IST-2002- 507382

EPOCH

Excellence in Processing Open Cultural Heritage

Network of Excellence

Information Society Technologies

D.2.4.9: Report on Showcase Rationale and Feedback

Due date of deliverable: 29 April 2005
Actual submission date: 28 April 2005

Start date of project: 15/03/2004
Duration: 4 Years

Ename Center

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
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1. Executive Summary

This document describes the rationale of each of the showcases that were developed in the first year of EPOCH, and gives the feedback that was received from conference delegates at conferences where these showcases were demonstrated and presented.

The showcases were designed to show an integration of different technologies to address specific issues in Cultural Heritage, at different stages of the EPOCH pipeline, and proof that ICT solutions can solve these issues in an elegant, cost-effective and innovative way. These showcases are intended to serve as good practice for the ICT community, as example and eye-opener for the CH world and as stimulator of integration within the EPOCH network.

2. Introduction

To create a clear understanding amongst all CH stakeholders and related decision makers of the potential and integration issues of IT in CH, a common language needs to be spoken. In the past, CH related IT projects did not have enough feeling with the real world problems of the CH domain, and demonstrations of projects were too often limited to small audiences in the IT domain only.

Therefore, we need to demonstrate recent integrations with real world content, and highlight the improvements in cost effectiveness, fitness for use, sustainability. By creating inspiring and realistic demonstration cases, we tried to address the real stakeholder needs, highlight distinct implementation opportunities need and stimulate down-to-earth feedback from the CH professionals.

Each of these showcases is the product of an integration effort that brings together different existing technologies, but combined and applied to key issues in cultural heritage. This text gives the rationale behind each of these showcases.

The following application domains are targeted :

- showcase 1 (On Site Reconstruction Experience) :
  archaeological site presentation
- showcase 2 (Multimodal Interface for Safe Presentation of Valuable Objects) :
  museums
- showcase 3 (Tool for Stratigraphic Data Recording) :
  archaeological recording
- showcase 4 (Multilingual Avatars) :
  multilingual presentation of urban landscapes
- showcase 5 (e-Tourism through Cultural Routes) :
  tourism
- showcase 6 (Avatar-based Interactive Storytelling) :
  interactive storytelling
- showcase 7 (Archaeological Documentation for the Semantic Web) :
  archaeological databases
- showcase 8 (Image-based Modeling) :
  3D modeling and recording

These showcases were presented and demonstrated at the VAST2004 and CAA2005 conferences, while showcases 3 and 4 were also demonstrated at the UK CAA2005 conference in Southampton. These conferences are attended by people that are active in the crosssection between ICT and cultural heritage. In the next paragraphs, we also give the feedback that the team members received during these demonstrations.

In year 2, the showcase dissemination will extend to other meetings and conferences that are more aimed towards the museum, archaeology or monuments professional, so obtain more feedback from non-technologists. The dissemination will also use regional meetings as there are very few European wide CH conferences. Dissemination towards the political level is planned also.

3. Showcases

3.1. On Site Reconstruction Experience

3.1.1. Rationale

Archaeological remains are difficult to interpret. They are nearly always fragmentary, and contain in many cases several building phases. To help the visitor of the archaeological site to understand and enjoy the history of the place, we need to provide a powerful tool that shows the splendour of the past, but in relation with the current remains, to stress their authenticity. Augmented Reality has shown to really create this experience, while being extremely simple to use. A first implementation of this method at the archaeologial site of Ename in 1997 has shown that an in-situ real-time augmented view on the past creates a real personal engagement and hence an effective presentation. Current technology allows creating portable versions of this AR visualisation, in the form of a head-mounted display or video-binocular, or fixed versions in the form of a telescope like device. The core of the visualisation is the optical tracking algorithm that allows (nearly) pixel precise superimposition of the virtual reconstructions on top of the real time video images for selected viewpoints. Further research would allow walking along a path and have a perfect visualisation for any viewpoint along that path. This will improve significantly the ease of implementation of such technology at archaeological sites as the viewing spots are potential bottlenecks that block the visitor flow.

