Scientific and Ethical Scope of Digital Modelling in Architectonic Heritage

José Antonio Fernández Ruiz
jafdezruiz@arquired.es
Cármenes de la Muralla 46. 18.011 Granada. Spain.
Doctor linked to the Escuela de Estudios Árabes of Granada CSIC
Associated Professor of the Escuela Técnica Superior de Arquitectura de Granada

Abstract
This work details the experience of the Granada School of Arabic Studies in the process from photogrammetry to digital modelling, establishing the necessary criteria to model the reconstructive hypotheses of Heritage, entirely or partially non-existent, directing the objectives towards a scientific professionalisation of these representations, on the side of architecture and archaeology.

Keywords
Virtual Heritage, Architecture, Archaeologie, Digital Modelling.

The primordial aim of the research into Heritage is to place its results at the disposal of the citizens. The question is in updating the concept of diffusion of knowledge with the emerging technology of digital modelling having appeared in the scientific spectrum. The classic techniques of architectonic representation could only convey one part of the architecture, however, light, colour and space remained relegated; only painting, with great effort and constrained to one point of view, was responsible for the expression of these variables of architectonic language. Now, digital modelling enables the user to interpret the feeling through a cloned element with all its attributes.

When we visit ruins there is a feeling of frustration on the ability to understand the spatial limits and nature of the pre-existing architecture. We perceive spaces, however, of a very open nature, which many surroundings never had. Serious errors are often interpreted, tending to think that the buildings and urban units would be similar to the open-plan spaces that we now see.

Digital Semiology
These considerations lead us to certain criteria for modelling Architectonic Heritage and illustrating a professional hypothesis: Once we have the plans of the reconstructive hypothesis, we shall determine the semiological variables of the architecture that will better define the space, geometry, light, texture, establishing the method of digital expression of these variables. The quality of those parameters must also be coherent with the level of reliability of the hypothesis. Consequently, our method of representation must reflect a level of conceptual simplification so that it is coherent with the uncertainty of any speculation. These matters lead us to determine certain simplification criteria that further resolve the budgetary matters, enabling modest administrations to develop many Heritage models.

Generally, we can say that, in principle, the proportions and global idea must be expressed correctly, in such a way that if the interpreter is unsure of specific details he/she can pass them by provided that global idea is expressed through its proportions. That is, we can define architectonic space with masses without the need for detailing its elements. We can also accept planimetric regularisation within the admissible perceptive levels. With regard to detail, it is possible to express the idea of a decoration without it being identical to the original, conserving the perception. Textures will not necessarily have to represent the image, which may be unknown, but an alternative that conveys that there had been a detail there that gave the same sensation. We do this by copying and pasting from certain sources of elements nearby. These textures are obtained preferably from pictorial sources and not photographic in order to avoid the perceptive rejection of contradictory light. These textures are bitmaps of large dimensions in order to avoid all types of repetitive sensation.

We do not pursue Realism as it can cause great confusion; our images assume digital ontology.

Methodology
A digital Heritage model especially needs good organisation of the pieces modelled. These are our phases once we have a reconstructive hypothesis:
- Planimetric regularisation, survey plans to theoretic levels admissible through perception.
- Cataloguing of elements of independent geometry.
- Study of contemporary and co-stylistic architecture for obtaining reconstructive hypothesis criteria, colour and textures.
- Drafting of symmetries and multiple copies.
- Revision of hypothesis in order to ratify or change the reconstructive hypothesis.
- Sample of results: Still images, animations, serialised panoramas, analyglyphs and panoramic stereoscopy.

Conclusions
Scientific digital modelling of Heritage favours a conceptual surrounding defined by the perceptive restoration of architectonic space. Then, it is not necessary to make a model with a high level of detail but an optimised model that expresses with correction spatial objective pursued. This annotation resolves various types of problems:
- It enables projects with more modest budgets thus extending the scope to administrations with reduced budgets. It is possible to overcome the indecisiveness of the interpreter of the conceptual reconstruction.
- It produces a model that does not endeavour to be realist, which avoids misunderstandings given the great capacity of emulation of reality of the computer medium.

This conceptual scope constitutes the necessary and subsequent step from that established in the restrictions of the restoration charter, permitting to observe prohibited reconstructions.

The choice and agreement on the scientific scope eliminates sensational and non-professional interpretations that generally arise in the world of computing. Currently, there is considerable lack of co-ordination on this matter and distinction is not made between scientific representations and those non-professional. More detailed information at: http://www.ugr.es/local/jafruiz/