# *Application of Mixed Reality Technologies in the Interpretation of Cultural Heritage*

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German Abstract

Ziel des hier vorgestellten Projekts ist die Entwicklung und Evaluierung neuer Konzepte für die Präsentation von kulturellem Erbe, wobei die Arbeit auf der Anwendung von modernster Mixed-Reality -Technologie beruht. Das Projekt versammelt Vertreter aller relevanten Forschungsbereiche, und die Ergebnisse werden für die zukünftige Erforschung und Entwicklung von neuen, innovativen Serviceleistungen und -Produkten im Bereich Cultural Heritage sowie deren Vermarktung richtungsweisend sein. Wir gehen bei unserer Arbeit grundsätzlich vom Besucher von Kulturstätten aus - Hauptziel ist es daher u.a. aufzuzeigen, wie Kunst und Kulturgüter ansprechend und bedienerfreundlich präsentiert bzw. erfahren werden können. Zugänglichkeit, Interaktion, individuelle Anpassung und Bildung sind darum die wichtigsten Aspekte der zu entwickelnden und zu überprüfenden Konzepte.
Da das Projekt interdisziplinär ausgerichtet ist, wurde eine Hauptarbeitsgruppe von Partnern aus den Bereichen Forschung, Industrie und kulturellem Erbe gebildet, um Fachwissen aus dem Bereich Mixed-Reality Technologie (VICOM-Tech), Vermittlung von geschichtlichen Aspekten des Kulturerbes (Universität Deusto) und Erfahrung bei der Präsentation von Kulturgütern und geschichtlichen Kunstgegenständen (San Telmo Museum) zu versammeln. Anlässlich der Hundertjahrfeier des San Telmo Museums wird ein neuer, innovativer Prototyp eines Mixed-Reality -basierten Cultural-Hertitage-Systems konzipiert und entwickelt werden. Ein zentrales Element dieser Ausstellung ist der virtuelle Schaukasten.

**Introduction**
Information and Communication Technologies (ICT) are some of the most important tools of this century. They impact the way people live, learn and work and the way institutions interact with society. During the last decade, new technologies have radically changed communications, business and cultural heritage. Cultural institutions should include innovative technologies in order to improve quality and cultural productivity.

The information society promotes improvements in the quality of life of all people. Intuitive access to information in daily environments is gaining great attention in the development of new technologies inside the information society. Mixed Reality technologies must play a decisive role here due to their contribution to the development of new user-friendly interfaces.

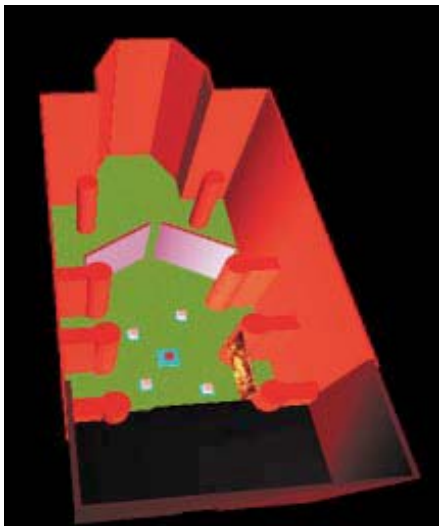

**Figure 1: Aerial view of the exhibition**

The final challenge of these emerging technologies is social acceptance. If hardware had a perfect intuitive interface, we would still need to define the way Mixed Reality technologies would be merged with daily activities.In other words, we still do not know whether Mixed Reality users would willingly wear helmets on their heads.

**Objectives**
The aim of the project reported here is to develop and test new concepts for the presentation of cultural heritage, based upon the application of advanced Mixed Reality technologies. It brings together representatives of all the major areas of expertise involved, and it will use the results to set out future directions for the research, development and marketing of new innovative cultural heritage services and products.

The approach adopted in the project is firmly based upon a human-centered view, and the main objectives of the project include the demonstration of new, exciting and user-friendly ways to present and experience art and cultural heritage. Accessibility, interaction, personalization, and education will thus be key aspects of the concepts to be developed and tested.

Current advances in display devices, multi-modal human-computer interaction, collaborative methods, and Mixed Reality techniques will be analyzed and evaluated with respect to their potential for cultural heritage interpretation.

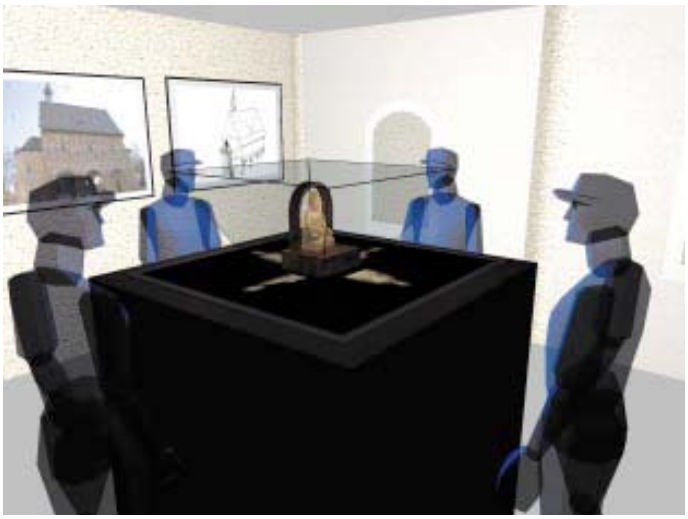

**Figure 2: Virtual Showcase conceptual design.**

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**Exhibition set-up**
A new innovative exhibition will be designed and constructed for the celebration of the centenary of the San Telmo Museum in San Sebastian (Figure 1). A central element of this exhibition will be an Augmented Reality set-up, probably based on the Virtual Showcase (Figure 2), showing objects from the old iron age in the Basque Country region. Conversations to cooperate with Fraunhofer CRCG (USA),founding member of the INI-GraphicsNet Foundation, for the use of the Virtual Showcase in the exhibition are ongoing. This would offer the possibility to mix real artifacts with high-resolution virtual 3-D images, thus enabling the visitor to see and interact with a mixed real and virtual combination.

The San Telmo Museum will be the venue for this exhibition, and it will be used to test and evaluate the effectiveness of the new interpretation and presentation concepts developed by the project. This will include both direct and indirect assessment of visitors' reactions and responses to the exhibition. In addition, it should help the content providers analyze new ways of teaching and learning using new technologies. Finally, this project will provide new practical knowledge (ideas, concepts and methods) for private and public agents involved in cultural heritage and local development.

**Outcomes of the project**
- A state-of-the-art review of current methods and technologies used, together with an evaluation of their effectiveness and acceptance in exhibitions, museums and at cultural heritage sites.
- A state-of-the-art review of the technologies available, their user-friendliness and acceptability.
- A review of pedagogical and educational aspects of cultural heritage presentations in order to establish what seems to be desirable in the future.
- An exploration of innovative services, applications, and products integrating Virtual and Augmented Reality technologies.
- An assessment of the visitor's behavior concerning the integration of ICTs in cultural heritage environments.

**Consortium**
Due to the interdisciplinary nature of the project, a core workgroup consisting of partners in research, industry, and cultural heritage has been established to combine knowledge of Mixed Reality technologies (VICOMTech), expertise in the communication of cultural heritage (University of Deusto) and knowledge and experience in the presentation of cultural heritage and historic art works (San Telmo Museum).