by the French Army (1849) and the plastic model of Imperial Rome in Emperor Constantine's age (that is in 1:250 scale), on display in the Museo della Civiltà Romana (Museum of Roman Civilization) in Rome (at EUR) (Fig. 23a). In this model, the main monuments, temples, and palaces are in greater detail, especially when they define characteristic features of the urban profile. (Fig.23b). Our digital model can be proposed to the City of Rome to be produced with 3D printers to create a physical model, after additional handwork, to be placed alongside the wooden model of Rome in Constantine's era, in the same Museo della Civiltà Romana. It will reach a wide audience and will allow a comparison of two images of Rome marking the summit of its two fundamental historical cycles.*



Fig. 23c



Fig. 23d

*Another possible aim: the realisation of the digital 3D model of a limited section of Nolli's New Topography of Rome to experiment with it all scales of representation, all the way to the more finely detailed ones permitted by a study of the great historical ichnographic heritage and the direct study of the still existing and living parts of Nolli's town. Such experimentation would make it possible to perfect the methodology, the technical tools and the selection of staff to extend, in future phases of the research, the work to the whole extent of Nolli's city. The digital result will tend to have the precision of Giuseppe Vasi's views of Rome (Fig. 23c) and the colorful grace of the painting of Van Wittel or Roesler Franz (Fig. 23d); the model should be prepared for close ups views and video from eye-level view-point and for realistic general views. The two aims are not alternative with each other. On the contrary they must be intended as unavoidable phases of the same long-term project.*