3D Reconstructions: A Critical Reflection Starting from the Roman Forum

Paolo Liverani*

3D reconstructions of ancient buildings, and even of entire cities, is already familiar both to specialists and to the wider public.[1] There is also a substantial literature on the potential and the risks of this sort of approach, both for research and for divulgation. I want to present here some reflections on method, starting from the comparison of several existing reconstructions of the Roman Forum. This is an example that is particularly important, as much from the historical as from the methodological point of view. In fact, perhaps no other place in the ancient world is so rich in archaeological evidence, in text, and in iconography, not to mention the documentation both written and graphic, that has come down to us from the medieval period onwards.

I will look at some 3D images created in the last twenty years with different criteria, ends, and means. They do not represent the totality of the existing reconstructions but are the best examples for a comparative approach.

The first reconstruction (fig. 1), both for its chronology and its complexity, is the Rome Reborn project, launched by Bernard Frischer in the Cultural Virtual Reality Lab of the University of California at Los Angeles in the mid 1990's. The project is certainly the most ambitions of those examined here and has managed to reconstruct in 3D the whole of the city of Rome. Its final aim is to reconstruct Rome in various periods, but for the moment the model we see is based on the Rome of AD 320. This choice is the most logical, following the example of Italo Gismondi's great model of the city of Rome in the Museo della Civiltà Romana. It is the moment for we have the greatest amount of data and minimizes the need for reconstructive hypotheses devoid of evidence.

Obviously that minimum is still hardly negligible, and, correctly, the project divides buildings into two classes. The first is constituted by those sites for which there is sufficiently detailed evidence, the second by the around 6,750 buildings and monuments – such as single-family houses, apartment buildings, and warehouses – about which we lack precise information, but which are a fundamental part of the urban fabric. For the latter, Gismondi's model was digitized, corrected and brought up to date. Then, in 2008, it was entirely replaced by a corresponding 'procedural' model, which added far more architectural detail. The Rome Reborn project has migrated with its inventor, first, between 2008 and 2013, to the Virtual World Heritage Laboratory of the University of Virginia, and then to the School of Informatics and Computing of the University of Indiana. I will not get involved in technical details: the model was entirely redone twice in order to overcome the limits of previous platforms, bringing it up to date and incorporating colours and sculptures. We are thus using the third generation of the model. This is certainly the project that has confronted most seriously the problem of the general diffusion of the model, or at least some parts of it, working on the possibilities

Fig. 1: Rome Reborn: the Roman Forum, west end.

of Virtual Reality in real time also for teaching purposes. Soon, it will be at disposal in a large number of different ways: VR headsets (Oculus, Vive, etc.), 360 video (GearVR, Daydreams, etc.) and Facebook Spaces.

Regarding the Roman Forum, the Rome Reborn project has made two versions. The first was created from 1997 to 2004 and is the subject of an article published in a JRA supplement in 2006[2] as well as a free-standing website, *The Digital Roman Forum.*[3] The latest version (fig. 2) was built from 2016 to 2018 and offers various improvements, including much more use of polychromy and taking into account the scientific literature that appeared after 2004.[4]

The second project, begun in 2011 and coordinated by Susanne Muth,[5] is the *Digital Forum Romanum* (fig. 3) of the Winckelmann Institute of the Humboldt-Universität of Berlin in cooperation with the Excellence Cluster TOPOI and the Architecture Unit of the German Archaeological Institute at Berlin. The project proposes to carry out reconstructions of the Forum in 18 different periods, as well as the actual state. So far seven of these have been created: two successive moments of the late Republican Forum and the situation in the Augustan, Flavian, Antonine, Severan and Tetrarchic periods, the latter around AD 310. On the website that presents the results is found, for each period, a view of the Forum, its plan, and a series of information sheets that explain the details of the various phases of the monuments with further images and reconstructions, both of details and of whole contexts (fig. 4), as well as a bibliography and links for navigating from one sheet to another. There is also a wiki,[6] still in its infancy (there are only three records) on which it is aimed to put all of the details of the proposed reconstruction. The authors have chosen to present the model only in black

Fig. 2: Rome Reborn: the Roman Forum, Rostra and the Arch of Septimius Severus.

and white, rather than adding colour. Their approach is solid, and relatively traditional. It is not possible to move around it in real time, except in the case of a few smaller models of single buildings.

