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Architectural Heritage Imaging: When Graphical Science Meets Model Theory

In the field of Architectural Heritage (AH), the Representative Model – that is an Interpretative Model by its very nature – is the core of the process of study, knowledge, understanding, communication, and valorisation (De Luca & Russo, 2021). The use of the interpretative model recalls the so-called Model Theory (Hodges, 2020), and in particular in the AH field the representative model acts in the visual dimension. This model is a cultural product, synthesis of the apparent oppositions between tangible and intangible, signifier and meaning, reality and interpretation, picture and image, history and memory.

AH current lines of study suggest combining Model Theory with Visual Sciences (Bertoline, 1998; Mitchell, 2015), and therefore with the Graphical Science (Cardone, 2017; Cicalò, 2020), favouring the broadening of the traditional fields of representation, drawing, geometry, and history. It fosters the understanding of the heuristic role of the architectural interpretative model: The process of drawing and modelling becomes a methodology of analysis, in the sense of a process of visual computing of spatial, historical, and cultural characteristics of built heritage; In this way the model is a sort of multi-dimensional vector that reproduces significant aspects of the architectural phenomena, and thus facilitates its study, understanding and communication (Ware, 2000; Brusaporci, 2015). This kind of model has characteristics and visual and meta-medial declinations, which differ according to the individualities of the represented architecture, the purposes of the visualisations, the user profiles. At the same time, the discourse on the model is intrinsically linked to its images, its visualizations according to ontologies that, in the case of the architectural sphere, are characterised by spaces, cultures, building systems, materials, architectural orders, historical transformations, etc.

Consequently, the same model must present different images and contents if it is addressed to scholars or other kind of users, and according to different aims, such as study or presentation (Brusaporci, 2019).

The interpretative model of historical architecture is a visual product, but at the same time an image/imagery producer, rooted on current and past cultures, made by traditional drawings or advanced digital artefacts. Representative models could be intended as visually experiential artifacts, entities that relate their historically concrete existence to a set of supports, media, devices. Therefore, they could be referred to the idea of 'picture', emanating images. This reflection could recall, renew and develop, even in an unprecedented way, the four concepts posed by Mitchell: The pictorial turn; The image/picture distinction; The "metapicture" – an image of one medium can originate from another image of another medium –; The "biopicture" – the images 'clone' themselves and are cloned, so that the images take on new and autonomous life – (Mitchell, 1986, 1994, 2005).

The ideas on which the London Charter (2009) origins, and in particular the concept of 'Trans-parency', are still alive (Bentkowska-Kafel et al., 2012), but Mitchell's concepts offer the keys to approach the provoking themes posed in 2021 by Sarah Kenderine curator of the performance "Deep Fakes: Art and Its Double" at EPFL Pavilions in Lausanne, where she reflects on issues posed by the digital replicas of cultural heritage and the future of museums. Mutatis mutandis, trying to shift Mitchell reasoning to the tangible heritage sphere, some considerations could be traced: A tangible heritage is a material entity that could be intend as a picture emanating own related images. When we digitalize a tangible heritage, we are realizing a digital twin, we are cloning it; Therefore, a digital heritage from a real content could be intended as a meta-picture (meta-model) of the real content. In this way, the images from digital heritage are not meta-pictures of the real but new pictures from digital heritage. If a digital heritage loses the conceptual relation with its real content, it could be understood as a bio-picture (a sort of bio-model), with related new own images.

This reflection could highlight much broader items, considering that images can be not only static or bidimensional, but also dynamic, or spa-tially immersive. Furthermore, they can rise from the reincarnation in 3D printings, and consequent interrelation between digital and physical dimensions (Nolan, 2019).

In conclusion, how these advanced images are realized? What's their origin? What allows their existence and experience? They are visualizations of digital models designed and continuously re-designed by data and information, 3D lines and surfaces, textual prompts, graphic languages (Visual Programming Languages), AI interactions. The marriage between Model Theory and Graphical Science becomes evident: These models offer a re-mediation (Bolter & Grusin, 1999) of existing phenomena – in this case the real architectural heritages –; models have their epiphany through innumerable visualisations, which can be declined according to different thematizations, and different modalities in the continuum of mixed reality (Milgram & Kishino, 1994). In particular, these models actually possess the character of 'virtuality': This word has not to suggest something 'less real' – virtuality not as 'de-reality' –, but a model is a 'field that can be interrogated', from which effected manifestations can spring forth thanks to its capacity

