

# Immersive Virtual Reality and some Perspectives for Daily Life Museums<sup>1</sup>

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**M. C. Liguori, D. Vasetti**

*Dipartimento di Discipline Storiche, Università di Bologna*

**M. A. Mauri**

*High Performance System Division - Vis.I.T. Lab, CINECA*

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## **Abstract**

*I musei della Vita Quotidiana, realizzati concretamente e molto diffusi in particolare modo nei paesi anglosassoni, sono praticamente inesistenti in Italia. La realtà virtuale e la grafica computerizzata interattiva possono offrire un valido supporto per una soluzione alternativa dei problemi legati alla realizzazione di questo tipo di museo, aprendo nuove ed interessanti opportunità.*

*Museums of Daily Life are widespread realities, mainly in the Anglo-Saxon countries. Immersive graphic can offer a valid aid in the solution of the problems related to the actual realization of this kind of museums and opens new and interesting opportunities.*

## **Museums of Daily Life**

One of the more important museums of daily life, for space positioning and for the collections, is Musée Carnavalet or Museum of the City of Paris, situated in the palaces Sevigné and LePeletier de Saint-Fargeau. Created with the intention of collecting paintings and other images of the city and of preserving interiors of houses to be demolished, according to the plans of baron Hausmann, it has lived and prospered thanks to the dedication of sponsors gathered in the association of the Friends of the Musée Carnavalet and responsible of the continuous acquisition of

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<sup>1</sup> Donatella Vasetti is to be considered the author of the first paragraph, Maria Chiara Liguori of the second, Massimo Alessio Mauri of the third.

new pieces of high antique-trade. This is the main niche of the Museum: reconstructing environments for showing French art at its best. An example could be seen in the boiserie of Gilles Demarteau's engraver shop, made by Fragonard and his apprentices around 1765 and acquired by the museum in 1973.<sup>2</sup>

In English museums illustrating daily life, the focus is prevailing on the 19<sup>th</sup> century and the 20<sup>th</sup> century and on middle and popular classes. The available space can be very limited, as in the Eastleigh Museum, dedicated to the reconstruction of a single historical period with the interiors of a skilled worker's house during the Thirties; or it can be wider, as in the Discovery Museum in Newcastle, where, for every decade of the 20<sup>th</sup> century, completely furnished sections of houses have been assembled, in some cases presenting also a comparison between different social classes; up till Milestones – Hampshire's Living History Museum, in Basingstoke, where houses and roads have been reconstructed in natural scale.<sup>3</sup>

In a commendable community spirit, private citizens lend or donate objects of common usage pertinent to different historical periods, which are put on display, also on a rotational base. In these structures there is a great use of billboards and other explanatory material in order to make perceivable to all the plan and its meaning.

The actual realization of Museums of daily life introduces a set of relevant problems: first of all, the economic difficulties related to a traditional kind of display (wide spaces dedicated to the museum and specifically arranged; the frequent need of upholsterers, restorers, keepers, guardians; definitive or temporary acquisitions of the objects and, therefore, the storing of the collections and the stipulation of insurance policies).

Immersive graphics may solve some of the abovementioned problems and may offer new and interesting opportunities.

### **An ideal Daily Life Virtual Museum**

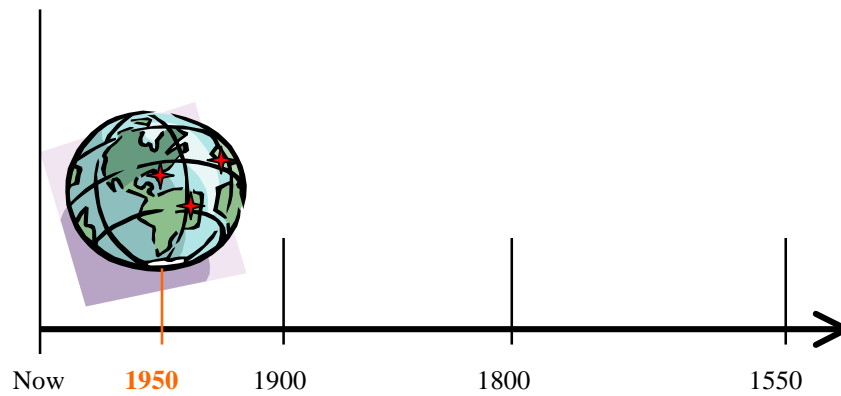
An ideal realisation of a Daily Life Virtual Museum could be arranged in a single space, adapted with a six screen "Cave" visualisation technology<sup>4</sup>, in order to enable visitors to see and interact with the entire museum content, organised in a multidimensional way. In a reality completely ordered around the concept of virtuality, it could be possible to multiply the environments endlessly, going up the

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<sup>2</sup> B. De Montgolfier (par), *Le Musée Carnavalet. L'Histoire de Paris Illustrée*, Albin Michel, 1986.