The third project is an online course (MOOC Massive Open Online Courses) of the University of Reading carried out by Matthew Nicholls: *Rome, A Virtual Tour of the Ancient City*.[7] On-line only since 2017, it is the result of over a decade of work that has reconstructed the whole of the city of Rome in AD 315. Using fairly simple technology, based on Sketchup, the result is notable, if we consider that it is the project of a single scholar (fig. 5). The weight of the model does not permit its presentation online: here we find only pre-registered videos or stills. Laudable though it is, it does have serious limits in its completeness and in the possibility of bringing the reconstructions up to date. Roman topography is by now such a vast field that it cannot be fully grasped by a single scholar. Not by chance, the manual of the Topography of Ancient Rome is still that of Hülsen,[8] of the beginning of the twentieth century, and no single scholar has had the courage to rewrite it.

The fourth project is *Visualizing statues in Late Antique Roman Forum*, (fig. 6) directed by Diane Favro with the collaboration of Gregor Kalas and Chris Johanson at the

Fig. 3: Digital Forum Romanum: the Roman Forum from east in the Tetrarchic period.
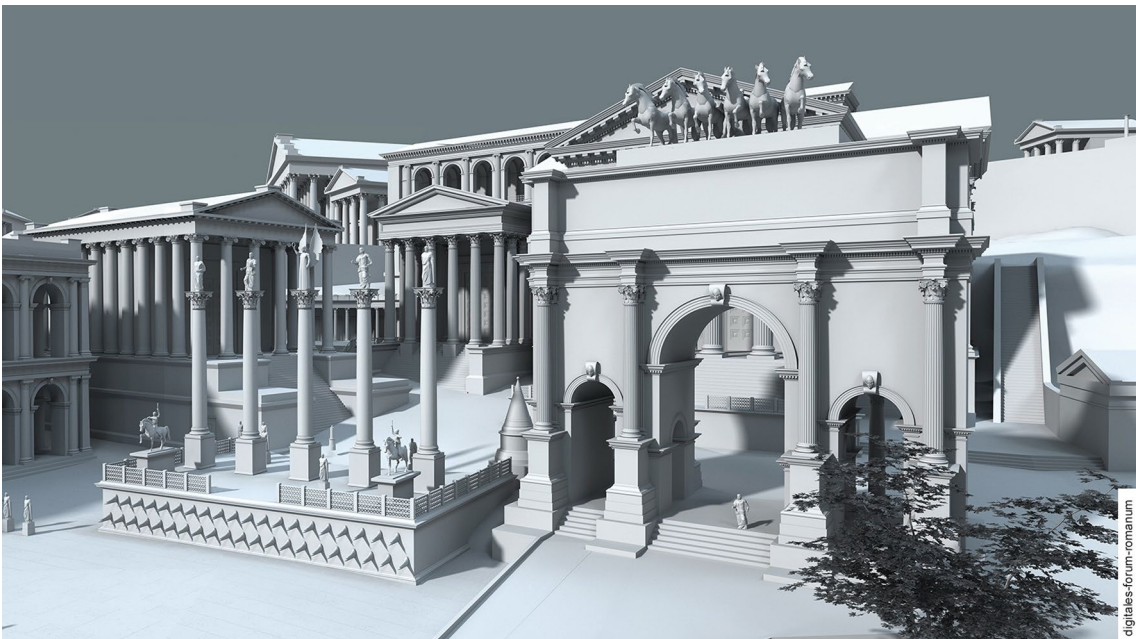

Fig. 4: Digital Forum Romanum: Rostra and the Arch of Septimius Severus.

University of California at Los Angeles. The focus of this project is concentrated on the decorative apparatus of the Forum and its meaning: thus the architectural context remains in the background, using the first model of *Rome Reborn* without the later

Fig. 5: Rome, A Virtual Tour: the Roman Forum from east.

updates. The results of the research are published on its website,[9] and, more in detail, in Kalas's volume: *The Restoration of the Roman Forum in Late Antiquity: Transforming Public Space.* To be honest, this is the weakest of those considered here: the reconstructions are sometimes approximate or barely justified at all: I am thinking of the reconstruction of an inexistent arch of Honorius in the middle of the square, of the position of the late antique *Atrium Libertatis* near the Curia of the Senate, and finally of the Grove of Marsyas – which we know instead to have been a tribunal.[10]

The last two projects should perhaps not be considered together with the previous ones because they aren't based on a virtual model. However, to give a complete panorama of this type of approach, it seems useful to consider them briefly. The first is a book, *The Roman Forum: A Reconstruction and Architectural Guide*, a fairly classical production along the same line as the great envoys of the French architects of the Prix de Rome. The volume presents the Roman Forum in the second half of the fourth century AD, through the illustrations of Gilbert J. Gorski and a text by James E. Packer.[11]

Fig. 6: Visualizing statues: the Roman Forum, Equestrian statue of Constantine in front of the Rostra.

