

D3.9 – Pilot experience(s) based on platform final release

Karolina Badzmierowska¹, Niall O hOisin¹, Klemens Kopetzky¹, Breffni O'Malley¹, Akrivi Katifori², Manos Karvounis², Emmeline Batchelor³, Charlotte Bishop³, Katrina Gargett³, Sierra McKinney³, Kristen O'Connor³, Sara Perry³, Maria Economou⁴, Hilary Young⁴, Emilia Sosnowska⁴, Rozhen Mohammed⁴, Cyril de Mengin Fondragon⁵, Maxime Chambefort⁵, Souheir Mili⁵

Reviewed by:

Maria Roussou (ATHENA), Nikos Chatzinikitas (EXUS)

Abstract

This demonstration deliverable details four EMOTIVE pilot experience prototypes further developed and updated in the third year of the project: the Hunterian Museum onsite experience ('Views on Verecunda's Life: A Digital Window to the Scottish Roman Past'; 'Ebutius's Dilemma' offsite virtual experience; the Çatalhöyük offsite virtual experience; the Çatalhöyük Audio-Enhanced Models, the Çatalhöyük Family and Group Dialogue Experience and the Çatalhöyük Digital Education Kit and the York Minster Visitor-led tours.

Official Submission Date: 31/08/2019

Actual Submission Date: 20/11/2019

Dissemination Level: PU

Partner	Estimated Effort (in PMs)
¹ NOHO	4
² ATHENA	1
³ YORK	5
⁴ UGLA	5
⁵ DIGINEXT	1



TABLE OF CONTENTS

1. Executive Summary.....	5
2. Hunterian experiences.....	6
2.1. ‘Views on Verecunda's Life: A Digital Window to the Scottish Roman Past’ Hunterian Museum Onsite Experience	6
2.1.1. Background.....	6
2.1.2. Experience Description.....	6
2.2. Hunterian offsite virtual experience (‘Ebutius’s Dilemma’)	16
2.2.1. Background.....	16
2.2.2. Experience Updates.....	16
3. Çatalhöyük experiences	18
3.1. Çatalhöyük Virtual Reality	18
3.1.1. Background.....	18
3.1.2. Experience Updates.....	18
3.2. Çatalhöyük Digital Education Kit	25
3.2.1. Background.....	25
3.2.2. Experience Update	26
3.3. Çatalhöyük Family and Group Dialogues with 3D Moulds	28
3.3.1. Background.....	28
3.3.2. Experience Description.....	29
4. Other experiences.....	31
4.1. Çatalhöyük Audio-Enhanced Models.....	31
4.1.1. Background.....	31
4.1.2. Experience Description.....	31
4.2. York Minster Visitor-Led Tours	32
4.2.1. Background.....	32
4.2.2. Experience Description.....	33

List of Abbreviations

AR	Augmented Reality
AW	Antonine Wall
ÇVR	Çatalhöyük Virtual Reality
FPE	Floor Plan Editor
SBE	Storyboard Editor
VR	Virtual Reality
VSE	Visual Scenario Editor

List of Figures

Figure 1. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - Screenshot from the VR Experience - Inside the kitchen.	7
Figure 2. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - Screenshot from the VR Experience - The kitchen window.....	7
Figure 3. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - Screenshot from the VR Experience - Part of the Bar Hill Fort.....	8
Figure 4. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - Screenshot from the VR Experience - View inside the Bar Hill Fort.	8
Figure 5. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ Screenshot from the VR Experience - The Bar Hill Fort.	9
Figure 6. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ -Users with “magic windows” and headsets. (Photo Stuart Campbell, University of Glasgow).....	10
Figure 7. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - Characters in the Verecunda’s experience.	10
Figure 8. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - Training pages. (Photo University of Glasgow Photographic Unit).....	11
Figure 9. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’- Mobile experience Introduction.	11
Figure 10. 10a. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’- Object location and 10b. – 10c. framing to show the AR effect. (Photo Stuart Campbell, University of Glasgow).....	12
Figure 11. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’- Narration related to the object.	12
Figure 12. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - AR effects related to different objects (12a. when the marker shown is framed through the magic window, the 3D model of the ring with the intaglio appears; 12b. original colours of slab shown) (Photos Stuart Campbell, University of Glasgow).....	13
Figure 13. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - AR effects related to different objects (13a. face of engraved figure appearing; 13b. dagger shown of only the hilt that is on display). (Photos Stuart Campbell, University of Glasgow)	13
Figure 14. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - AR effects related to different objects (14a. Captions and translation of slab appearing; 14b. Animation of pot on display breaking into pieces). (Photos Stuart Campbell, University of Glasgow).....	14
Figure 15. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - AR effects related to different objects (14a. Video of how the shoes on display were constructed; 14b. Animation of the pieces of the board game moving). (Photo Stuart Campbell, University of Glasgow)	14
Figure 16. ‘Views on Verecunda’s Life: A Digital Window to the Scottish Roman Past’ - End of character-driven exploration reinforced by idea of magic window losing power.....	15
Figure 17. Structure of Part 3 of the Verecunda experience.	15
Figure 18. ‘Ebutius’s Dilemma offsite virtual experience - Updated interface of the 360-panorama view.....	17
Figure 19. ÇVR - Screenshot from the tutorial room in Scene 1.	19
Figure 20. ÇVR - Users introducing themselves for the first time in Scene 1.	19
Figure 21. ÇVR - Screenshot from the experimental replica house IBR rendering in Scene 2.....	20
Figure 22. ÇVR - Screenshot of users personalising their avatars with masks and colours.....	20
Figure 23. ÇVR - Screenshot of a user selecting a figurine.	21
Figure 24. ÇVR - Screenshot from the hunting shrine replica house IBR rendering in Scene 3.....	21
Figure 25. ÇVR - Users plastering the damaged wall together.	22

Figure 26. ÇVR - Users applying stamps to the wall.....	22
Figure 27. ÇVR - Screenshot from the vulture shrine replica house IBR rendering in Scene 4.....	23
Figure 28. ÇVR -Users uncovering the burial platform pieces.	23
Figure 29. ÇVR -Users leaving behind grave offerings.	24
Figure 30. ÇVR - Screenshot of the excavation site IBR rendering showing wall stamps in Scene 5....	24
Figure 31. ÇVR - Screenshot of users discussing their impact on the archaeological record.	25
Figure 32. Examples of personalised 3D printed objects (Photo Sierra McKinney).	26
Figure 33. The chatbot included in the final stage of the kit, named Bo, acts as a facilitator in a group dialogue between multiple users (Photo Sierra McKinney. Credit to Grant Cox, Artas Media, for the 3D model of a Çatalhöyük home).	26
Figure 34. The Kit has is currently featured on the University of York’s Archaeology Department website (Photo Sierra McKinney).	27
Figure 35. The Exploration of Egalitarianism Manual includes step-by-step instructions and helpful tips for its application, including suggested approaches to challenging preconceptions (Photo Sierra McKinney).	27
Figure 36. EMOTIVE’s How To Guide for Dialogic Chatbots - a step-by-step manual for conceiving of and building your own bots using the third-party Snatchbot programme.....	28
Figure 37. Çatalhöyük Family and Group Dialogue Experience - Going clockwise from the top left: human figurine metamold, hand stamp, leopard stamp, horse figurine (Photo Charlotte Bishop). ...	29
Figure 38. Çatalhöyük Family and Group Dialogue Experience - Example of a clay Hand Stamp being made, using polymer modelling clay and a Metamold (Photo Charlotte Bishop).....	30
Figure 39. Çatalhöyük Audio-Enhanced Model - Overview of components of EMOTIVE’s audio-enhanced model use case.....	31
Figure 40. Çatalhöyük Audio-Enhanced Model-Screenshot of a section of Building 77, as navigated on the computer during the second and third parts of the audio-enhanced models experience.	32
Figure 41. York Minster Visitor-Led Tours- Screenshot of the Minster’s themes and structure in the Storyboard Editor.....	33
Figure 42. York Minster Visitor-Led Tours- A sequence of screenshots of the storytelling experience on the EMOTIVE app.....	34
Figure 43. York Minster Visitor-Led Tours - Screenshots of the Minster windows used as inspiration for storytelling.....	35

1. Executive Summary

This demonstration deliverable details the four main EMOTIVE pilot experience prototypes further developed and updated in the third year of the project, reaching their final version: the Hunterian Museum mixed reality storytelling experience ('Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' and 'Ebutius Dilemma'); the Çatalhöyük Digital Education Kit, the Çatalhöyük Virtual Reality Experience and the Çatalhöyük Family and Group Dialogues with 3D Moulds

'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' is a multi-part experience which combines immersive VR and AR features to contextualise the objects on display. It integrates social interaction, designed for four concurrent users who are encouraged by a facilitator to work together to critically examine the past.

The **Exploration of Egalitarianism Digital Education Kit** expands the on-site experience for Çatalhöyük for off-site use by students, aged 11-14. The Kit modifies the existing pre-visit and on-site elements and introduces a dialogue-facilitating chatbot to explore the application of historical empathy to a pre-historic site.

The **Çatalhöyük VR experience** aims to provide an interactive, multi-user encounter within a virtual reality (VR) reconstruction of portions of the Neolithic site of Çatalhöyük.

The **Çatalhöyük Family and Group Dialogue Dialogues with 3D Moulds** explores the relationship between dialogue, the making of one's own artefact and the understanding of intangible human values. These short sessions for families and groups focus on making replicas of ancient material objects from Çatalhöyük and, through such tactile work, sparking critical conversation about the relationship between past artefacts and present-day values.