<sup>3</sup> <http://www.hants.gov.uk/museum/milestones/>

<sup>4</sup> <http://www.evl.uic.edu/EVL/VR/systems.shtml>

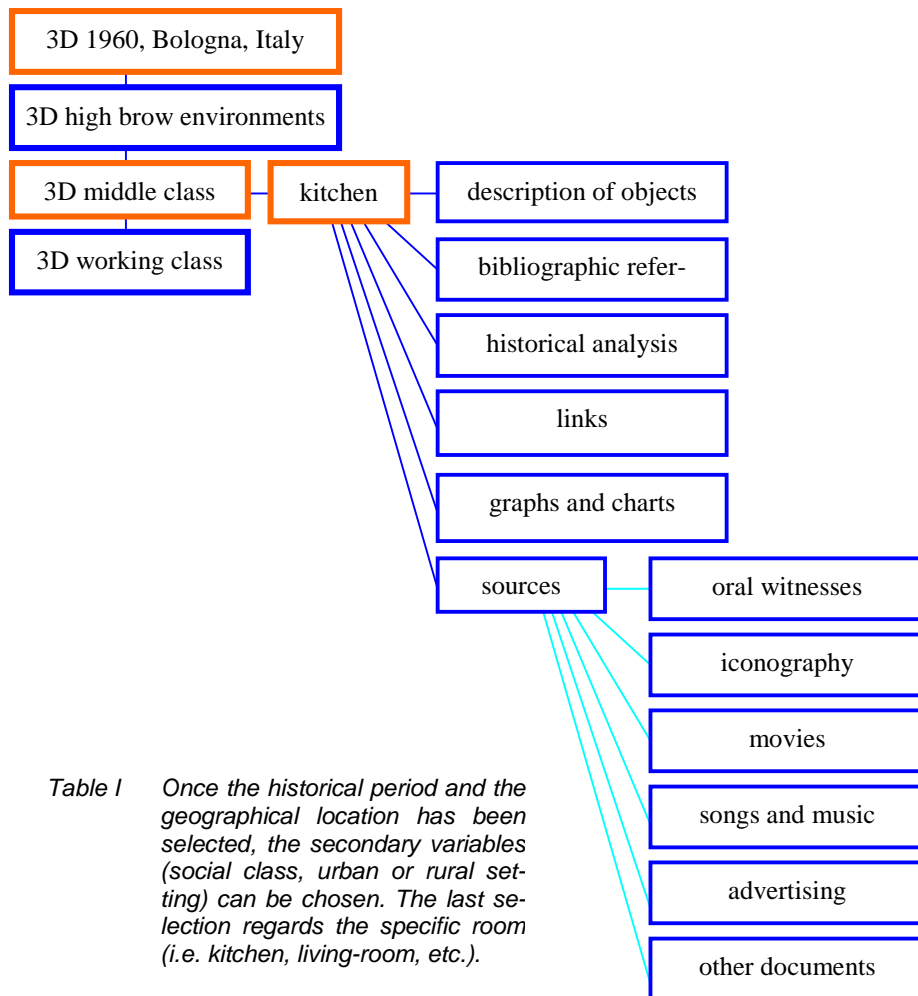


*Figure 1 The first selection is about the two fundamental variables: historical period and location.*

time line and in different geographical areas, in accordance with many different variables, such as social class, kind of room, or urban and rural setting.

The final outcome could be a kind of gigantic puzzle, assembling organically as much information as possible. The visit could linger at a superficial level, visualising only the 3D reconstructions, or it could turn the environment into a Virtual Reference Room, drawing deeper into the sources lying behind the reconstruction. In this way the reconstruction, realised thanks to valid historical researches, can act as an interface, enabling a multiple access to a heterogeneous knowledge and sources linked to that specific thematic environment.

The 3D reconstruction would become the tip of an iceberg, helping visitors to orient themselves in the maze of the underlying information given by the “collection”. Of course, it would not be formed by real objects but by the digitised material, possibly continually increasing. After entering the room and having selected basic and secondary variables leading to one of the possible environments, it could be possible to “take” an object in one’s hand or walk around it and, with a touch, have access to the characteristics of the single consumer good or to the historical explanations and interpretations sprouted from the analysis of that good. Or it could be possible to hear voices of people talking about the object, about how it entered their life and modified it. In the meanwhile, movies, charts or other tools could be activated. The whole experience would contribute to a better comprehension of an historical period, starting from the daily life point of view, and would enable people to experiment not only a sensorial but a highly emotional immersivity.



