

Institution: University of Reading
Unit of Assessment: 31 Classics
Title of case study: Bringing ancient Rome to life through digital architectural modelling
<p>1. Summary of the impact</p> <p>Research by the University of Reading's Dr Matthew Nicholls on the architecture and topography of ancient Rome has created a world-class digital asset - a huge and complex architectural model of the city. This visual resource, and the research underpinning it, harnesses new technologies and has advanced understanding of the urban environment of ancient Rome and the relationship of its buildings to each other and to the city's topography. The exceptional impact of this work is evident in various fields related to enhanced public understanding, notably: i) commercial publication and broadcast work, ii) pedagogical practice in universities and schools and iii) the travel industry.</p>
<p>2. Underpinning research</p> <p>Nicholls' research into ancient books and libraries has generated a number of substantial publications (including 2-4 in Section 3 below). His work particularly concerns the architecture, contents and use of public library buildings and their monumental role in Rome and other cities, drawing on both literary and archaeological source material. As part of this work, Nicholls developed an interest in conveying his findings through 3D architectural modelling, initially of library buildings and their urban surroundings.</p> <p>Building on this background in ancient buildings and monuments and his abilities as a 3D computer modeller, Nicholls has gone on to create an enormously detailed digital model of the entire city of ancient Rome. While the very early development of the model began during his DPhil work, c.2005, the great majority of it has been undertaken and completed in Nicholls' post as a lecturer (now senior lecturer) at the University of Reading (2007- present).</p> <p>Nicholls conducted the detailed interdisciplinary research necessary for the proper understanding and representation of individual buildings and sections of the city using, for example, ancient literary sources, inscriptions, modern archaeological reports and Renaissance drawings of lost ruins. Such research was carried out through field trips to Rome for observations, measurement, photography and 'field testing' of the model (every year since 2005), and through participation in international conferences and workshops. This has been an enormous undertaking, involving both a scholarly understanding of the architecture and landscape of the entire city, and the acquisition of the technical skills to convey this digitally (the model contains, for example, about 9,000 buildings and 3.26Gb of data).</p> <p>The conclusions of Nicholls' research are expressed both in his print publications and also through incorporation into his digital model of Rome, which was constructed using commercial software packages such as SketchUp and CINEMA 4D. The overall model of the city is then used to generate still and moving images for incorporation into, for example, academic and commercial publications, slideshows, lectures and other teaching aids, online material and footage for broadcast.</p> <p>Nicholls' work is one of a small but growing number of academic projects using digital tools to recreate ancient places. It is distinguished from other initiatives on ancient Rome (of which there are two others in the world, Rome Reborn at the University of Virginia and a digital project at the University of Caen Basse-Normandie) by its methodological approach, the nature of the software used, its level of detail and the uses to which it can be put in generating images for print and web distribution. These have created a unique digital asset with a wide range of applications and a claim to be considered the most visually detailed and naturalistic model of ancient Rome to date.</p>
<p>3. References to the research</p> <p>1. Digital model of ancient Rome</p>

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- Creation date: 2007- present
- Author: Dr Matthew Nicholls
- Format: a set of several hundred .skp and .c4d digital files, which can be used to generate still and moving images in any digital format.

Viewing the model's data files requires access to and expertise in a software package called CINEMA 4D. While Nicholls would be able to provide the files to the REF panel on request, a selection of images might be a simpler way to demonstrate the nature of the work. **A short web page on the model with a sample of representative images can be found at:** <http://www.reading.ac.uk/classics/research/Virtual-Rome.aspx>.

The model is a new sort of academic output and therefore difficult to compare with others; its quality is indicated by its shortlisting for a national award by the British Universities Film and Video Council 'Learning on Screen Awards' 2013 (the only project by a single person so nominated), an awards list that also included units of the BBC, several professional film and documentary makers, and a recent Oscar nominee. <http://bufvc.ac.uk/events/learningonscreen/winners/nominations> It is also now the basis of a University of Reading National Teaching Fellowship award submission.

The model is also in regular use in universities and other institutions of learning in the UK and overseas, and images from it requested to illustrate publications by leading scholars in the field.

Print publications on library buildings and the urban landscape include:

2. Nicholls, M. (2013): 'Roman libraries as public buildings in the cities of the Empire' in: Woolf, G., König, J. and Oikonomopolou, K. (eds.) *Ancient Libraries*. Cambridge University Press, pp. 261-276B (especially digital illustrations on p.268 and p.272).
3. Nicholls, M. C. (2011): 'Galen and libraries in the *Peri Alupias*'. *Journal of Roman Studies*, 101, pp. 123-142 (map based on digital model of Rome).
4. Nicholls, M. (2011): 'Bibliotheca Latina Graecaque: on the possible division of Roman libraries by language'. *Latomus: SIEN Neronia VIII*, 327, pp. 11-21.

These publications have been internally assessed as of at least 2* quality.

4. Details of the impact

Nicholls' work on creating a digital reconstruction of the entire city of ancient Rome has generated very considerable impact in the following areas:

Commercial publication and broadcast work

Articles about the model have appeared in international publications *Dossiers D'Archéologie* (December 2009) and *Storica National Geographic* (May 2011), as well as the UK's *BBC History Magazine* (February 2011, circulation 73,000), in which Nicholls' research was described as 'groundbreaking' and 'the world's most up-to-date model of ancient Rome'. It has also been used to illustrate commercial and academic publications in the UK and overseas.

