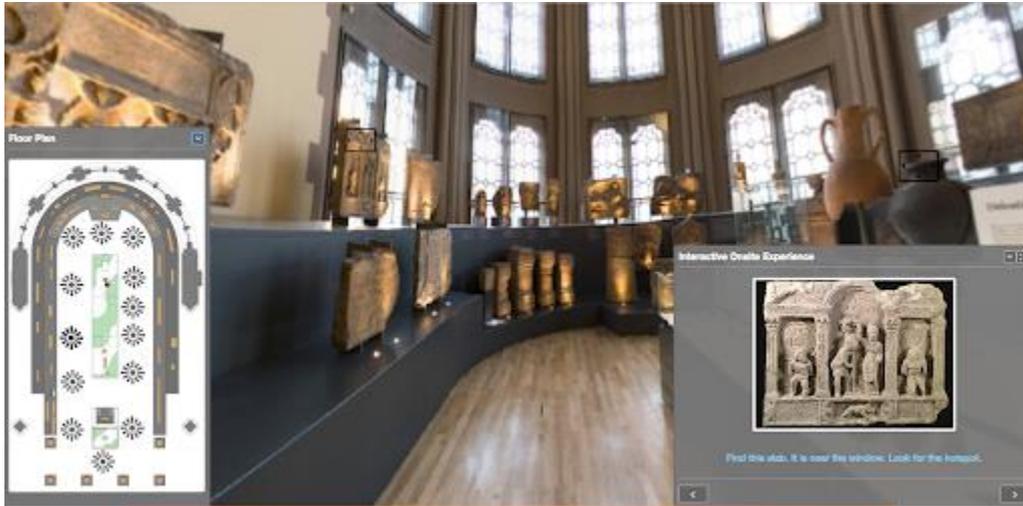# EMOTIVE HUNTERIAN MUSEUM DIGITAL STORYTELLING ABOUT THE ANTONINE WALL*

Experiencing the Ebutius' story online through the Web Experiencing application

AUTHORS

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ABSTRACT: EMOTIVE is a 3-year H2020 project, which aims to use emotional storytelling to change how we experience museums and heritage sites. The principal objective for EMOTIVE is to research, design, develop and evaluate methods and tools that can support the cultural and creative industries in offering their diverse audiences effective emotive storytelling. The Hunterian EMOTIVE prototype experiences include VR/AR technologies and 3D printed objects to convey two personal stories (told by a Roman centurion and by a local a local Caledonian slave girl) that tackle personal dilemmas and issues of identity. These stories were created with an Authoring Tool for cultural content creators and can be easily transported for online use combined with an easy-to-build 360° virtual space. The evaluation carried out to date measured the impact and effectiveness of the user-centred approach and effectiveness of prototypes. The results showed very promising results about the impact of both the tools for Cultural Heritage professionals and the emotive, mixed reality approach for cultural heritage audiences.

KEYWORDS

On-site/off-site cultural heritage experiences, emotions, storytelling, 3D printed objects, authoring tools.

I. IDEA GENERATION & CONCEPT

EMOTIVE is a 3-year H2020 project, which aims to use emotional storytelling to change how we experience museums and heritage sites. The Hunterian Museum at the University of Glasgow (UGLA) is one of the project's two cultural partners, employing the EMOTIVE digital storytelling techniques and tools to bring to life and engage diverse audiences with its Roman Antonine Wall collections (that come from the related UNESCO World Heritage site). Apart from the Hunterian Museum and the Information Studies team at the University of Glasgow (which worked on persona development, content research, user-centred design and evaluation), stakeholders from the other EMOTIVE partners were: NOHO, SME, Dublin (narrative design and character creation); ATHENA Research Centre, Athens (user modelling, user-centred design, evaluation, design of storytelling experiences); DIGINEXT, Company, Toulouse (research and development of the authoring tool for interactive VR, AR, MR and location-based experiences); and CNR, Research Centre, Pisa (3D digitization, scanning, and printing); and EXUS, SME, Athens/London (project management and system integration). Historic Environment Scotland, which managed the site of the Antonine Wall is in the Advisory Board of the project. Input from Hunterian museum visitors was sought through the project development, while feedback from experts in digital storytelling, cultural heritage interpretation, design and evaluation was elicited mainly with the EMOTIVE users' workshops with participants from around the world.