The final release of the offsite virtual **'Ebutius's Dilemma'** used as a basis the same interactive, character-driven experience of the onsite **'Ebutius's Dilemma'** experience (D3.8), but converted the physical environment of the Hunterian Antonine Wall gallery to a 360° digital one, so that the experience could be used online by users not physically present at the exhibition, who can interact with the digital representations of both the space and the objects.

Apart from these four experiences that were our main focus in EMOTIVE, we have proceeded with the development or update of additional experiences that helped us to build and feed into the four main ones, Çatalhöyük Audio-Enhanced Models and the York Minster Visitor-led tours.

The **Çatalhöyük Audio-Enhanced Models** aim to integrate simple compilations of sounds into reality-based 3D models of archaeological sites to incite curiosity about the past in wide public audiences. The prototype uses panoramic images of Building 77 from the site of Çatalhöyük and applies concepts from auditory archaeology, sound use in heritage sites, and the arc of dialogue.

York Minster Visitor-led tours combines collaborative storytelling to discover the Minster's past and its stories, a group-based activity, and a session of facilitated dialogue on a related contemporary issue, all under an umbrella "theme" related to the York Minster.

2. Hunterian experiences

2.1. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' Hunterian Museum Onsite Experience

2.1.1. Background

The Verecunda EMOTIVE experience is a multi-part, facilitator-led in gallery experience created for four concurrent users. It focuses on the story of a local Caledonian 15-year-old slave girl, Verecunda, who worked at the Roman commander's house in Bar Hill fort, one of the Antonine Wall sites. It aims to encourage reflection about the past, particularly in Roman Scotland, challenge stereotypes about life in the Frontiers of the Roman Empire, and link with users' life today through exploring the issue of identity (in the past and today).

2.1.2. Experience Description

Part 1 - Facilitated Introduction

At the start of the experience, the Facilitator welcomes the users and briefly explains what the experience will be about. Users then learn something about each other and the Antonine Wall (AW), are introduced to the character of Verecunda as a physically absent member of the group, and are shown her gravestone on display at the Hunterian Museum (the only piece of material evidence which survives today that can be clearly identified as belonging to her). This part of the experience was informed by the EMOTIVE York Minster visitor-led tours (see 4.1 in this deliverable).

Part 2 - VR videoscape

Users then experience the VR part (using Oculus Go headsets) which introduces Verecunda's life in Bar Hill fort. First, this is in the kitchen where she works (Figure 1) with the users only listening to her voice-over indicating that she is upset and needs to leave. Then, the camera view of the video moves through the kitchen's window (Figure 2), which is based on the real window on display at the exhibition and links with the title of the story, to take the user to a flyover of Bar Hill fort (Figure 3, Figure 4, Figure 5). During this, they see the buildings, the Antonine Wall, and the surrounding area, as well as get glimpses of various characters. They can hear some of these briefly refer to Verecunda and the fact that she was upset and has disappeared.



Figure 1. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Screenshot from the VR Experience - Inside the kitchen.



Figure 2. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Screenshot from the VR Experience - The kitchen window.



Figure 3. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Screenshot from the VR Experience - Part of the Bar Hill Fort.

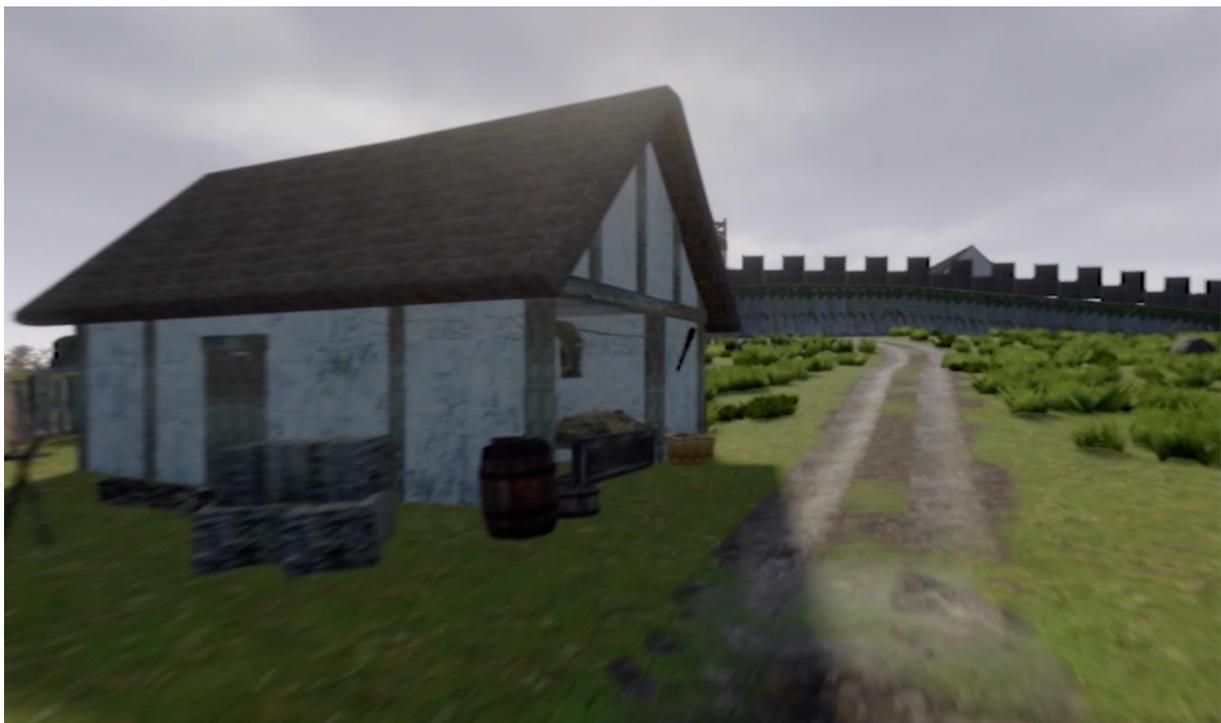


Figure 4. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Screenshot from the VR Experience - View inside the Bar Hill Fort.



Figure 5. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' Screenshot from the VR Experience - The Bar Hill Fort.

Part 3 - Character led object exploration of the Antonine Wall display

After the VR videoscape, users remove the Oculus Go headsets and are given a “magic window” and headset each (Figure 6), with the facilitator explaining that they need to look after this magic device as it is old and fragile. The “magic window” is a Samsung smartphone encased in a 3D-printed version of the real window on display, strengthening the metaphor that through this they can get glimpses of the past and see different views of the objects (supported by the narratives and the AR effects which bring them to life). Users are encouraged to use their magic windows to guide them as they move on through the AW display to do a character-driven exploration of the related objects that show different aspects of life along the AW.



Figure 6. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' -Users with "magic windows" and headsets. (Photo Stuart Campbell, University of Glasgow)

On each magic window a different character's ID is presented, so each of the four users gets a different character. Each user is encouraged one after the other to read aloud to the group the character profile they have been given. The characters are people who are all somehow related to Verecunda, her friends, acquaintances or family, highlighting different influences to what shaped her identity (Figure 7). These are Menna, an African cook and fellow slave (work), Corotica, a Caledonian farmer and friend of Verecunda (heritage), Julia, the daughter of the Roman commander and friend of Verecunda (friendship), and Lossio, a Caledonian metal worker and Verecunda's father (family).

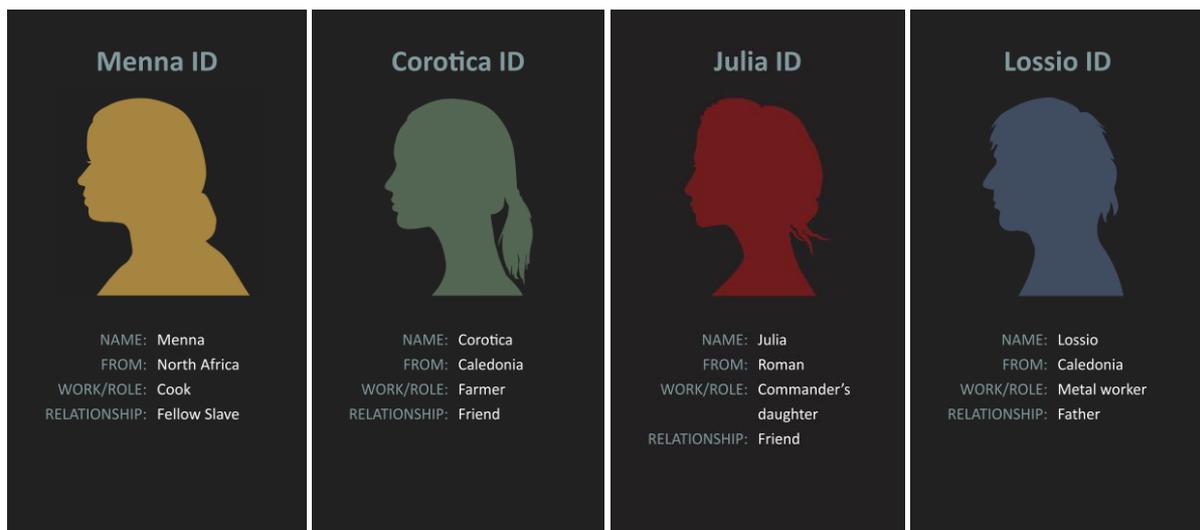


Figure 7. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Characters in the Verecunda's experience.

Users then press next on their magic windows to access training pages to practice how to locate on the floorplan of the Antonine Wall gallery on their screens the object on display related to their story (Figure 8).