3.1.2. Feedback

There is a definite demand for this kind of technology, as it gives a simple yet powerful presentation of the past of a place. Under certain lighting conditions, the tracking algorithm was performing unsuffiently. Demonstrations off-site, based on posters of buildings, do not give the right impression of the buildings and the site.

This technology certainly has market potential, but needs further improvement and product design. It was noted that the binocular or telescope approach yields a safer use on an archaeological site than a head-mounted display.

3.2. Multimodal Interface for Safe Presentation of Valuable Objects

3.2.1. Rationale

Through the combination of virtual reality, a replica of an object of art and interactive storytelling, this interface gives a natural, intuitive but yet innovative way to deal with museum objects, which is based upon tactile feedback and the "object is the interface" paradigm. The concept is also explorative, the museum visitor finds the content by manipulating and "questioning" the objects (which is implemented by touch sensors or small push buttons) hence gives a higher personal engagement and adaption to the personal interests. The addition of touch not only stimulates a sense that is seldom used in a museum, but also breaks the psychological barrier of "untouchable" that always has been connected with valuable museum objects.

Although the ideal setup is to show the real object and complement it with the interactive object, the concept allows also to have multiple copies of the object, which allow several people or even groups (where the guide uses the replica) to explore the object at the same time, but also to have the presentation of the object at multiple locations at the same time.

The costs of this approach are moderate, even low when taking into account that the accessibility of the object is improved drastically. This cost can be significantly reduced by using a dummy object that is a coarse representation of the object rather than a replica. The ARCO software, which is used as software platform, allows the museum curator to build the stories and provide the information in house, so that updates are easily made without extra costs.

Further research need to be done concerning the integration of 3D screens without glasses, to further stimulate the sensation of really manipulating the object.

3.2.2. Feedback

The haptic or tactile interface works well and is effective in showing the hidden information contained in an historical object. The orientation sensor allows the virtual replica on the PC screen to be revolved completely, so both sides of the object can be explored. This is impossible with the original crosier, as it is shown in the museum.

Since no special glasses or high-end equipment is needed to visualise the 3D image on the screen, the technology is suitable for single visitors as well as larger groups, and can be installed in smaller museums too.

The use of virtual humans (12 monks and the abbot, set in the virtually rebuilt abbey of Ename), helped to understand how the ceremonial staff was used.

The only criticism might be that due to the size of the components that had to be inserted, the replica is larger than the original. This may raise some questions about the link between the original and its copy. New small sensors from the medical world however can solve this problem.

3.3. Tool for Stratigraphic Data Recording

3.3.1. Rationale

This tool for stratigraphic data recording and analysis, and is an integration of a 2D analysis method called jnet, based upon the Harris Matrix, with a 3D analysis method that was developed in the 3D MURALE project. The jnet graph tool provides an interactive visualisation of a site in the form of a Harris Matrix, showing the sequence of deposition of layers. The Stratigraphic Visualisation tool (STRAT tool) provides a 3D visualisation of an excavation site. The tool enables wide-ranging visualisation and manipulation plus the storage and querying of archaeological data. The 3D layer information is acquired with the image-based modeling techniques described in showcase 8.

The goal of this tool is not only to improve the stratigraphic analysis of archaeological data by combining well known 2D tools with innovative 3D tools, but also to provide a tool that fits in the EPOCH philosophy of integrated, pipelined applications.

3.3.2. Feedback

The showcase received a reasonable amount of interest at the two meetings. The overall impression was that most delegates were impressed by the tools (Strat or jnet) and saw immediate applications for them in their own work or that of their colleagues. The idea of STRAT and jnet as a 3D and Harris Matrix mapping between two views seemed to be of great interest and most people could see the benefit.

A smaller number appreciated the central theme of the showcase (and the EPOCH 'pipeline'), that of integrating or enabling communication between different visualisation tools.

That the concept of integrated systems was not understood by everyone and that this aspect appeared to be appreciated mostly by those with a significant level of computing expertise suggests that we still have some work to do to get this message across.