The Antonine Wall display at the Hunterian Museum

The EMOTIVE Hunterian experiences use images, models, and related information from the Museum's collection (the largest Antonine Wall collection in the world); 3D models of objects and sites (Bar Hill fort reconstruction) used with permission from Historic Environment Scotland. By employing EMOTIVE methods and tools in the design of these experiences, The Hunterian aims to increase and deepen visitors' engagement and connection with the objects on display at the museum, and more broadly with the related themes, historic periods, heritage, museums, and the past.

The principal objective for EMOTIVE is to research, design, develop and evaluate methods and tools that can support the cultural and creative industries in offering their diverse audiences effective emotive storytelling. At The Hunterian, we aim to develop pilot experiences creating high-quality, interactive, personalised digital stories that integrate effectively different state-of-the-art technologies in order to bring the objects to life and encourage an interest in the past by connecting with visitors' lives today. These are addressing both onsite visitors in the museum gallery, as well as those accessing the experience remotely, online.

The Hunterian EMOTIVE prototype experiences include: a) "Ebutius' Dilemma", the story of a Roman centurion who has a difficult decision to make (if he will leave the family he created when the Roman army retreats south or become a deserter), designed in both onsite and online versions; and b) the Verecunda onsite experience, which uses the story of a local Caledonian slave girl to explore issues of identity and integrates both VR/AR. Both stories were developed collaboratively during with the writing and story development carried out mainly by UGLA and NOHO. Domain experts from the Hunterian, University of Glasgow Archaeology Department, and Historic Environment Scotland were consulted on the content to ensure that the story adhered to the known facts about the objects and historical period. One of the challenges faced was introducing and making clear what were the facts behind the story in an appropriate way, without negatively affecting users' immersion in the storytelling. Another challenge we faced with Verecunda was integrating effectively different technological components, without disrupting the engagement with the real objects on display nor breaking social interaction which is so important in museum and heritage visits (such as VR storytelling in the exhibition, followed by different components, like an AR scavenger hunt for objects in the gallery).

The first stage of the project (November 2016 - October 2017) included the alpha release of the pilot experience prototypes and tools. The second stage of the project (November 2017 – June 2018) included the Beta Release of the EMOTIVE pilot experience prototypes and tools. The final stage (July 2018 – May 2019) will include the Final Release of EMOTIVE experiences (in the Hunterian's case: 'Ebutius' Dilemma' both onsite and virtual offsite experiences and an onsite 'Verecunda' experience and tools and will be followed their summative evaluation.

As these experiences were developed as part of a 3-year research and innovation project (with an overall budget of: €2.6-million) that included two case studies, it is difficult to isolate the exact cost that was related only to the Hunterian experiences. The University of Glasgow's budget allocated is €241,891. It is envisaged that both the tools and prototypes designed as part of EMOTIVE will be used after the life of the project by The Hunterian (and other cultural institutions) as they plan their future interpretation strategies. In the case of The Hunterian, the EMOTIVE experience is informing its Digital Strategy (2017-2022) and what is planned for the display interpretation as part of the Kelvin Hall Phase II and III, a large partnership project with Glasgow Life/Museums, the National Gallery of Scotland, and other cultural partners.

EMOTIVE offers a wide set of tools that support the creation of a variety experiences for on-site and remote visitors:

- **"Interactive storytelling experiences for mobile devices"**. With the EMOTIVE Authoring Tool creators and cultural heritage experts are able to collaborate to create interactive storytelling experiences for a museum or any cultural heritage site. Visitors download the curated experiences on their smartphone and get guided throughout the site while being engaged in immersive narratives. By supporting several author roles with a variety of technical expertise, the EMOTIVE Authoring Tool can be used to produce virtually any type of experience, from simple text-based presentations (as was the alpha version of "Ebutius' dilemma") to advanced multi-user AR collaborative experiences (as is done in one component of the Verecunda experience).