Figure 8. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Training pages. (Photo University of Glasgow Photographic Unit)

Once the users have practiced using their “magic window” they then start their experience by listening to their character’s introduction (Figure 9).

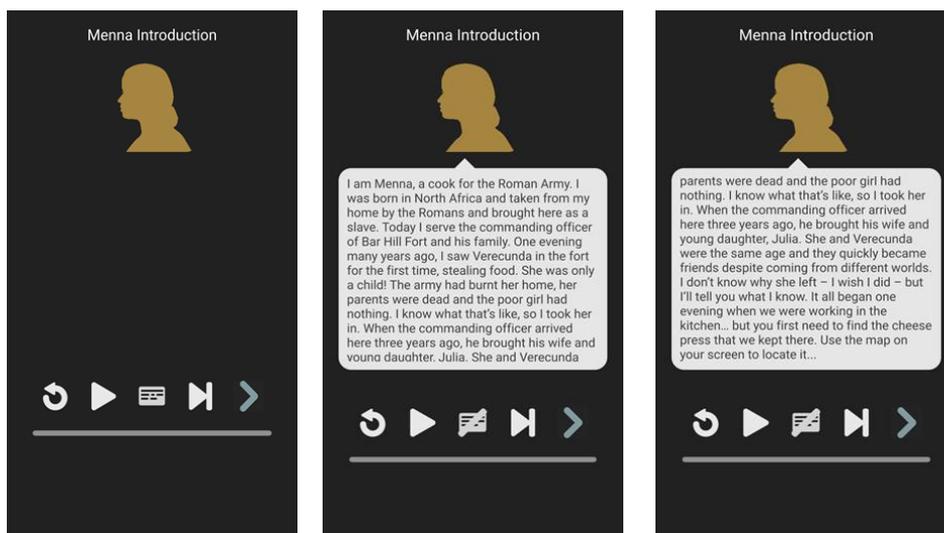


Figure 9. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past'- Mobile experience Introduction.

Through all audio segments/narratives, users are encouraged to listen to the story but are also given the option to also toggle the transcript button on or off if they wish to read the text. In this first audio segment, each character explains how they know Verecunda. Each character then instructs the user to locate the first object in the Antonine Wall display using the floorplan related to the character’s story (Figure 10a). After that, they are asked to frame through their magic window the related sticker/marker with the silhouette of their character (Figure 12a) located near the object, so they can see the related AR effect (Figure 10b-c).



Figure 10. 10a. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Object location and 10b. – 10c. framing to show the AR effect. (Photo Stuart Campbell, University of Glasgow)

Then, they get the audio narration segment related to that object (Figure 11).

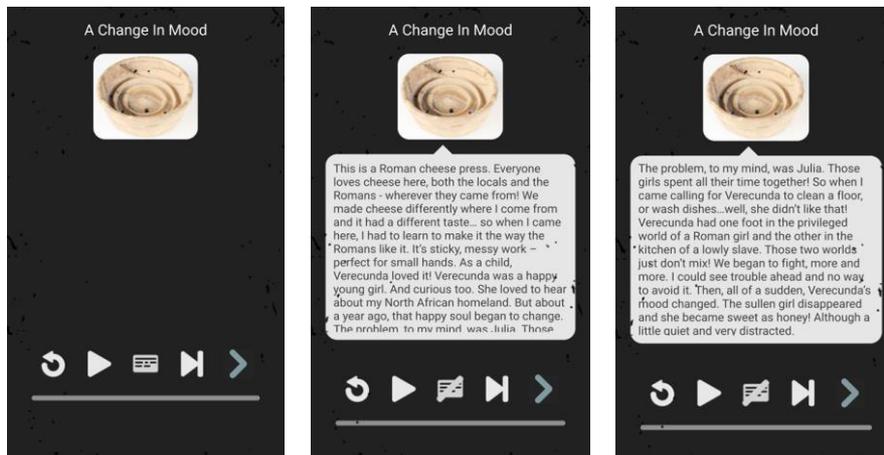


Figure 11. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - Narration related to the object.

Each character engages the user with three objects on display for each of which there is a different AR effect (Figure 6 showing how the tile with the paw print on display was part of a hypocaust, and Figure 12-Figure 15).

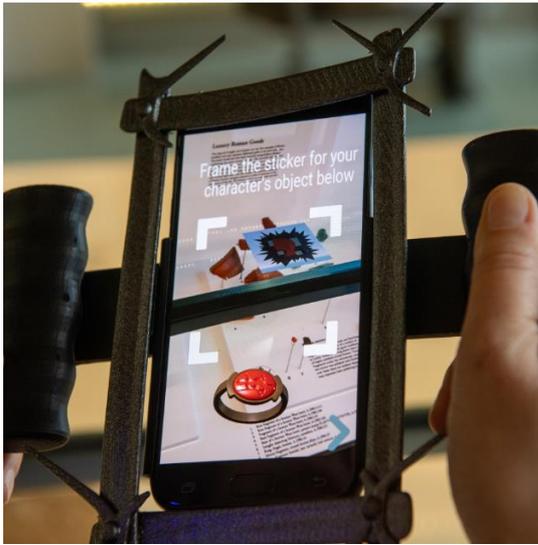


Figure 12. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - AR effects related to different objects (12a. when the marker shown is framed through the magic window, the 3D model of the ring with the intaglio appears; 12b. original colours of slab shown) (Photos Stuart Campbell, University of Glasgow)



Figure 13. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - AR effects related to different objects (13a. face of engraved figure appearing; 13b. dagger shown of only the hilt that is on display). (Photos Stuart Campbell, University of Glasgow)



Figure 14. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - AR effects related to different objects (14a. Captions and translation of slab appearing; 14b. Animation of pot on display breaking into pieces). (Photos Stuart Campbell, University of Glasgow)

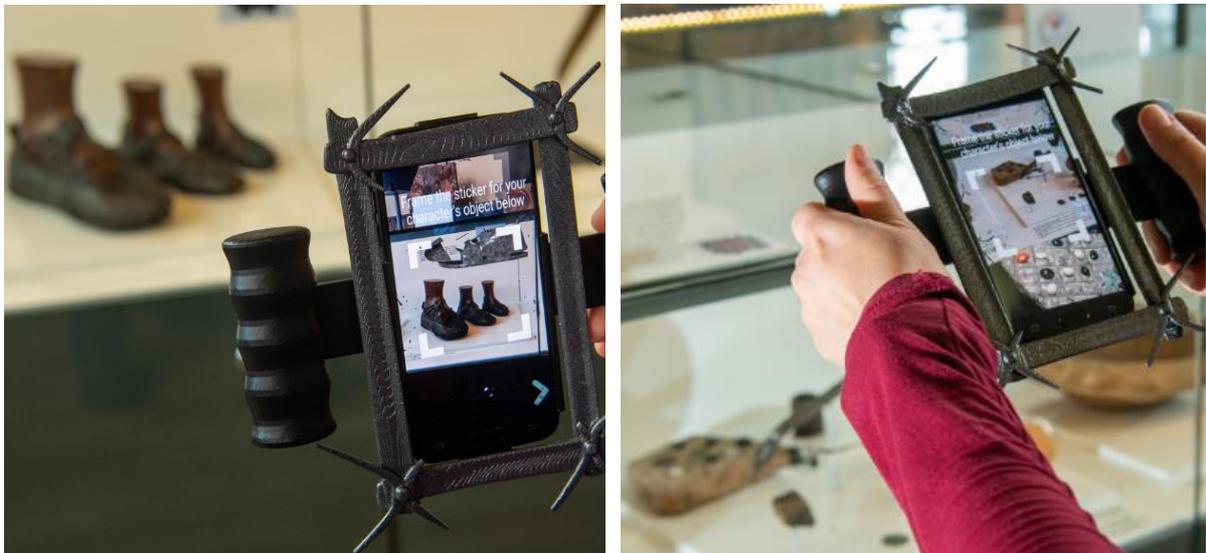


Figure 15. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - AR effects related to different objects (14a. Video of how the shoes on display were constructed; 14b. Animation of the pieces of the board game moving). (Photo Stuart Campbell, University of Glasgow)

As the users progress through the experience guided by their character, the screen of their magic window progressively cracks and there is also a related audio effect of cracking glass. At the end of this part of the experience, the message to return their window where they started appears, as their window is losing its magic power (Figure 16, Figure 17).



Figure 16. 'Views on Verecunda's Life: A Digital Window to the Scottish Roman Past' - End of character-driven exploration reinforced by idea of magic window losing power.