3.4. Multilingual Avatars

3.4.1. Rationale

This showcase demonstrates the integration of three important developments : efficient modeling of buildings and urban settlements, multilingualism and avatars as virtual guides.

The efficient modeling allows for non-technical people to create buildings, or exact as they are or were, or generic to create a cityscape. This tool is very useful for creating virtual reconstructions of historic towns, with the right complexity of such a city centre, but at a much lower cost than before. As the appropriate specialists can use the tool directly, the scientific accuracy and quality of the data will raise, maintaining a low modeling time.

The multilingual system allows to add languages and build dialogues efficiently, and maintain them afterwards. These multilingual systems have automatical lip sync with the avatars. The system runs on a medium to high end PC.

All these elements allow also smaller cultural heritage institutions and historic towns to use this high end innovative technology, and take care themselves of the content.

3.4.2. Feedback

The feedback was mainly positive comments regarding the multilingualism of the system, that additional languages could be easily added, and about the fact that the lip sync of the avatar could match the speech in different languages. Positive feedback was noted regarding the rapid assembly of the urban scene and the crowd scenes that populate the model.

There were some initial slightly negative comments regarding the lighting and textures used for the buildings, but these have since been improved.

There were some comments about making the avatars look more natural both in their look and movements.

3.5. e-Tourism through Cultural Routes

3.5.1. Rationale

Research concerning tourism and cultural heritage has shown that both domains are poorly connected, and the Stakeholder Needs analysis has shown this once again. Nevertheless is tourism using the cultural heritage assets extensively. The most obvious way to link both domains together is the cultural route, which has become quite popular in the last years.

This showcase develops a concept for an international cultural route that is supported by ICT in the pre-visit, visit and post-visit stages. The cultural route concept that was developed has a highly decentralised structure with a small central organisation that takes care of the redactional and organisational issues of the route, and with locally managed micro-routes that have a high independence. This structure allows the micro-routes being run by local authorities or tourist organisations and facilitates the integration of existing touristic offerings into the cultural route.

The portal structure of the cultural route is personalised and is based upon a paradigm where the visitor is a "member" of the cultural route. The membership is offered for free through the institutions and organisations in each local route, and stimulates a two-way communication about heritage. A route member has his own travel journal (similar to a blog), in which experiences, tips, comments on the sites visited, digital photos and digital souvenirs can be added, which can be shared with family or friends, or with the whole world, hence creating a community around the theme of the route. After visiting a site, extra information about that site is added to the personal page of the member. As this information remains up to date, a psychological link of being "in touch" is created with the visitor-member of the route.

By integrating the local authorities and tourist organisations at the local level, no funding issues are likely to appear there. The funding of the portal is small, and divided over the many organisations that take part in the route.

3.5.2. Feedback

Although tourism and (a few) route portals exist, this concept has received very positive feedback, not only from the delegates at the conferences where it was presented, but also from different organisations that show clear interest to implement it. A recent meeting on Cultural Tourism, where this showcase was presented, highlighted the importance of international cultural routes, and of ICT support to improve cultural integration.

The implementation of the local route in Oudenaarde was received very well by the local authorities and the tourist office. Feedback from the tourists will be available soon.

3.6. Avatar-based Interactive Storytelling

3.6.1. Rationale

The showcase explores the possibilities of using an avatar as a storyteller, linked to synthetic speech. The stories contain virtual reconstructions of an archaeological site, populated with virtual humans. The stories explore issues of virtual reconstruction, scientific uncertainty and communication with the user. Two avatar technologies were explored.

The first technology uses a 3D avatar that is driven by phonemes, so that synthetic speech (generated from the story database) can be synchronised with the lip movements and facial expression.

The second approach uses 2D morphing of images, driven by external speech (coming from a recorded voice). This system has proved to be very effective to make portrets or statues come alive, and is easy to integrate in HTML and XML based applications. The use of historical characters through animated paintings, drawings or statues is a new way to make the past come alive and create an appealing user experience.