- **"Bring your experiences online"**. Experiences made for mobile devices (like "Ebutius' Dilemma"), can be easily transported for online use combined with an, easy to build, 360° virtual space (like the virtual "Ebutius' Dilemma"). The Floor Plan Editor enables museum experts to create virtual representations of their cultural heritage sites by organising 360° photographs through a web environment. These virtual spaces are viewable through the EMOTIVE's Web Experiencing System along with a storytelling experience originally made to be used on-site, bringing the same experience off-site.
- **"Bring objects to life"**. Emotional engagement with the past becomes much more intense when we are able to touch historical objects, see their colours and feel their texture (as was the case, for example, with a 3D-printed version of Ebutius' hammerhead that has his name scratched on it). EMOTIVE provides tools that enable cultural heritage creators, or even visitors, to cast their own replicas of historical artefacts. Additionally, with the help of the EMOTIVE's Mixed Reality Plugin for Unity, these objects can be brought back to their original glory through the lenses of a Virtual Reality headset.

II. ELABORATION OF DESIGN, STUDY, & PLANNING
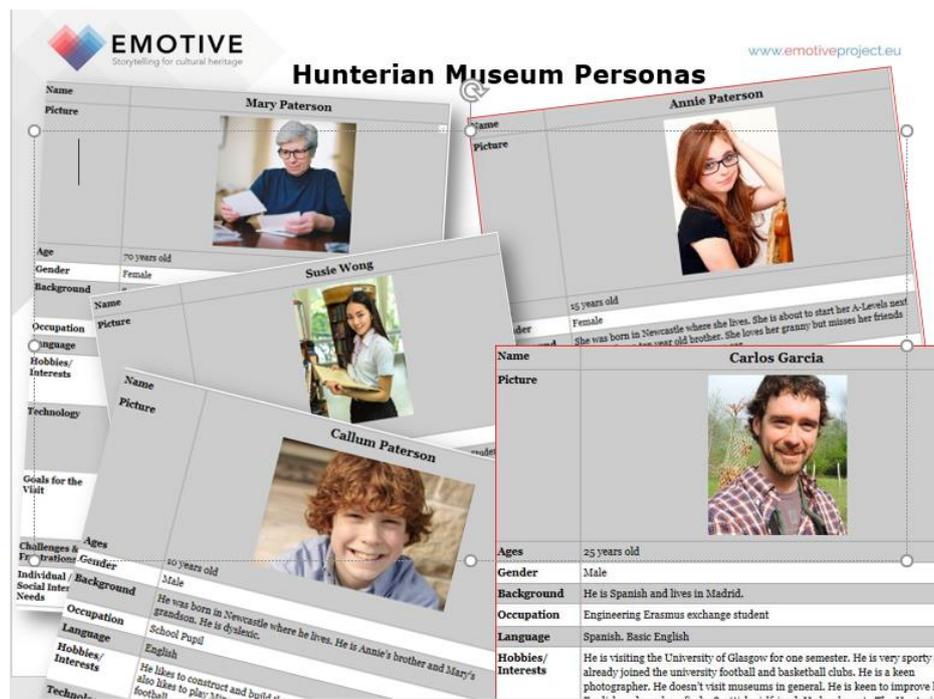
User-centred design with the personas created based on real Hunterian Museum visitors' profiles informing the design process of the EMOTIVE Hunterian experiences

The Hunterian onsite experiences were designed iteratively by the EMOTIVE user group and co-created with end-user groups. These include the participants of the 1st EMOTIVE Workshop held in February 2017 at the University of Glasgow. As for all EMOTIVE experiences, we used personas for developing our experiences, i.e. archetypical visitors based on the characteristics of real Hunterian visitors and interpretation cards with key information about objects and exhibits. As the EMOTIVE experiences represent a user-centred design philosophy, which draws heritage-specialist and museum visitors into all phases of the planning, development and evaluation of our tools and experiences, we invited external cultural heritage experts in user design, gaming,

curation, digital engagement and interpretation, who listened, discussed, evaluated and brainstormed with the aim of developing concepts for our user experiences and design tools for heritage professionals.

The Promotion Plan at this stage is to create visibility of the project and raise awareness among all relevant EMOTIVE stakeholders, which the project has achieved and continue to grow. This consisted of creating the project profile, website, online and print communication material (e.g. brochures, posters, newsletters), organizing and participating at project-related events. It also includes contribution to open research data management. We further share our knowledge through the publication of papers in scientific journals and conferences, participation at related conferences and events.