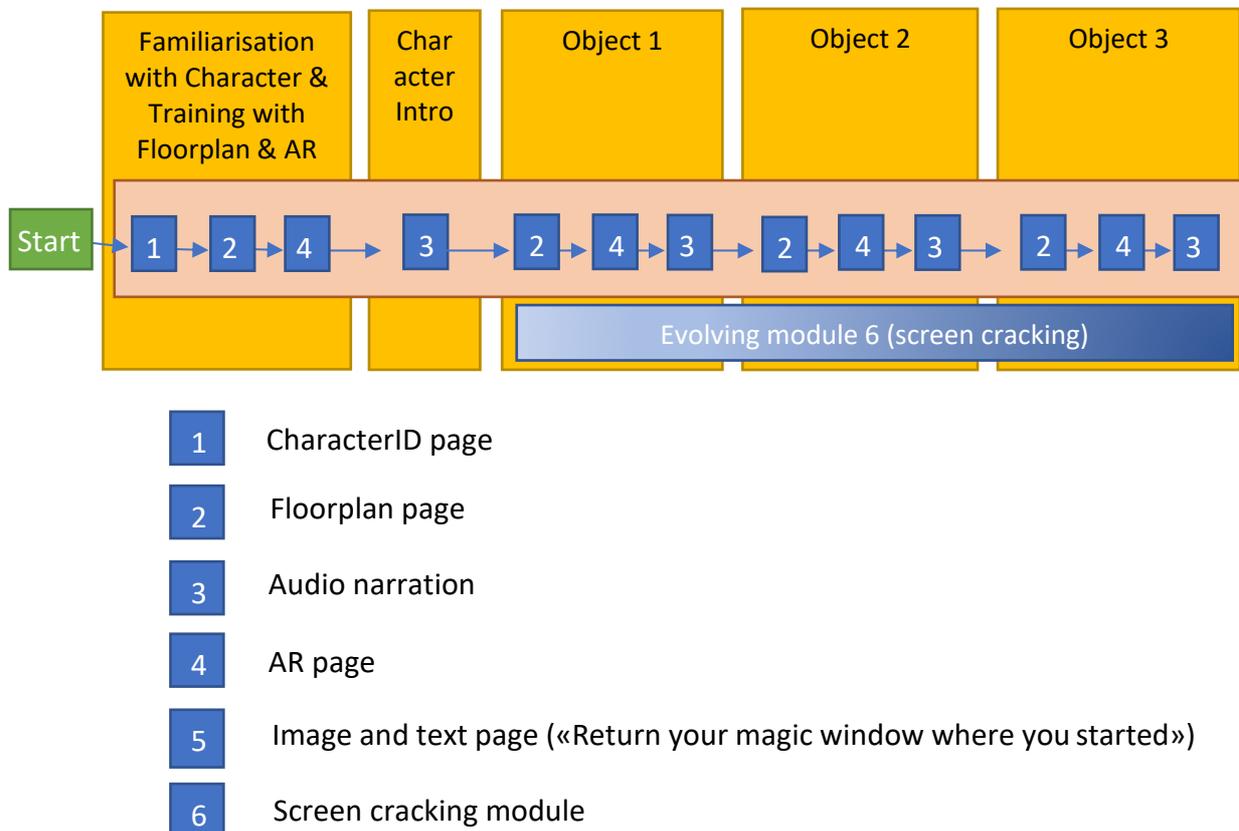


Figure 17. Structure of Part 3 of the Verecunda experience.

Part 4 - Discussion and reflection

In the final part of the Verecunda experience, the users share what they have discovered about Verecunda and discuss what shaped her identity. They are encouraged to reflect on how we can never know the whole truth about her life but also to consider how thinking about her life and identity is connected with issues of identity today.

The following partners were involved in the development of the Verecunda experience:



- University of Glasgow - providing the conceptual framework, background historical and archaeological research, user experience design (scriptwriting, interaction design, and other design elements), and evaluations
- Noho – scriptwriting of early versions of the experience and contribution to the conceptual framework, 2D graphics, design of the 3D videoscape and AR effects
- DXT - providing an updated version of the Visual Scenario Editor (VSE) for Part 3 of the experience, guiding the UGLA team on its use for authoring the stories, integrating the AR effects using ARCore and positioning of the markers
- ATHENA and YORK teams – feedback on the scripts of the experience and overall approach

2.2. Hunterian offsite virtual experience ('Ebutius's Dilemma')

2.2.1. Background

As was described in D3.8 (section 2.2), the 'Ebutius's Dilemma' offsite virtual experience derived from the related onsite experience (described in its beta release in D3.8, section 2.1 and its previous version in D3.7), an interactive, character-driven experience designed for the Hunterian Museum's Antonine Wall display. This offsite virtual experience recreates the museum space with a 360° panorama designed using the Floor Plan Editor and the Web Experiencing System.

Offsite virtual Ebutius has retained the story-based approach which allows remote users to choose their own path through the experience while they navigate their way through the virtual, online representation of the display to locate objects pertinent to the story. The experience allows both a) remote users from around the world to access the story and get a feel of visiting the gallery virtually, as well as b) visitors who have used the on-site version of 'Ebutius's Dilemma' to access this virtual one after they have left the museum, or to use it in preparation for their visit, making it a powerful visitor engagement and learning tool.

The experience was updated through collaboration between the following EMOTIVE partners:

- the University of Glasgow team carried most of the evaluations and gave feedback about what needed to be updated;
- the ATHENA team who carried also some evaluations and implemented the updates decided with the Floorplan Editor, as well as led the experiments with the Web of Knowledge.

The initial concept of 'Ebutius's Dilemma' was designed by the University of Glasgow and Noho teams in collaboration with the ATHENA team for the use of the storyboard editor for the alpha release, as well as the transfer to the Storyboard editor in its Beta release.

2.2.2. Experience Updates

Small changes to the interface were made following the summative evaluation in November 2018 and Summer 2019 (Figure 18):

- An introductory training section for the user was added explaining what the main components of the experience visible on their screen were and how to navigate around the screen between the windows.
- The inclusion of new image viewpoints (i) on objects indicate information about the object is available within the 360-panorama view.
- A different design (sunburst) was used to indicate which viewing point the user had selected within the floorplan window to navigate through the virtual museum window.

- A filter was applied to the sunburst to indicate which direction the user is facing as they moved within the virtual museum window.

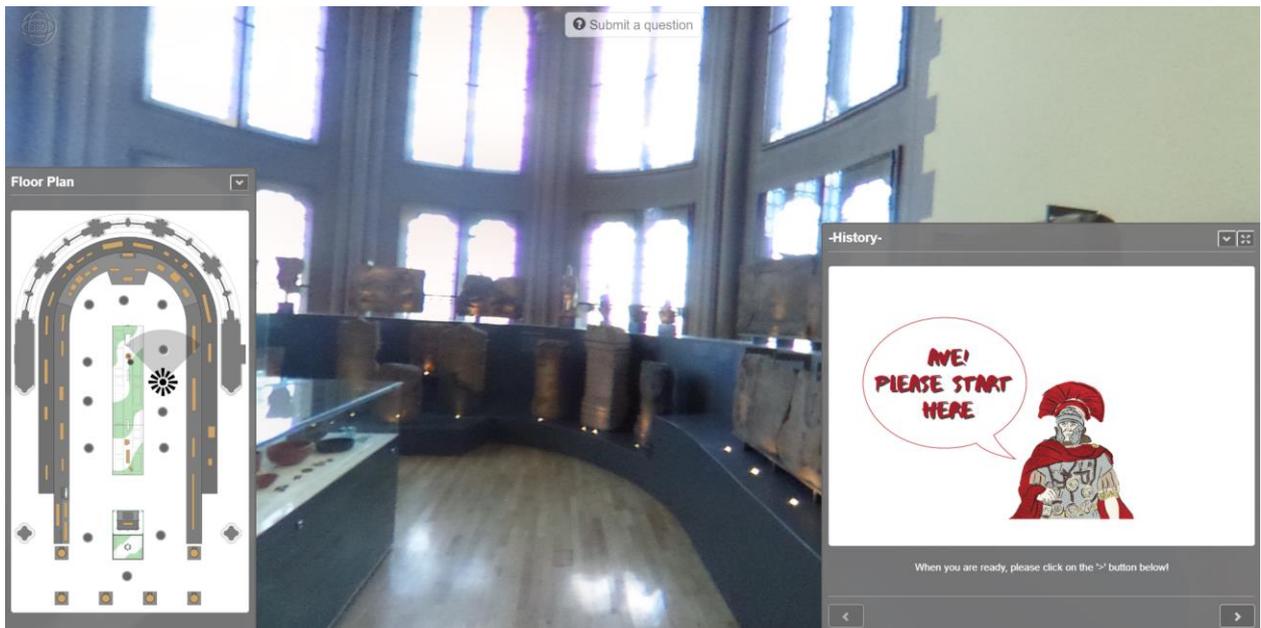


Figure 18. 'Ebutius's Dilemma' offsite virtual experience - Updated interface of the 360-panorama view.

Additionally, we experimented with the application of Web of Knowledge features in this experience. The related experiment is reported in D5.4.

3. Çatalhöyük experiences

3.1. Çatalhöyük Virtual Reality

3.1.1. Background

The Çatalhöyük Virtual Reality (ÇVR) experience explores portions of the UNESCO Neolithic site of Çatalhöyük. This experience pushes the limits of common heritage VR models by demanding multi-user interaction (as opposed to typical single-user exploration), and also by prioritizing social and emotional engagement over educational aims. Traditional virtual models view users as open receptacles ready to receive dry, factual data. In ÇVR, users are understood as social and emotional beings who engage with information in dynamic ways. This experience uses value-oriented critical questions to encourage users to think more meaningfully about how their lives connect to the past people of Çatalhöyük. ÇVR has shown the ability of VR more generally to serve as a medium through which users broach deep and complex social questions, as well as hold thoughtful discussions about their broader impacts on the world today.

The following partners are involved in ÇVR's development:

- University of York - providing a conceptual framework, user experience design (scriptwriting, interaction design, and other design elements), and evaluations
- INRIA - providing photographic site capture via camera and drone, Image-Based Rendering (IBR) technology, assisting with Unity programming of interactive features, and assisting with evaluations
- ATHENA - providing Unity programming of the interactive features and assisting with the experience design and evaluations
- Noho - providing 3D graphic designs (avatars, masks, and other in-game objects), and some Unity programming

3.1.2. Experience Updates

In previous deliverables (D3.7, 3.8), we report on the development of this experience. In its current and final form, the experience contains five scenes and incorporates elements of the Çatalhöyük onsite experience (see D3.7) and the digital education kit (see below and D3.8). The narrative-driven focus and emotional engagement is continued from earlier versions (see D3.8). Image-Based Rendering has been used to develop a static environment in which users can explore virtual reconstructions of three replica houses and the excavation area on-site today at Çatalhöyük. A task-driven narrative has been developed over nearly ten user evaluation workshops (with both EMOTIVE team members and the wider public), conducted at various partner sites. A multitude of in-game elements have been designed and implemented to allow user interaction with the environment, as well as with one another.