The second descends from the models, in cork of the end of the eighteenth century, or in plaster in the last century, created by Paul Bigot and Italo Gismondi. The project was carried out under the direction of Martin Boss[12] at the Institute of Classical Archaeology at the University of Erlangen between 2003 and 2007. The models are now displayed at the Hirsvogelsaal of Nuremberg (fig. 7). Executed at 1 : 200, the wooden models represent the Forum respectively in the time of Caesar and in that of Augustus. As is obvious, their function is essentially didactic, and they cannot be used outside the exhibition space. However, the communicative capacities of this traditional technique should be noted. It is possible to discuss the issues in front of these models in a way that is simply impossible with a virtual model. The strength of the old technology is that it is 'transparent' in a semiotic sense, that is, that it does not remove our attention from the object represented. Virtual reality, instead, is still 'opaque' from this standpoint, leaving the user to be fascinated far more by the technique than by the subject it represents. In other words, the danger of the videogame in virtual reality is ever present. It is possible that, in the future, boredom with the technique will set in, and this risk will diminish.

Fig. 7: Hirsvogelsaal of Nuremberg: the Erlangen wooden model of the Roman Forum in the Augustan period.

On this basis we can attempt to outline a conclusion. In twenty years, virtual 3D reconstructions, initially viewed by archaeologists with a mixture of admiration and suspicious, have boomed. Further, studies of Roman topography, previously the hunting ground of a small number of Italian specialists, have become fashionable. Finally, archaeology itself has been transformed: on the one hand integrating with an ever-larger number of technologies and research methods from the hard sciences, on the other becoming ever less involved with historical culture and classical literature. This process has both positive and negative sides, as always. A larger international community permits a more interesting and vivacious discussion, but there is the risk that many of the international scholars do not have a deep knowledge of the places and the monuments. The problem here is the transformation of very concrete problems into abstract debates, with ideological readings outweighing merely structural considerations. Further, it is difficult to find scholars who unite technical competence with a classical preparation: it follows that the dialogue between 3D modellers and archaeologists could be insufficient to fill the gaps, or even that the archaeologist herself or himself lacks the necessary experience of direct documentation of monuments, the only school that

properly prepares one for a real understanding of the ancient city. In other words the risk is that experimentation and the desire for the new become more important than correct archaeological methodology.

A second level of the problem is that of documentation, both sources for a reconstruction and for the reconstructive process, or, in other words, the problem of *metadata* and *paradata.* The point is clearly expressed in the fourth principle of the London Charter: «Sufficient information should be documented and disseminated to allow computer-based visualization methods and outcomes to be understood and evaluated in relation to the contexts and purposes for which they are deployed».[13]

The difficulty of presenting a detailed accounting of the sources and interpretative criteria, and of distinguishing between certain elements and those that are uncertain or hypothetical, is even stronger when the target is the general public. Attention to *metadata* was already evident in the first generation of the Rome Reborn project. The above-mentioned website *The Digital Roman Forum* included a temporal map of the Forum and citation of the relevant ancient texts in both the original language as well as English translations. In the last model of Rome Reborn the choice has been made to insert this sort of information in a pdf file dedicated to the various monuments on the website of the project. *Metadata* and *paradata* are obviously clearly evident in the more traditional presentation of the Berlin project. They are altogether lacking in the Reading project, and unsatisfactory in *Visualizing statues*, although this is an interesting case because of its choice of a double channel of presentation, both a web site and a traditional volume. The problem is very different in the case of Gorski and Packer's book, or in the wooden models of Erlangen.

This seems to be the really crucial theme here: I am not aware of a completely satisfying solution for the accessibility of the *metadata* and the *paradata*, and feel strongly that this is the priority for the scientific community. I am not of course certain that I know of all the projects currently underway: several of them tried to tackle the issue but the proposals were focused on the specific model they deal with[14] and less concerned to formulate a more general proposal for standards of documentation. For this purpose, on the other hand, I would like to mention a couple of very promising attempts. The first is that of Emanuel Demetrescu,[15] at the Institute for Technologies Applied to Cultural Heritage of the Italian National Council for Research, who proposes an Extended Matrix, a formal language with which to keep track of the entire virtual reconstruction process. The second was elaborated by Mieke Pfarr-Harfst and Marc Grellert at the Digital Design Unit of the Technische Universität Darmstadt,[16] a proposal notable for its user-friendly approach already experimented in a good number of case studies.