The budget for design, study and planning was covered by the EMOTIVE project budget and was carried out by the staff that has been allocated among partners without having to use any external sub-contractors. Students work placement (e.g. by an Erasmus+ Art and Design student who was also an experienced children books' illustrator helped improve the design of the graphics used in the experience without incurring additional costs.

The technologies involved in this phase correspond to the StoryBoard Editor. The SBE had been designed and developed by ATHENA with the objective to support the initial, drafting stages of authoring experiences. It is a new pre-authoring tool dedicated to enable authors to design interactive stories using a simple, text editor-like, user interface. The Floor Plan Editor complements these experiences with a virtual environment for offsite use. The Wizards allow experiences initialization with a few questions rather than starting from scratch. The Visual Scenario Editor (VSE) developed by DigiNext, extends these experiences by integrating mobile technologies and VR/AR content allowing programming in a visual way, particularly useful for authors with limited programming skills. As for the mobile experiences, the VSE allows developers or creative designers, depending on their skills, to create desktop experiences. Finally, the Mixed Reality Plugin works along the popular Unity engine to create offsite 3D experiences.

III. DEVELOPMENT & IMPLEMENTATION

The stakeholders involved in this phase were several. UGLA provided image capture of the Antonine Wall display, object assets, audio narration files, and conceptual design. ATHENA provided the Floorplan Editor Tool to create a virtual representation of the Antonine Wall display for the virtual Ebutius experience. Noho provided scriptwriting for the original 'Ebutius's Dilemma' onsite experience and parts of Verecunda. DigiNext transferred the story from the StoryBoard Editors to the Visual Scenario Editor and trouble-shoot NFC tag activation. Finally, Hunterian visitors, other EMOTIVE partners, EMOTIVE Users' Group, University of Glasgow and external subject specialists, education and interpretation staff and students gave feedback and helped evaluate and improve the prototypes.

The first prototype iteration of the Hunterian onsite EMOTIVE experience Ebutius' Dilemma (alpha release) was designed in August-September 2017 with improvements and changes carried out until December 2017 using the EMOTIVE StoryBoard Editor. The second iteration (beta release), which improved the user interface and included some extra content, was designed using the Visual Scenario Editor January to June 2018. Working with rich qualitative methods, including focus groups, interviews, and observations, complemented by quantitative survey techniques, to elicit and explore user needs, we included both audio and text in the story, for those with impaired hearing.

All EMOTIVE Hunterian experiences are free to use as they are part of a Research and Innovation Project. A business and exploitation plan has been drawn up by EXUS examining how the EMOTIVE tools will be offered to creative and cultural heritage professionals in the market.
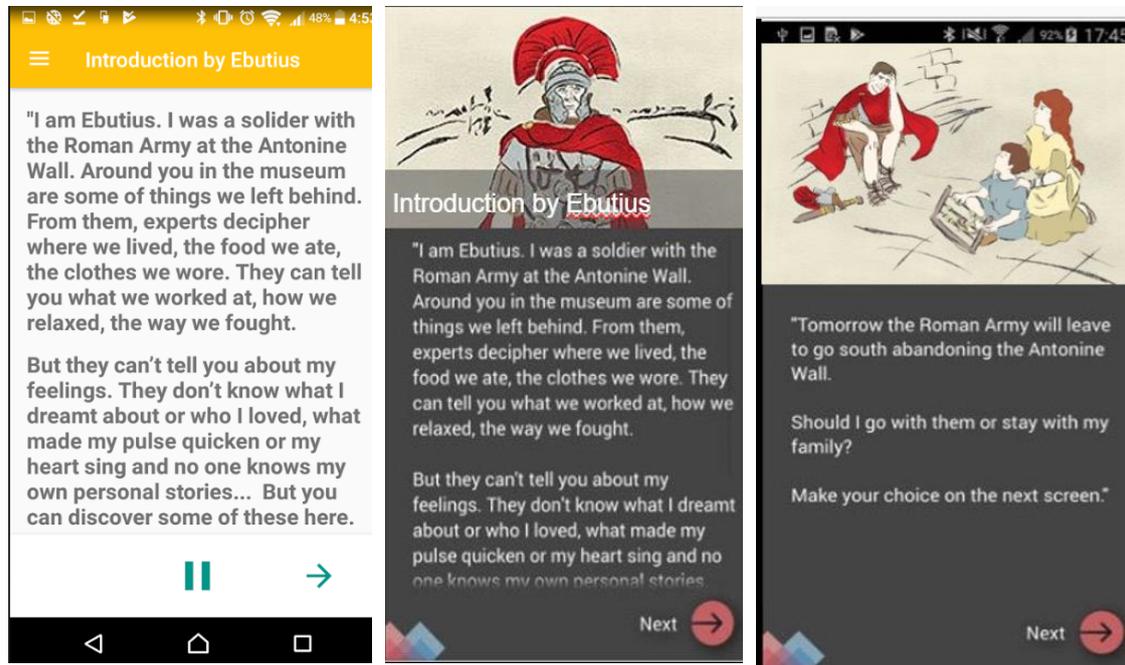
Left: Alpha-release primarily text-based version. Centre and right: Beta-release of "Ebutius' Dilemma" designed on the Visual Scenario Editor and exporting the final result on a smartphone