Users begin the experience in a tailor-made tutorial room (Figure 19), where they introduce themselves to one another (Figure 20). Instructions then guide users through the controls necessary for interacting in the virtual environment, including navigation, picking up in-game objects, and a 'high five' mechanism, which is how users progress through the script.



Figure 19. ÇVR - Screenshot from the tutorial room in Scene 1.

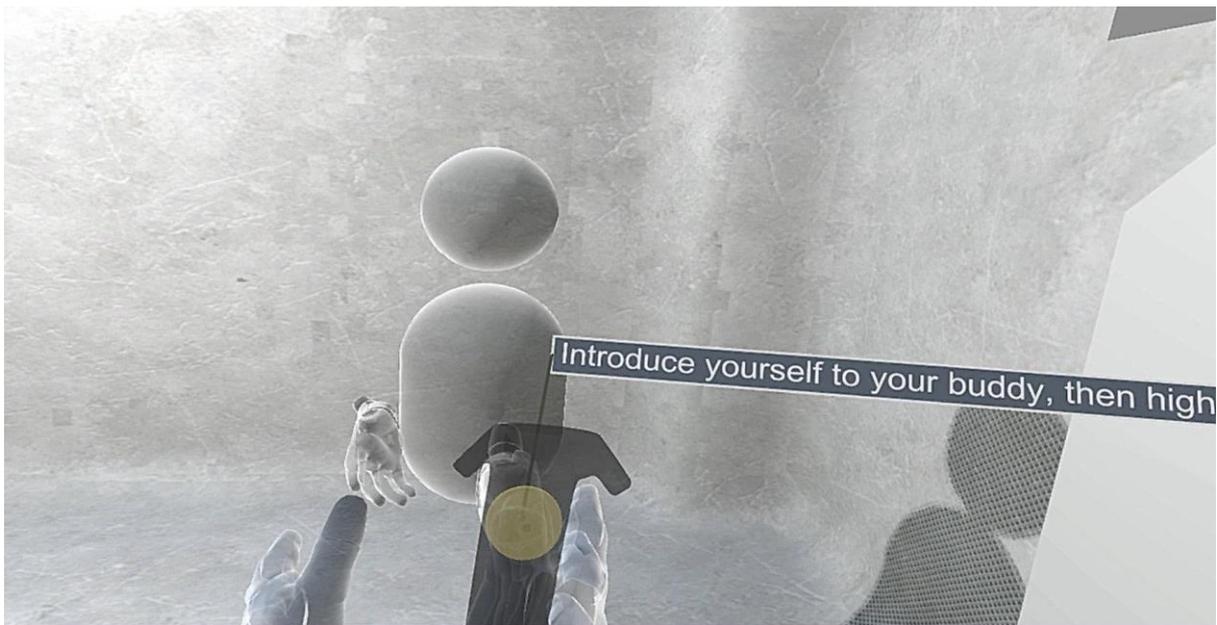


Figure 20. ÇVR - Users introducing themselves for the first time in Scene 1.

In Scene 2, users enter the experimental replica house (Figure 21), where they are each able to customize their avatar in front of a mirror (Figure 22) and select an artefact to carry with them throughout the experience (Figure 23). This scene encourages users to build attachment to their avatar embodiment and to one another, furthering investment and engagement in future scenes.



Figure 21. ÇVR - Screenshot from the experimental replica house IBR rendering in Scene 2.



Figure 22. ÇVR - Screenshot of users personalising their avatars with masks and colours.



Figure 23. ÇVR - Screenshot of a user selecting a figurine.

In Scene 3, users are taken to the hunting shrine replica house (Figure 24) and asked to identify parts of the mural which represent either the mask or artefact they have chosen. It is explained that these murals represent more than just art, indicating community identities. After sharing their findings with one another, users are then instructed to identify a portion of the wall which appears damaged and to mend it with plaster (Figure 25). Once finished, they can then dip their stamp artefacts into bowls of red ochre and leave its pattern imprinted on the wall (Figure 26), signifying a contribution of their identity to the murals of the room.



Figure 24. ÇVR - Screenshot from the hunting shrine replica house IBR rendering in Scene 3.

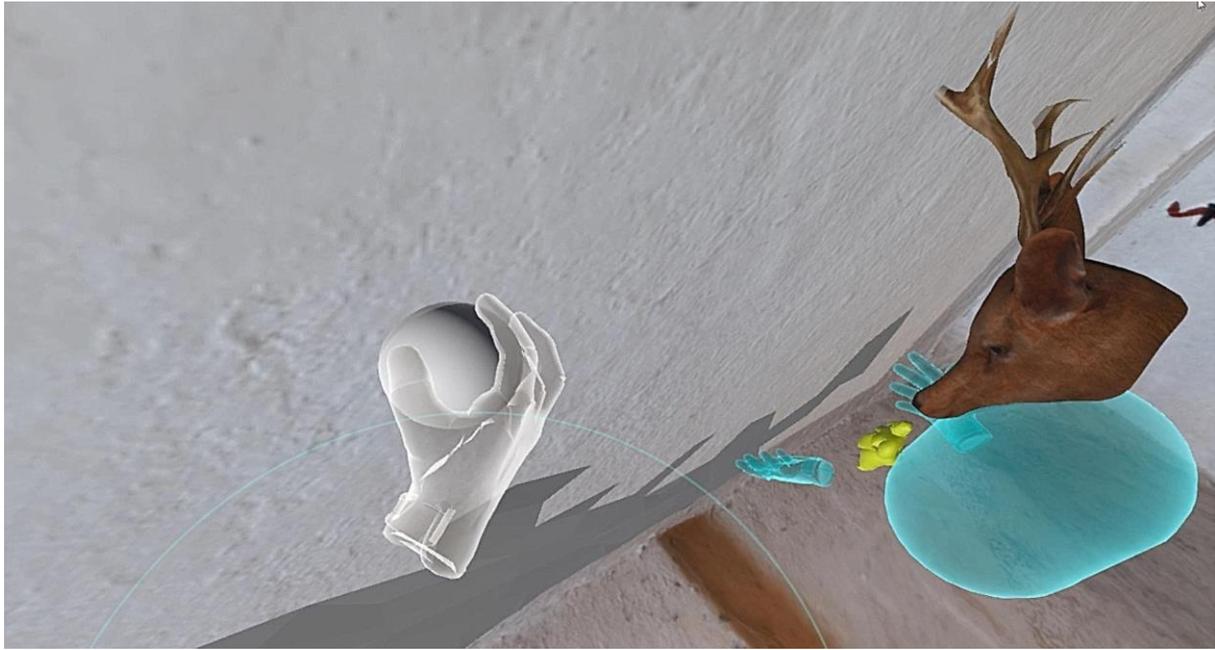


Figure 25. ÇVR - Users plastering the damaged wall together.



Figure 26. ÇVR - Users applying stamps to the wall.

In Scene 4, users enter the vulture shrine replica house (Figure 27) where they explore concepts of death and burial prevalent at Çatalhöyük. The significance of platforms at this site is highlighted, discussing its connection to burial and community. Together, users uncover the puzzle pieces of the platform (Figure 28), then are encouraged to leave behind a grave offering (Figure 29). This scene ends as the house dissolves around them, revealing the excavation site.



Figure 27. ÇVR - Screenshot from the vulture shrine replica house IBR rendering in Scene 4.

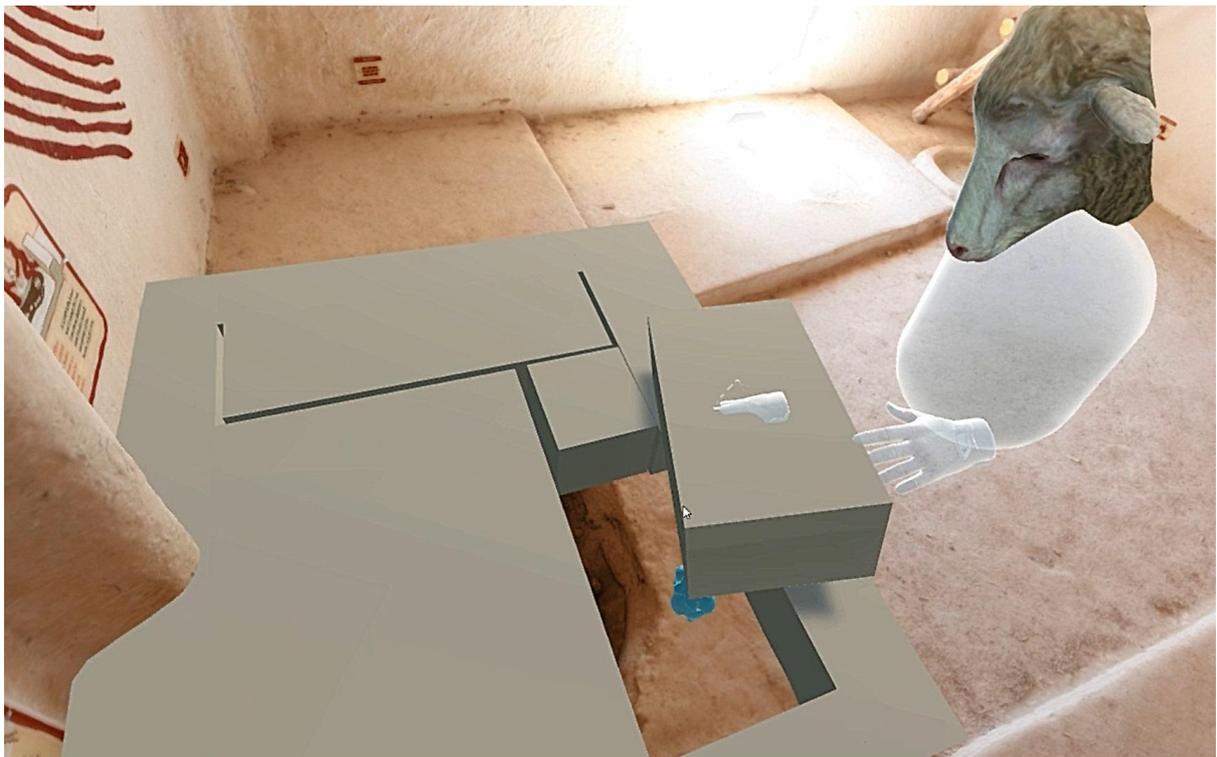


Figure 28. ÇVR -Users uncovering the burial platform pieces.