A final observation regards the theme of colours: this field has been developing only over the last twenty years, particularly in the case of polychrome sculptures. In contrast, studies of polychromy in architecture have been few and far between. This is

what I have defined as the fourth dimension.[17] Currently colours are probably the most arbitrary element in all the reconstructions; not by chance, the project most concerned with a philological approach have side-stepped the problem – this is the case of the Berlin project. Those more oriented towards divulgation and cultural marketing, on the other hand, consider colour aesthetics essential. The motives of the last are entirely comprehensible but working with a method that is not yet rigorous enough could be risky.

If I could sum this up in a single phrase it would be that an archaeologist needs a lot of imagination and very little fantasy. I mean, that he or she should be able to consider an ample range of possibilities to avoid simplifications and mechanical solutions. However, his or her imagination must follow a rigorous method in order to avoid uncontrolled fantasies and gratuitous hypotheses.

Notes

* Paolo Liverani, Università di Firenze

paolo.liverani@unifi.it

[1] I am indebted to Lisa Fentress for the English translation of my text and to Bernard Frischer for information about the Rome Reborn project.

[2] Frischer et al. 2006; Guidi et al. 2008; Wells et al. 2010; Dylla 2010.

[3] <http://wayback.archive-it.org/7877/20160919152126/http://dlib.etc.ucla.edu/projects/Forum/> (last visit: 10/10/2018).

[4] <https://www.romereborn.org/> (last visit: 10/10/2018).

[5] Muth 2014; <http://www.digitales-forum-romanum.de/?lang=en> (last visit: 10/10/2018).

[6] <https://wikis.hu-berlin.de/digiforo/Hauptseite> (last visit: 10/10/2018).

[7] <https://www.futurelearn.com/courses/rome> (last visit: 10/10/2018).

[8] Jordan – Hülsen 1907.

[9] <http://inscriptions.etc.ucla.edu/> (last visit June 2018). At the moment of closing the paper (10/10/2018) the site was not accessible anymore, but an earlier version can be visited at <https://web.archive.org/web/20180129214929/http://inscriptions.etc.ucla.edu:80/index.php/statues-and-memory/>.

[10] Giuliani – Verduchi 1987, 95–102 n. 13.

[11] Gorski – Packer 2015.

[12] It was completed by Robert Nawracala and Bernhard Steinmann: Steinmann et al. 2011; <http://www.klassischearchaeologie.phil.uni-erlangen.de/projekte/forum.html> (last visit 10/10/2018).

[13] <www.londoncharter.org>, cf. also the Seville principles <http://smartheritage.com/seville-principles/seville-principles>; Beacham et al. 2006; Denard 2012.

[14] An overview in Pfarr-Harfst – Grellert 2016, 43 f.

[15] Demetrescu 2015; Demetrescu – Fanini 2017; <http://osiris.itabc.cnr.it/extendedmatrix/> (last visit 10/10/2018).

[16] Pfarr-Harfst – Grellert 2016; <www.sciedoc.org> (last visit 10/10/2018).

[17] For the definition Liverani et al. 2016. An updated overview about the topic is in the Oxford Classical Dictionary (online ed. Feb. 2018) s.v. Polychromy, sculptural, Greek and Roman (J. S. Østergaard); Polychromy, sculptural, Greek and Roman (S. Zink).

Image Credits

Fig. 1–2: Courtesy of Bernard Frischer. – Fig. 3: http://www.digitales-forum-romanum.de/wp-content/uploads/2014/07/1-Phase-P_tetrarchisch_Blick-von-O.jpg – Fig. 4: http://www.digitales-forum-romanum.de/wp-content/uploads/2014/07/A-1-0603_O_Arcus-Severi_Kontext.jpg – Fig. 5: https://www.futurelearn.com/courses/rome – Fig. 6: http://inscriptions.etc.ucla.edu/ – Fig. 7: by the author.

References

Beacham et al. 2006

R. Beacham – H. Denard – F. Niccolucci, An Introduction to the London Charter, in: M. Ioannides – D. Arnold – F. Niccolucci – K. Mania, The e-volution of Information Communication Technology in Cultural Heritage. Where Hi-Tech Touches the Past: Risks and Challenges for the 21st Century. Project Papers from the Joint Event CIPA / VAST / EG / EuroMed (Budapest 2006) 263–269.