Fig. 1 - Church of Santa Maria ad Cryptas in Fossa (AQ, Italy). Aerial view by drone; Plan, main elevation, longitudinal and cross sections.
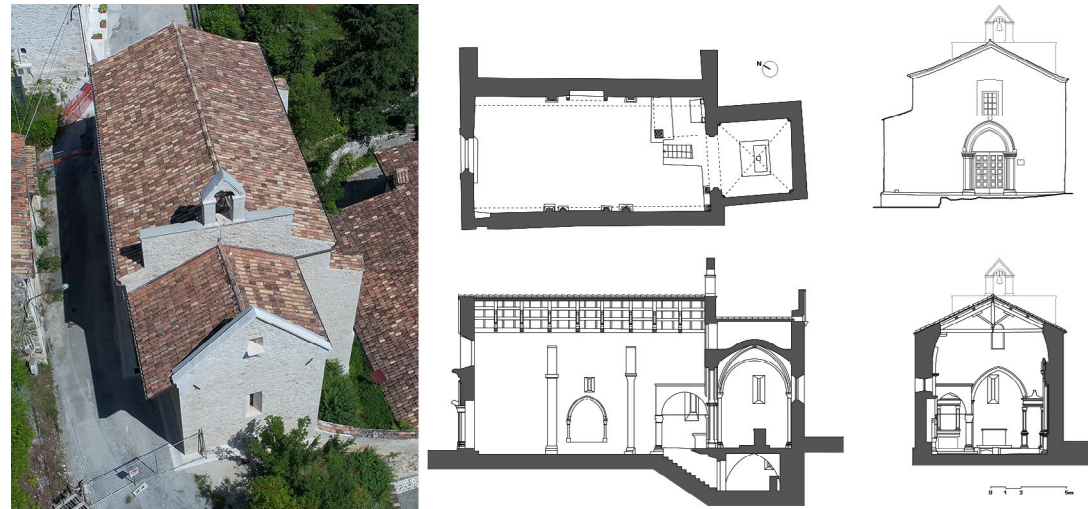
to decline its ontological centre of gravity (Lèvy, 1995): Thus the model is no longer configured as a finished product, but rather as open-ended eco-system, and it is 'virtual' in the etymological sense of something endowed with 'virtue' in relation to its dynamic capability to analyse and communicate contents and support experiences. This aspect favours a participatory discourse (Jenkins, 2009), where all the actors – scholars, users, the model itself – play a central role, according to a concept of cultural heritage intended as a 'discourse' in a complex and inclusive way (Smith,2006). Advanced models break the three dimensions of space, and the fourth dimension of time with 'interactivity', and they consent to navigate in a fifth dimension of 'autonomy' (bio-models / auto-models / generative-models): The model can continuously modify itself – according to parameters, data, queries, active participation of users, etc. –, thus with representations that are not predefined images, but with images that are always current. Every time it is a sort of performance where previously no one can exactly define the outcomes, and where the modeler may be compared to a screenwriter.
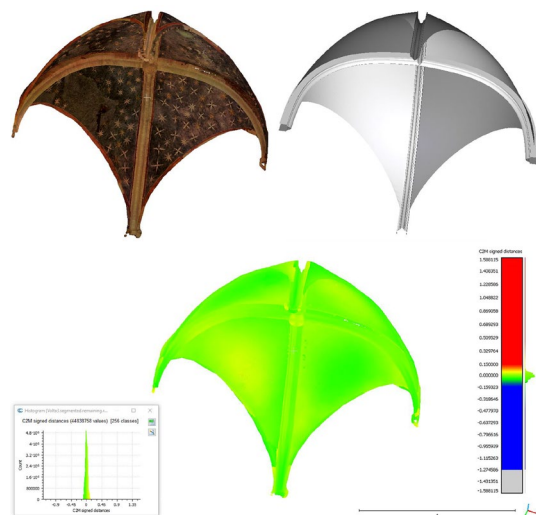

Fig. 2 - Views of high density point cloud of the church.

Fig. 3 - 3D model of the cross vault of the presbytery of the church, and reliability evaluation in relation to the deviation of the model from the point cloud.

The DISEGNARECON ISSUE Vol 16, No 31 (2023) aims to encourage a reflection on the characteristics and potential of representative models and related imaging for architectural heritage visualization, with reference both to traditional and advanced approaches. Main keywords are, but not limited to: Visual Architectural Heritage, Architectural Heritage Graphical Studies, Architectural Heritage Interpretation and Presentation, Architectural Heritage Visual Storytelling, Architectural Heritage & Archive, Digital Architectural Heritage, Architectural Heritage Extended Reality, Architectural Phygital Heritage.
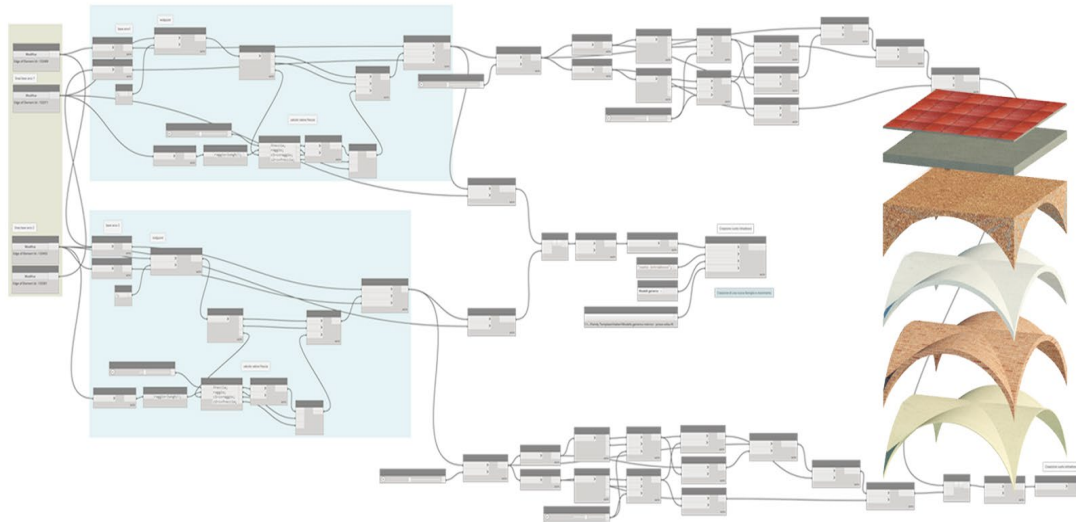
Fig. 4 - Visual Programming Language for the parametric modelling in HBIM environment of a vaulted system.

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