Figure 29. ÇVR -Users leaving behind grave offerings.

Scene 5 reveals to users that their actions have left an impact on the archaeological record (Figure 30). Their wall stamps and grave offerings from previous scenes are visible. As users locate these places of impact together, they are also asked to think about bigger social questions which relate to their lives today (Figure 31).



Figure 30. ÇVR - Screenshot of the excavation site IBR rendering showing wall stamps in Scene 5.



Figure 31. ÇVR - Screenshot of users discussing their impact on the archaeological record.

3.2. Çatalhöyük Digital Education Kit

3.2.1. Background

The *Exploration of Egalitarianism Digital Education Kit* explores the Stone Age site of Çatalhöyük and its egalitarian society. The Kit expands the Çatalhöyük collaborative on-site experience (reported in D3.7) and introduces a dialogue-facilitating chatbot to explore the application of historical empathy to a pre-historic site. Historical empathy is both a cognitive and affective endeavour in which the development of historical contextualisation, perspective taking, and affective connection are combined by students in practice “to better understand and contextualize [historical peoples’] lived experiences, decisions, or actions” (Endacott and Brooks 2013, 41). This Kit is designed for young people aged 11-14, but it was successfully trialled with children (8 and up) as well as adults.

The Kit consists of three components; Welcome to Çatalhöyük, an Egalitarian Trading Experience, and a Discussion with Bo the Chatbot. In the first section, Welcome to Çatalhöyük, the children take a personality quiz to find their role in the Neolithic society of Çatalhöyük. This quiz provides each child with a Neolithic identity and a selection of four artefacts. Students choose and personalise a 3D printed version of one of the artefacts (Figure 32), which they use in subsequent elements of the experience.

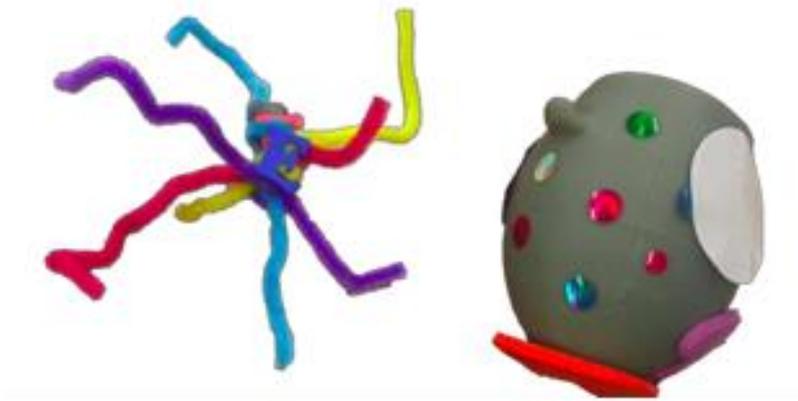


Figure 32. Examples of personalised 3D printed objects (Photo Sierra McKinney).

In the second component of the Kit, the children are guided through a series of four virtual houses. In each house the participants are tasked with exchanging their personalised objects, as they learn more about Çatalhöyük's archaeology and culture. The third and final component of the Kit is a dialogic chatbot, an innovative digital tool designed to facilitate conversation between multiple users (Figure 33). Groups of five to eight participants are prompted by the bot to discuss a series of questions related to the topic of egalitarianism and Çatalhöyük.

A Discussion with Bo

The last part of this experience is a conversation with our chatbot, Bo. A chatbot is a computer program that is created to talk to people over the internet. In fact, the term chatbot is a combination of the words "chatter" and "robot"! We programmed our chatbot to lead a group discussion about egalitarianism. To start your discussion, just hit the small button in the bottom right hand corner of the screen.

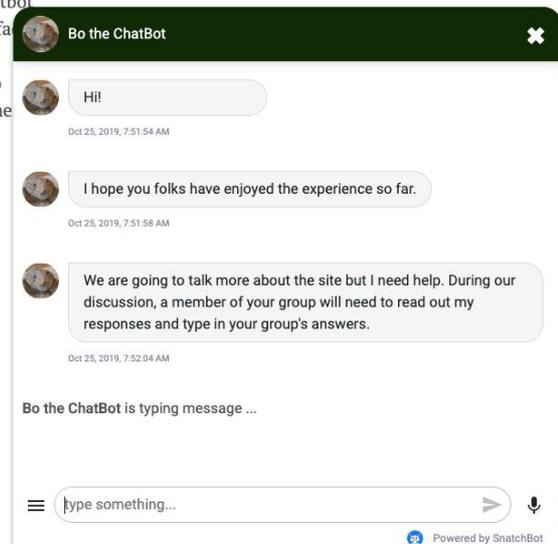


Figure 33. The chatbot included in the final stage of the kit, named Bo, acts as a facilitator in a group dialogue between multiple users (Photo Sierra McKinney. Credit to Grant Cox, Artas Media, for the 3D model of a Çatalhöyük home).

3.2.2. Experience Update

After completing a series of evaluations, the Kit was finalized and made publicly accessible on a purpose-built website. It can currently be found linked through the EMOTIVE website and on an educational resources webpage compiled by the University of York's Archaeology Department (Figure 34).

Secondary education

[Exploring egalitarianism using prehistory: a digital classroom kit](#)



Using an interactive personality quiz, a virtual tour of reconstructed houses and a ChatBot, students learn what egalitarianism is and how it is reflected in the archaeology of the UNESCO Stone Age site of Çatalhöyük. [See more](#).

[Making Stone Age cheese](#)



These resources use the context of feasting at Stonehenge to consider aspects of food processing, food allergies and intolerance, with activities including making cottage cheese. [See more](#).

Figure 34. The Kit has is currently featured on the University of York's Archaeology Department website (Photo Sierra McKinney).

Included on the Kit's website is a downloadable document providing detailed instructions for the Kit's use as well as access to all of the digital content required to participate in the experience (Figure 35).

 **EMOTIVE**
Storytelling for cultural heritage

www.emotiveproject.eu

Common Discussion Topics

During our trials and applications of the Kit, certain lines of discussion tend to emerge. Below we suggest comments or additional questions for leaders to use to prompt evaluation of these presumptions.

- 1. Lazy people will take advantage of the system.**
 - Why do you think that?
 - Should a few people taking advantage mean that no one should receive support?
 - Because someone from an egalitarian system knew they would have access to the resources they needed, what do you think their concerns would be about others taking advantage? Would they have any? In that situation, would you still be concerned?
- 2. In an egalitarian system no one could be famous or the best at anything.**
 - Why makes you think that?
 - Just because people are egalitarian doesn't mean that some people won't be better at certain things than others. How do you think people would define success in a society where everything is shared?

Figure 35. The Exploration of Egalitarianism Manual includes step-by-step instructions and helpful tips for its application, including suggested approaches to challenging preconceptions (Photo Sierra McKinney).

In addition, to promoting the Kit as practical teaching tool we have expanded our efforts to include the development of a How-to-Guide (Figure 36), to enable heritage practitioners to create similar experiences. The Guide focuses on the creation of dialogic and affective chatbots, similar to the bot used in the third stage of the Kit. The guide introduces readers to key methodological concepts including historical empathy, digitally-facilitated discussion, and the Arc of Dialogue and provides clear examples of their practical application. This includes an explanation of the three EMOTIVE models for an affective Chatbot; the Figure 8 Model (based on EMOTIVE’s Chatbot of Conviction), the Funnel Model, and the Nesting Doll Model (based on the bot included the Kit). Templates of these models are publicly available to serve as examples and starting points for new bots. Finally, a technical step-by-step guide is included to help guide users through the bot creation process.