Demetrescu 2015

E. Demetrescu, Archaeological Stratigraphy as a Formal Language for Virtual Reconstruction. Theory and Practice, JASc 57, 2015, 42–55.

Demetrescu – Fanini 2017

E. Demetrescu – B. Fanini, A white-box Framework to Oversee Archaeological Virtual Reconstructions in Space and Time: Methods and Tools, JASc Reports 14, 2017, 500–514.

Denard 2012

H. Denard, A New Introduction to the London Charter, in: A. Bentkowska-Kafel – D. Baker – H. Denard (eds.), Paradata and Transparency in Virtual Heritage, Digital Research in the Arts and Humanities Series (Ashgate 2012) 57–71.

Dylla et al. 2010

K. Dylla – B. Frischer – P. Mueller – A. Ulmer – S. Haegler, Rome Reborn 2.0: A Case Study of Virtual City. Reconstruction Using Procedural Modeling Techniques, in: B. Frischer – J. Webb Crawford – D. Koller (eds.), Making History Interactive. Computer Applications and Quantitative Methods in Archaeology (CAA). Proceedings of the 37th International Conference, Williamsburg (Virginia), March 22-26 2009, BARIntSer S2079 (Oxford 2010) 62–66.

Frischer et al. 2006

B. Frischer – D. Abernathy – F. C. Giuliani – R. Scott – H. Ziemssen, A New Digital Model of the Roman Forum, in: L. Haselberger – J. Humphrey (eds.), Imaging Ancient Rome. Documentation-Visualization-Imagination, JRA Suppl. 61, 2006, 163–182.

Frischer et al. 2010

B. Frischer – J. Webb Crawford – D. Koller (eds.), Making History Interactive. Computer Applications and Quantitative Methods in Archaeology (CAA). Proceedings of the 37th International Conference, Williamsburg (Virginia), March 22–26 2009, BARIntSer S2079 (Oxford 2010).

Giuliani – Verduchi 1987

C. F. Giuliani – P. Verduchi, L'area centrale del Foro Romano (Florence 1987).

Gorski – Packer 2015

G. J. Gorski – J.E. Packer, The Roman Forum: A Reconstruction and Architectural Guide (New York 2015).

G. Guidi et al. 2008

G. Guidi – B. Frischer – I. Lucenti – J. Donno – M. Russo, Virtualising Ancient Imperial Rome: From Gismondi's Physical Model to a New Virtual Reality Application, International Journal of Digital Culture and Electronic Tourism, 2008, 240–252.

Jordan – Hülsen 1907

H. Jordan – Chr. Hülsen, Topographie der Stadt Rom im Alterthum I.3 (Berlin 1907).

Liverani et al. 2016

P. Liverani – G. Verri – U. Santamaria, La quarta dimensione della scultura: il colore, in: C. Márquez – D. Ojeda (eds.), Escultura Romana en Hispania VIII – Homeanje a Luis Baena de Alcázar. Actas de la Reunión Internacional Cordoba 5–8 octubre 2016 (Cordoba 2018) 121–138.

Muth 2014

S. Muth, Historische Dimensionen des gebauten Raumes. Das Forum Romanum als Fallbeispiel, in: O. Dally – T. Hölscher – S. Muth – R. Schneider (eds.), Medien der Geschichte – Antikes Griechenland und Rom (Berlin 2014) 285–329.

Pfarr-Harfst – Grellert 2016

M. Pfarr-Harfst – M. Grellert, The Reconstruction – Argumentation Method. Proposal for a Minimum Standard of Documentation in the Context of Virtual Reconstructions, in: M. Ioannides – E. Fink – A. Moropoulou – M. Hagedorn-Saupe – A. Fresa – G. Liestøl – V. Rajcic – P. Grussenmeyer (eds.), Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection, 6th International Conference, EuroMed 2016, Nicosia (Cyprus) October 31 – November 5, 2016 (New York 2016) 39–49.

Steinmann et al. 2011

B. Steinmann – R. Nawracala – M. Boss, Im Zentrum der Macht. Das Forum Romanum im Modell (Erlangen 2011).

Wells et al. 2010

S. Wells – B. Frischer – D. Ross – C. Keller, Rome Reborn in Google Earth, in: B. Frischer – J. Webb Crawford – D. Koller (eds.), Making History Interactive. Computer Applications and Quantitative Methods in Archaeology (CAA). Proceedings of the 37th International Conference, Williamsburg (Virginia), March 22–26 2009, BARIntSer S2079 (Oxford 2010) 373–379.