'Virtual museums': engaging with our cultural heritage through digital media

The 3D reconstruction of Santa Chiara at the V&A allowed the church's chapel and altar, purchased by the museum in 1861, to be reunited with the main church. This gave visitors the opportunity to explore all three components 'virtually' and overcame the dislocation of church, chapel and altar for the first time in almost 150 years.

Research at Sussex has enabled the development of interactive 'virtual museums', creating an immersive, dynamic experience of historical sites, monuments and artefacts. Virtual representations allow the public to experience cultural and scientific objects within their historical context, thereby enhancing awareness and understanding of our cultural heritage.

Overview

The country's museums and galleries are a national treasure, vast warehouses of social memories and representations of our cultural heritage. However, the public's experience of these collections is often limited by time and space. Access to fragile historical sites and monuments is often restricted, collections are often far larger than can be presented within the confines of the physical space of a museum or gallery, and curators have to balance the sometimes conflicting priorities of preservation and public access. Technological advances mean that museums can now archive and catalogue material digitally. However, digitising large collections is extremely time consuming and can require expensive information and communications technology (ICT) expertise. Thus, there is a need for cost-effective and innovative ways to preserve cultural heritage materials while allowing public access.

Furthermore, people want to experience objects 'in the round' and understand them in their cultural context. Finding solutions to these problems has given rise to the idea

of the 'virtual museum'. Dr Martin White, Reader in Computer Science (Informatics) at the University of Sussex, and colleagues have explored several novel ways of developing intelligent, dynamic, self-aware and adaptive digital interfaces that allow the public to engage with a museum's digital objects and relate them to their cultural context.

The Augmented Representation of Cultural Objects (ARCO) system allows museums to create their own virtual museums and exhibitions independently, building, manipulating and managing digital cultural objects with minimal ICT support. This project has provided a new metadata standard for such systems and demonstrates the innovative application of augmented reality for presenting digital cultural objects.

The Marie Curie Training Site: Virtual Reality and Computer Graphics (MAVRIC) project has developed computer graphics and virtual-reality methods and expertise to build large-scale, 3D digital reconstructions of heritage sites, monuments and artefacts, such as the church of Santa Chiara for the Victoria and Albert (V&A) museum's Medieval and Renaissance galleries, while the Motion in Place Platform (MiPP) used an innovative inertial motion-capture suit to augment virtual reconstructions of early Romano-British buildings at the Silchester archaeology site using real-time motion characters.

Reanimating Cultural Heritage: Digital Repatriation, Knowledge Networks and Civil Society Strengthening in Post-Conflict Sierra Leone created a unique digital heritage repository that connects the Sierra Leonean diaspora, scattered through civil war and the country's economic collapse, to its heritage through the novel integration of social media.

Achieving impact

This research has major impacts in improving how museums and other memory institutions can engage the public with their cultural heritage, and provides social, cultural and public services with potentially global reach.

Innovative systems such as ARCO allow museums to independently develop approaches that go beyond standard multimedia (eg Adobe Flash) to create virtual museums and exhibitions that combine the internet, 3D technologies and virtual and augmented realities in new ways. Although there has been some economic impact – commercialising the ARCO project to a spin-out based in Poland has generated consultancy and licensing income for Sussex – the benefits of ARCO are primarily cultural and social and related to the end user, the public.

Augmented and virtual reconstructions of heritage sites allow the public to situate themselves in a cultural context, to appreciate how such heritage was first created and how sites and objects were used. Furthermore, digital representations can be viewed remotely, giving access to a much broader audience. The 3D reconstruction of Santa Chiara at the V&A in 2009 allowed the church's chapel and altar, purchased by the museum in 1861, to be reunited with the main church. This gave visitors the opportunity to explore all three components 'virtually' and overcame the dislocation of church, chapel and altar for the first time in almost 150 years. In a visitor's survey, 93 per cent reported that the Santa Chiara interactive exhibit had enhanced their enjoyment, while 60 per cent reported that it had caused them to look more closely at the physical chapel exhibit.

The unique social media-based digital-heritage repository SierraLeoneHeritage (**www.sierraleoneheritage.org**) combines digitised artefacts augmented with metadata and media objects and was created using material from several major collections of cultural artefacts from the Sierra Leone National Museum, the British Museum, Glasgow Museums and the Brighton Museum and Art Gallery. Post-launch, both the British Library and World Museum Liverpool requested that their Sierra Leone Collections be added to the repository. In early 2013 the Cootje Van Oven Collection was also added, demonstrating the value that leading institutions placed on this novel repository. The British Museum reported 66,996 visits to its combined physical and virtual display in spring 2013 and considers that 'the digital resource has been extremely useful in encouraging exploration of Sierra Leone's heritage by specialists as well as non-specialists … the unprecedented access it provides to multiple museum collections is impressive.'

The Sierra Leone National Museum has developed a schools outreach programme supported by a version of the website on DVD and, during the 50th anniversary of independence celebrations in 2011, Sierra Leone's President announced that the country had a cultural website to be proud of. A Sierra Leone Facebook community integrated within the website allows people in the diaspora to connect with others and their shared culture, giving the project global reach.

Future impact

It is already possible to create 'tangible representations' of museum artefacts interfaced to a virtual representation. In the future, it is anticipated that 3D authoring software of this quality, and the commercialisation of virtual and augmented reality tools combined with the advent of cheap 3D printing, will allow the creation of more sophisticated virtual museum exhibitions that incorporate multimodal interaction with a museum's artefacts.

Funding and partnership