The integration of an avatar and synthetic speech that can be driven from written text not only creates added value by using animated historical characters, but also resolves the last bottleneck in updating interactive storytelling systems, being the recorded voices. Through this integration, a powerful interactive storytelling system becomes available that can be updated instantly by CH professionals without substantial ICT skills, without any additional costs.

3.6.2. Feedback

The presentations were generally effective. The tools for creating the avatars were perceived as easy to use, even by non-technical people (choose the character, tweak its appearance and link the appropriate audio file). The output is an AVI file that can be imported directly into the storytelling application.

On the choice of character, it was noted that our human avatars could just as well have been cartoon figures. As the facial features are less easy to compare with a real person, non-human avatars somehow look more acceptable. The use of talking paintings, artefacts or statues opens interesting perspectives.

The choice to use synthetic voices was not always well received, as the quality seem to depend on the language and voice, some results were good, others not.

The choice to use avatars as storytellers was received very well, but a good balance needs to be found between the avatar and the other information presented, as the attention of the user is split over both elements.

Further demonstrations to CH professionals will give appreciations of the storytelling qualities of the system.

3.7. Archaeological Documentation for the Semantic Web

3.7.1. Rationale

Because archaeological data is going digital, the possibility of managing effectively huge and diverse data archives, is often frustrated by the different structure such archives were given by their creators.

This showcase aims at showing that such integration is in fact possible, with an already available technology which substantially improves the way digital archaeological data have been handled as yet. The showcase also will consider existing paper documentation and will show how it can be integrated with digital archives.

The showcase has demonstrated that archaeological data conversion is possible and in fact simple; that it can be performed also on “vintage” datasets, thus preserving them from technological obsolescence and eventual impossibility of access; that conversion allows “cleanup” of datasets, an operation which is very often indispensable; and that searches may be effective and have a good performance.

Another interesting feature was the compatibility with jnet, a tool developed within showcase “Tool for Stratigraphic Data Recording”. This allows using the stratigraphic data concerning relations to feed the present records into jnet and obtain the Harris matrix of the excavation, and links to showcase 3.

3.7.2. Feedback

The feedback by researchers was rather good. They were interested in the possibilities offered by the search system. Some of them were not willing of investing too much time in better documentation, others were very much interested in the methodology (for example the Dutch ROB, the Irish Discovery Program, Israel Antiquity Authority). It seems that there is a split between archaeologists who understand the potential of interoperability among different datasets and in general data management, and those who don’t.

Some archaeologists in the end do not care about documentation of any kind. Old style archaeologists do not believe very much in publication of source

data but only care of publication of results and interpretation. Major efforts will be needed to disseminate the EPOCH data and workflow models in the archaeological world.

The showcase partners managed to have a large partnership in AMA because the results of this showcase were very convincing.

3.8. Image-based Modeling

3.8.1. Rationale

Since many years photogrammetry has been used quite a lot for mapping, recording and documentation of archaeological monuments, excavation findings and cultural heritage sites. Lately digital techniques for recording, processing and visualization have opened new possibilities for 3D modeling. Image-based modeling is a breakthrough technology for the creation of 3D object and scene modeling. Only images are needed to produce the 3D models. From the processing of these images textured 3D models can be built.

The workflow that is needed for image-based modeling is quite simple, and a good recording technique is easy to learn. This technique is also being used in showcase 3, and can be considered as a disruptive technology in the creation of 3D models, yielding a fast turn around, a simple workflow and low costs. However further research is needed to improve the quality of the 3D models in some special cases and to improve the robustness of the processing.

3.8.2. Feedback

The feedback concerning the technology of image-based modeling and the applications was mostly positive, especially for the Bamiyan-Buddha project. Interested people were archaeologists and architects, their main question was how to apply the technology by themselves at relative low costs. The prices for the photogrammetric processing software, as it is quite expensive, seemed to be too high for most of them. This means that freely available and user-friendly tools are definitely a need in cultural heritage. This is exactly what the EPOCH Common Infrastructure Activity is about. Free image-based modeling will become available as a web service on the EPOCH website in the second year. Generally, most of the interested people liked the 3D models that were presented, and showed interest to make use of 3D technology (also visualisation) for their projects.