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## **Representing historic urban landscapes. The city of Braga through VHV**

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Based on the results of the archaeological and historical research carried out in Braga for the last three decades it is now possible to reconstruct its evolution, since the Roman foundation until the Modern Age.

The concern about the dissemination of Braga’s archaeological research results steered the first essays regarding the virtual reconstruction of the Roman city of Bracara Augusta carried out between 1998 and 2000 using *Microstation 95 (Bentley)* and *trueSpace™ 4 V4.3 (Caligary)*. These essays were based on a two-step methodology: (1) modelling (based on constructive solid geometry techniques) and (2) realism enhancement (based on an accurate definition of material properties and adequate texture mapping). Currently, the virtual reconstruction and visualization methodologies follow technologies based on Computer Vision, 3D Computer Graphics and Information systems (particularly GIS).

Computer vision techniques, such as structure from motion (SfM) and dense stereo-reconstruction algorithms are used to minimize the loss of 3D information and to record 3D shape and appearance of archaeological objects. In this work *123DCatch* from *Autodesk* has been considered to generate a rigorous 3D mesh representation. The *Visualization Toolkit (VTK)* from *Kitware* is also used enabling the creation of different visualization filters to interact and freely deconstruct any virtual model.

The 3D representation of the modern city was essayed using the iconographic data of '*Mapa das Ruas de Braga*' dated from 1750 and the Esri CityEngine software. The book draws the facades of 4064 houses in an accurate scale, organized by streets, inviting the reconstruction of a city that no longer exists.

In this paper we present the results of the multidisciplinary work of UAUM team, regarding the recreation of Braga urban landscapes and we discuss the assumptions, challenges and constraints of VHV to represent knowledge about the urban world, taking into account the principles of the London Charter 2.0.