Nicholls' work led the BBC to commission a series of digital reconstructions for broadcast in the programme *Rome's Final Frontier* (7 December 2012, initial viewing figures 164,000), for which the director wrote: '*The reaction from the BBC has been extremely positive. Graphics are commonplace in television, yet your work brought a weight of academic credibility to the project*'.

The digital model was also used for the documentary *Strip the City: Rome*, appearing at several points throughout the programme to enable viewers to understand the architecture and layout of the city. The programme was transmitted by Discovery Canada in October 2012, by Discovery Science and Quest in February 2013, and on terrestrial channels throughout the world. The UK production company, Windfall Farms, writes that the work '*has now been shown in several countries and all to very high critical acclaim ... your model has proven a real success at increasing public awareness! I'm quite sure many of the key stories in the programme would not have been possible without it*'. This demonstrates that Nicholls' model has achieved impact both

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through its value to the production firms involved and through improving understanding among huge international audiences.

Paedagogical impact

The digital model is now used for teaching purposes at UK universities such as Durham, St Andrew's, and Nottingham, where it has been used to illustrate undergraduate modules and to provide pictorial material for use in examination papers since 2011. It has also been used overseas, in undergraduate teaching at the British School at Rome (c.80 students 2008-11), and in a workshop on digital modelling at Venice International University in collaboration with Duke University, North Carolina. In addition, it was the subject of a lecture at the Higher Education Academy's annual Humanities conference in May 2013, generating further speaking invitations from the HEA's Discipline Lead for History who wrote "your presentation ... last May was a highlight, if not the highlight for me". Outside the higher-education sector the model has been used to illustrate talks to around 50 schools, museums and societies over a five-year period, reaching a total audience of c.3,000 mostly GCSE and A-level pupils and adults. Reaction has been uniformly positive and includes comments such as the following from the Head of Godolphin and Latymer School: *'Many of our students ... found it really inspiring. They have also uniformly commented on the usefulness of the models and illustrations to their understanding ... and have been able to comment thoughtfully on the central tenets of the lecture.'*

Impact within the travel industry

Nicholls' work lends itself to use in the tourism industry, as there is a large public appetite for visual representations of the ancient past. He has worked in particular with the two travel companies described below, offering holidays to ancient sites in the Mediterranean, achieving an impact both on the activities of these companies and on the customers they serve, by providing a unique experience which enhances their clients' understanding of the architecture and archaeology of ancient cities and monuments, especially those of Rome. Nicholls' lectures are advertised in the promotional material for both companies and help to generate sales.

a) Voyages to Antiquity: Nicholls has worked with this company on five tours around the ancient Mediterranean (2010-present, addressing a total of c.1,600 passengers), and as a consultant. The firm's Enhancement Programme Director, writes: *'Dr Nicholls' lectures on board our ships on a variety of topics have been very well received, often using his innovative digital architectural models and research work to add to our passengers' understanding.'*

b) Westminster Classic Tours. Nicholls has worked with this company, which arranges niche tours for over 200 customers per year and has a turnover of more than £0.5m, on tour design and lecturing since 2007. On the basis of customer interest in lectures drawing on his research, he was asked in 2012 to join the firm's Board of Directors.

The cumulative worth of these areas of impact, and in particular the consistently positive reactions to Nicholls' work from the tourist and education sectors, led Cambridge University Press to offer him a contract in June 2013 for a print book and package of digital products (such as e-books in various formats), drawing on his work in digital modelling of ancient Rome. This demonstrates the scholarly validity of this research project and will sustain, broaden and deepen its global impact.

Impacts from related work

Beyond this, Nicholls' work on ancient books and libraries has led directly to his participation in BBC Radio 4 programmes such as *In Our Time* (initial listening figures of two million) and *Our Libraries: the next chapter*, a documentary on libraries. He has also taken part in a number of television programmes, such as BBC4's *Mothers, Murderers and Mistresses*, (viewing figures of 575,000 per episode) and *Rome: A History of the Eternal City*. Feedback from producers, listeners and viewers demonstrates that Nicholls' work has helped to change public awareness and understanding of this aspect of ancient history.

5. Sources to corroborate the impact

Media that Nicholls' work has informed:

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In Our Time, BBC Radio 4 (broadcast 12 March 2009)

Our Libraries: the next chapter, BBC Radio 4 (recorded on 25 June 2013).

Mothers, Murderers and Mistresses, BBC4, (broadcast on 29 May and 12 June 2013)

Rome: A History of the Eternal City, BBC4 (broadcast 5 December 2012)

Letters from the following (available upon request):

- Enhancement Programme Director, *Voyages to Antiquity*†
- Managing Director, Westminster Classic Tours†
- Director, Rome's *Final Frontier* documentary†
- DV Director, Windfall Films (for the Discovery Channel documentary)*
- Associate Professor of Ancient History, Nottingham University (for paedagogical impact at Nottingham University)*

(*)Contact details provided separately

(†)Testimonials available upon request.