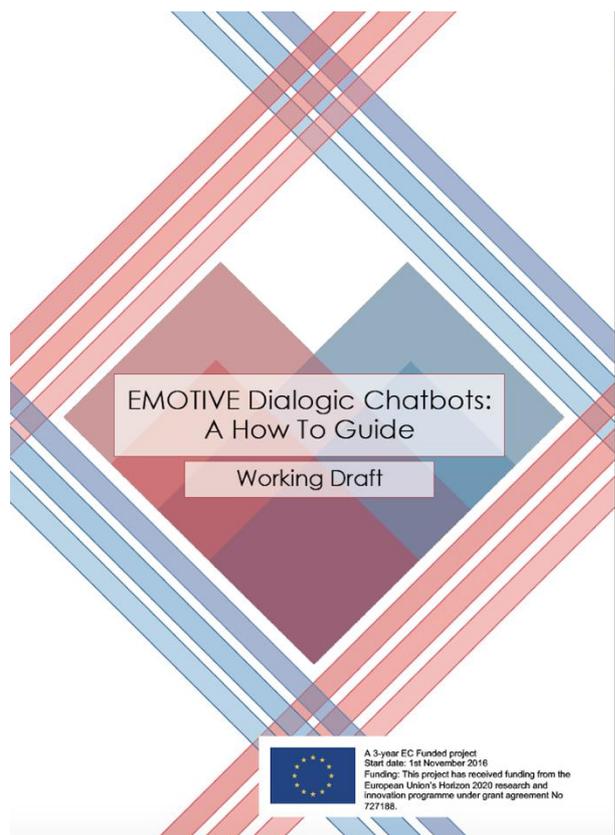


Table of Contents	
	Page
How to Guide	
Introduction	3
Topic Overviews	
Chatbots.....	4
Historical Empathy	5
Dialogue	6
EMOTIVE Affective and Dialogic Bots.....	7
Facilitated Dialogue: A Basic Framework	
Phase 1: Community Building.....	8
Phase 1: A Chatbot Example.....	9
Phase 2: Developing Personal Connections.....	10
Phase 3: Exploring Alternative Perspectives.....	11
Phase 4: Synthesis and Summary.....	12
Mapping out Content	
The Nesting Doll Model.....	13
The Funnel Model.....	14
The Figure 8 Model.....	15
Digital Dialogue.....	16
Doing Work in a "Good Way": Ethical Considerations....	17
Activities, Ideas and Suggestions.....	18
Technical Guide	19
Building a Bot	
Introduction.....	20
Orientation.....	21
Create a Bot.....	22
Creating Interactions	
Orientation	23
Basic Bot Building Blocks.....	24
The Building Menu.....	25
Adding Text.....	26
Making Connections.....	27-28
Quick Reply Buttons.....	29
Fallback Statements.....	30
Adding Variation	
Images.....	31
Galleries.....	32
In-Text Media.....	33
Recalling Previous Responses.....	34
Settings: The Configure Page.....	35
Publishing.....	36
Appendices	38-42

Working Draft

Figure 36. EMOTIVE’s How To Guide for Dialogic Chatbots - a step-by-step manual for conceiving of and building your own bots using the third-party Snatchbot programme.

3.3. Çatalhöyük Family and Group Dialogues with 3D Moulds

3.3.1. Background

EMOTIVE’s Çatalhöyük Family and Group Dialogue Experience explores the relationship between dialogue, the making of one’s own artefact and the understanding of intangible human values. These short sessions for families and groups focus on making replicas of ancient material objects from Çatalhöyük and, through such tactile work, sparking critical conversation about the relationship between past artefacts and present-day values. The sessions start with the creation of objects using novel 3D moulding tools (‘MetaMolds’ - for more information see Deliverable D6.2 Low-cost Physical Artefact Reproduction). Groups make their objects together using modelling clay, personalise them, and then venture into dialogue with a human facilitator who guides discussion between participants.

The past has much to tell us about how we live today and how we could live differently in the future. We explore these ideas in 20-minute sessions - and participants can take home their replicas, carrying on the conversation into the future!

3.3.2. Experience Description

This use case employs moulds created with 3D printed Metamolds (Figure 37) of four examples of artefacts from Çatalhöyük (a human figurine, horse figurine, leopard stamp and hand stamp). Each speaks to a particular intangible value, theme or act from the past (e.g., human identity, sharing), via which participants are encouraged to consider the connections to present-day values, themes and acts.



Figure 37. Çatalhöyük Family and Group Dialogue Experience - Going clockwise from the top left: human figurine metamold, hand stamp, leopard stamp, horse figurine (Photo Charlotte Bishop).

The Experience unfolds in three parts: (1) through an ice breaker where the facilitator asks participants to personalise their experience by choosing a clay of their favourite colour, and then engages them in conversation about why they've chosen that colour. (2) As the participants work the clay material (i.e., by rolling it in their hands to make it pliable), the facilitator contextualises the site and its objects. The facilitator encourages participants to engage with the site from the offset using visual references (i.e., the location of the site, interpretations on the houses, and images from the site) and two-way conversation. (3) The facilitator then draws participants into a deeper conversation, focused around open-ended questions, connecting Çatalhöyük's past egalitarian lifestyle with present-day values. The use of open-ended questions is designed to subvert the role of the expert, turning participants into the focus of the experience, rather than having participants focus their questions on a single authoritative expert voice. While participants engage in answering and reflecting on the facilitator's questions, they are simultaneously pushing the clay into the mould and finalising their replica (Figure 38).



Figure 38. Çatalhöyük Family and Group Dialogue Experience - Example of a clay Hand Stamp being made, using polymer modelling clay and a Metamold (Photo Charlotte Bishop).

The Experience ends with a final question where the objective is for the participant to continue thinking about their experience beyond the immediate - into the future. Participants are given the materials to wrap up their object and take it home, alongside instructions on how to bake it in the oven to solidify it. In theory, this allows them to continue exploring the story of Çatalhöyük whilst also extending their reflection and connection to the past. The facilitator of the Experience has the possibility to use a mobile app to view the Experience script, combined with images, when needed to highlight different points within the script, like showing to the participants examples of the original artefacts.

This experience was made possible through the collaboration of the following EMOTIVE partners:

- The CNR team who created the Metamolds and adapted them for the case study's needs.
- The ATHENA team who worked on the script and implemented it in digital form for future iterations of the project.
- The University of York team who were closely involved in the scriptwriting, choosing the material and objects, and designing of the Experience.

4. Other experiences

4.1. Çatalhöyük Audio-Enhanced Models

4.1.1. Background

EMOTIVE Audio-Enhanced Models aim to integrate simple compilations of sounds into reality-based 3D models of archaeological sites to incite curiosity about the past in wide public audiences. The prototype uses panoramic images of Building 77 from the site of Çatalhöyük and applies concepts from auditory archaeology, sound use in heritage sites, and the arc of dialogue. The simple soundscapes used have been compiled using the PLUGGY project PlugSonic soundscape editor. Young people (reading level 9-10 years old) in groups of up to five participants listen to sounds that refer to the purported activities of Building 77 and aim to connect these to the fragmented archaeological remains visible on the 3D model, presented through the EMOTIVE Web App. Dialogue is prompted between participants via guiding questions delivered through the EMOTIVE Storyboard Player app.

4.1.2. Experience Description

The experience is split into four sections as per the arc of dialogue (described above and in D5.5). Participants proceed through: (1) an icebreaker activity, (2) a computer-based exploration of a particular 'theme' sound, (3) a computer-based exploration of all the model's sounds, presented in two variations, and (4) a facilitator-led summary activity (**Error! Reference source not found.**). The computer experience was built using the EMOTIVE FPE and SBE tools. The script was developed by Emmeline Batchelor (University of York) with support from the wider YORK and ATHENA teams.

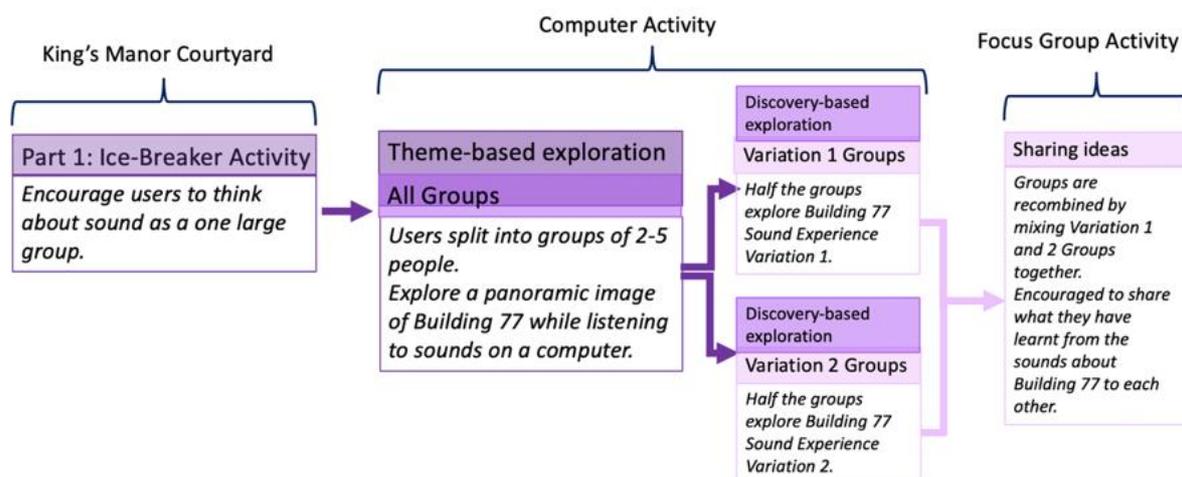


Figure 39. Çatalhöyük Audio-Enhanced Model - Overview of components of EMOTIVE's audio-enhanced model use case.

A facilitator is present throughout the experience playing a more prominent role during the delivery of the icebreaker and summary activity, with the EMOTIVE Storyboard Player taking over the facilitator role during the computer-based experiences. However, the facilitator is always present to help should difficulties arise. The icebreaker activity is designed to introduce users to the concept of sound, the role it plays in how we understand the world around us, and how this can be used to understand the past. The theme-based activity, the second component of the experience, introduces the sounds of Building 77 to participants via the Storyboard Player, asking them to choose one of several theme sounds and then tour the model with the help of guiding questions. These questions aim to prompt participants to share their thoughts and feelings about which sound area could best fit their theme.