Designing a mobile experience was carried out either by using the Story Board Editor (SBE) or the Visual Scenario Editor (VSE). While the SBE was sufficient for providing some level of interactivity like choice making (i.e., branching point) and displaying multimedia content (e.g., audio, video), the VSE offered mobile specific capabilities (e.g., geolocation, orientation), VR/AR content (e.g., displaying 3d models, 360° images) and more complete control over the flow of the story. The evaluation offered useful feedback on usability issues (such as the need to indicate more clearly to users that scrolling of the text on the screen was required to keep up with the audio, so that they would not inadvertently hit next which took them to the next section of the story). The beta release of the 'Ebutius Dilemma' Hunterian onsite experience included improved graphic elements, navigation and overall look and feel of the application. It also included additional section on the facts behind the story offered at the end of the experience. Shading of chapters once read has been included to facilitate more understanding of progress through the experience for users. A sound has also been included to signal to users when they have scanned the NFC tags correctly.

IV. OPERATION & MAINTENANCE

In the exploitation-oriented phase of the project, EXUS in collaboration with the other partners focus on identifying the exploitable results of EMOTIVE and working towards their exploitation and utilization beyond the project's duration. Activities within this phase include comprehensive market research, identification and monitoring of competitive or complementary projects and products and the development of a clear exploitation plan both on an integrated system and on

individual components level. IPR management within the consortium is also tackled during this phase. Additional communication material is being developed for this phase, focusing on the presentation of EMOTIVE results as a commercial product, rather than a research project:

- Maintenance: The stickers placed around the Hunterian gallery hiding the NFC tags that activate parts of the story, were often removed by visitors, so had to be frequently replaced. Mobile devices have to be frequently charged and headphones with splitter cables offered to visitors who wanted to share the mobile devices when going through the experience.
- Both the Ebutius and Verecunda prototypes in their current form require at least one member of staff to monitor and facilitate any questions.

In terms of budget, the printing of the stickers and NFC tags is of relatively low cost. The headphones were purchased in bulk so were also reduced in cost. The VR headsets were provided by the partners for the demos in the gallery but would require to be budgeted if installed permanently in the gallery.

Hunterian Museum, Glasgow, Explorathon2017, Primary 7 class from Castlemilk using "Ebutius's Dilemma", September 2017

Evaluation work underpins all the stages of development of the EMOTIVE experiences and tools and is carried throughout the project: from evaluating the development stages of tools, methodologies and experiences (formative evaluation) to final prototypes (summative evaluation). The evaluation of the experience is based primarily on rich qualitative methods, which include observations, focus groups and interviews, complemented by quantitative survey techniques, to elicit and explore user needs. The evaluation carried out to date resulted in measuring the impact and effectiveness of the user-centred approach and effectiveness of prototypes. The results showed very promising results about the impact of both the tools for Cultural Heritage professionals and the emotive, mixed reality approach for cultural heritage audiences.

CONCLUSIONS

The Hunterian Museum Digital Storytelling about the Antonine Wall provides an example of the combination of different technologies to provide a more emotional approach to cultural heritage off-site experiences. Although it is developed within the framework of an EU-funded research project, the design pipeline, impact results, and especially technological outcomes are a powerful resource for cultural heritage institutions and professionals who aim to bring new perspectives to the enjoyment of cultural heritage by wider audiences.

ACKNOWLEDGEMENTS

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