*Table 1* Once the historical period and the geographical location has been selected, the secondary variables (social class, urban or rural setting) can be chosen. The last selection regards the specific room (i.e. kitchen, living-room, etc.).

The Mu.Vi. project, the Virtual Museum of Daily Life in the 20th century Bologna (<http://www.cineca.it/muvi>), can be seen as an instance of this ideal vision<sup>5</sup>. The work has begun with the reconstruction of a bolognese high-middle class kitchen of the late Fifties. At present, the second environment, the living-room, is under construction. We are taking into consideration the idea of linking at least a part of the related information through a database that will use both the pages already edited for the web, the advertisements published on “Il Resto del Carlino”, a newspaper widely read in Bologna, and many other source.

<sup>5</sup> F. Bocchi, M. E. Bonfigli, L. Calori, A. Guidazzoli, M.C. Liguori, M.A. Mauri, M. Melotti, D. Vasetti, *Virtual Reality and Cultural Heritage: some applications*, Proceedings of the Conference EVA 2000 Florence - *Electronic Imaging and the Visual Arts* - 27-31 marzo 2000, Firenze, Bologna, Pitagora Ed., 2000.



Figure 2 and 3 3D reconstruction of the kitchen and card about the material called “Formica”.

### Applicative Methodologies

The Virtual Museum of Daily Life in Bologna is a long term project aiming to investigate and “build” a virtual representation system that can be used to solve problems that other kind of realisation are unable to. Photographic exhibitions, for example, are unable to involve the visitor in an immersive way, while real reconstructions are often too expensive and sometimes hard to achieve because objects are not easy to be found and there is the need of adequate spaces.

The kitchen of the Fifties has been the first realisation of the project and has been mainly worked on in order to specify a methodology for a field which has not been defined yet. We preferred to elaborate a series of small or medium linkable objects, instead of a single large model, less manageable when it has to be transformed into an immersive environment.

The developed methodology can be divided into three fundamental steps:

1. The creation of a database gathering useful information (the scanning of existing objects or their measurements and the transfer of data in a cad system or similar, the collection of photographic texture and all the helpful material needed for a virtual fruition – from music to oral witnesses and other historical sources). The multiple dimensions database is the creation of the scientific committee research work, selecting and synthesising historical sources;
2. Geometric modelling of furniture and other objects with a 3-D modelling package suitable for real time applications (a modelling software capable of mapping photographic texture or video images on “simple” geometric models

of objects). For the kitchen, the starting point is to be found in the photos of historical objects, framed from different angle shots and accompanied by precise measurements. A modelling software has been used for creating geometries to be texture-mapped. In the beginning we chose 3D Studio Max, but the requirements of a real time application made us preferring MultiGen, a virtual reality world-building software, that provides also a scene graph view of the data;

3. The uploading of the model in an immersive visualisator. When the model has been loaded in a simulator for viewing, a run-time database of the 3-D dimensional geometry is generated. This visual database, which is known as the “scene” is structured to maximize the efficiency of frame display so that real-time dynamics are feasible. The scene is organized into a hierarchical structure called “tree” which is composed of connected database units called “nodes”. The scene hierarchy supplies rules which describe how items in the database relate to one another. The simulation software uses the spatial organization of the database to efficiently “cull” (temporarily remove from the scene) unseen entities and thereby increase the performance of the renderer. This means that the database should be organized along a spatial hierarchy which allows the system to eliminate portions of the models that are outside the cone of vision.

Beneath the improvement of the efficiency of the methodology developed since now, the project aims to increase:

- a. Interactivity with objects, thanks to gloves or other trackers;
- b. Realism, that could be achieved through photo-realism for the background environment or real-life images, that allow true recognition and representation of a real place; detecting suitable algorithms for conferring the best brightness, refraction, etc. and using some “tricks” for simulating shadows in real time, while waiting for programs capable of their real time computation;
- c. Easiness for the visitor to navigate intuitively the virtual environment;
- d. Flexibility for creating models and their subsequent visualisation, in order to enable a easy transformation and improvement in every moment.

The final goal is to realise a “certificate” database comprehensive of geometric models and information that can be expanded during time and give way to a wide range of multimedia products.

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