The third part of the experience, the discovery-based exploration, is designed to have participants listen to the sounds with a more pedagogical purpose in mind - with reference to specific

archaeological findings from recent research at Çatalhöyük (**Error! Reference source not found.**). There are two variations for this part of the experience, meaning that different groups hear different facts about the same areas.



Figure 40. Çatalhöyük Audio-Enhanced Model-Screenshot of a section of Building 77, as navigated on the computer during the second and third parts of the audio-enhanced models experience.

The summary activity then brings together the groups who have variously explored Variation 1 and Variation 2, prompting them to share the information they have learnt and reflect on their potential relations to and impacts on the people of Çatalhöyük.

The experience was made possible through:

- The University of York team who were instrumental to conceptual development, script development, and the technological development and testing of the prototype
- The ATHENA team who aided with conceptual development, script development and technological development, through its Storyboard Editor (SBE) and Floorplan Editor (FPE) tools
- Sheffield Young Archaeologists' Club who participated in the first test of the prototype with the target user group

4.2. York Minster Visitor-Led Tours

4.2.1. Background

EMOTIVE's visitor-led tours aim to challenge the traditional guided tour model of one-way, guide-visitor communication. Instead, they recognise the guided tour as a platform for direct and meaningful democratic dialogue between institutions and visitors, and between visitors themselves of varying backgrounds and beliefs. Using participatory methods of co-creation and facilitation, groups of 6 to 8 visitors to the UK's York Minster are aided by both digital devices and a human facilitator to learn about the cathedral. Framed through stories of the Minster's past, visitors enter into a dialogue about related contemporary issues. In doing so, the tours seek to experiment with and develop two key models/concepts of democratic engagement at heritage sites to break down barriers, challenge prejudices and foster mutual respect between participants: (1) the 'arc of dialogue' model used by the US National Park Service and the International Coalition of Sites of Conscience, and (2) Nicole Deufel's (2017) "agonistic interpretation".

4.2.2. Experience Description

The experience broadly follows a tripartite model comprising (1) collaborative storytelling to discover the Minster’s past and its stories, (2) a group-based activity, and (3) a session of facilitated dialogue on a related contemporary issue, all under an umbrella “theme” related to the York Minster. To enact this model, each tour begins with a critical introductory session, guided by a human facilitator from the Minster, where participants are asked “ice-breaker” questions and agree on “ground-rules” for participation. Everyone is handed their own digital device (iPad or mobile phone) on commencing the tour, which acts as an aid throughout, offering prompting questions, allowing them to read aloud stories to one another, and allowing them to collectively select themes and choose the content of their experience. This was built using the Storyboard Editor developed by ATHENA, with the script for each aspect of the tour developed by both the EMOTIVE teams at the University of York and ATHENA (Figure 41).

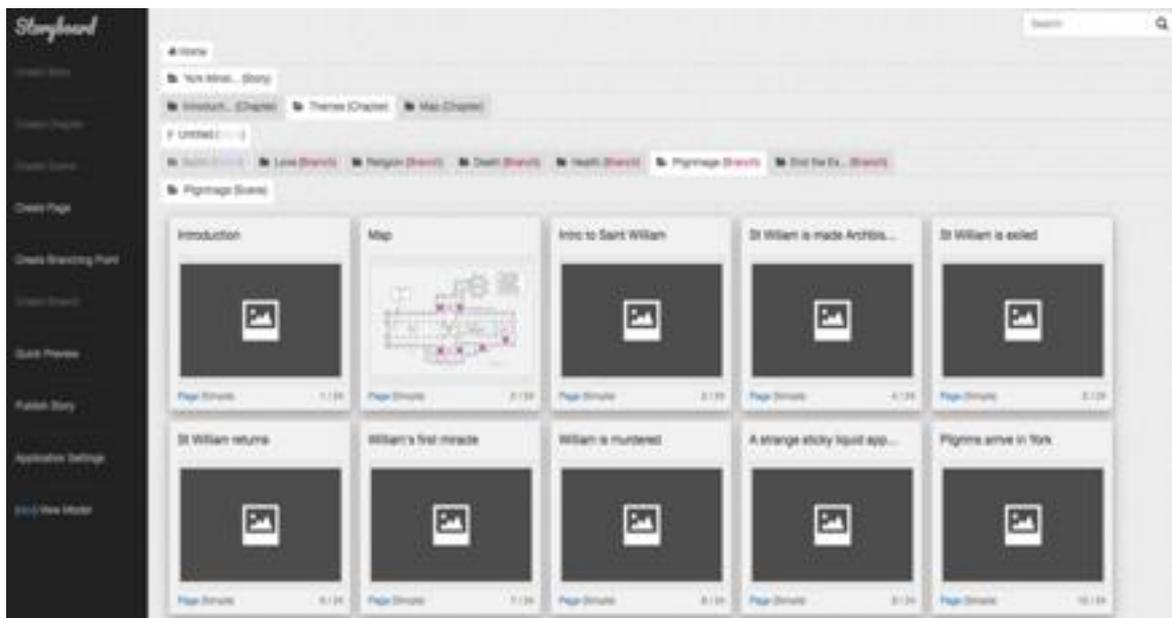


Figure 41. York Minster Visitor-Led Tours- Screenshot of the Minster’s themes and structure in the Storyboard Editor.

Following the icebreaker session, the facilitator steps back and participants are encouraged to speak. Using their digital aids, they take it in turns to read facts about the Minster aloud to the group to introduce the site and the context of the tour. They are then asked to choose together one of five themes: love, health, pilgrimage, death and religion. Once a theme is chosen, participants are invited to use a map on their screens to guide themselves and each other to a related object or space in the building (Figure 42). For example, choosing ‘pilgrimage’ leads participants to the crypt to hear about the story of St. William, the ‘healing saint’.

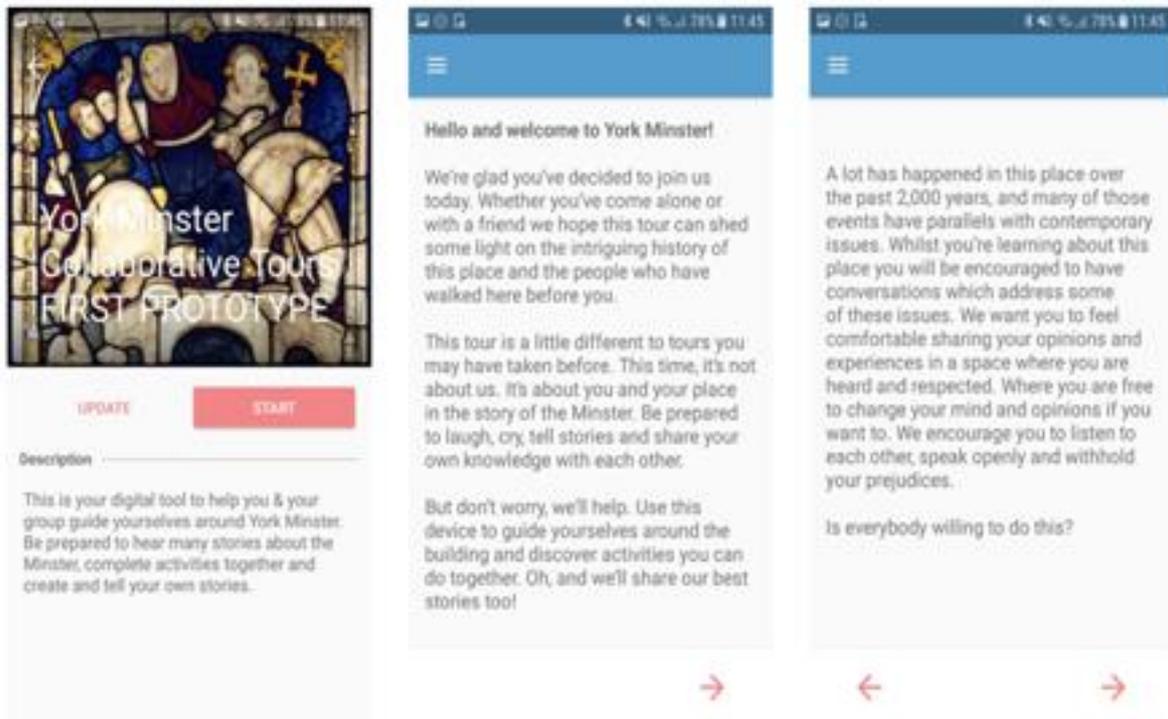


Figure 42. York Minster Visitor-Led Tours- A sequence of screenshots of the storytelling experience on the EMOTIVE app.

Upon arriving at the space, methods of co-created storytelling come into play. Participants are prompted to read aloud a story about the Minster's past, such as that of St. William before being prompted to enter into a collaborative activity which allows them to use their own knowledge and experience to design their own story. In the case of the St. William activity, for example, participants are asked to create a story about a pilgrim depicted in one of the Minster's stained-glass windows, the 'St. William Window' (see Figure 43). Participants are supported by questions on their digital devices and are then encouraged to share their stories with the rest of the group. Finally, this process of co-created storytelling leads into a dialogue session on a contemporary issue related to the theme and activity, e.g. the recent refugee crisis (under the theme of pilgrimage). The facilitator leads this session, bringing it to a close at an appropriate time by relating it to the Minster's current role in society and providing supporting resources to whomever might need them. Participants can then choose to end the experience or continue with another theme.

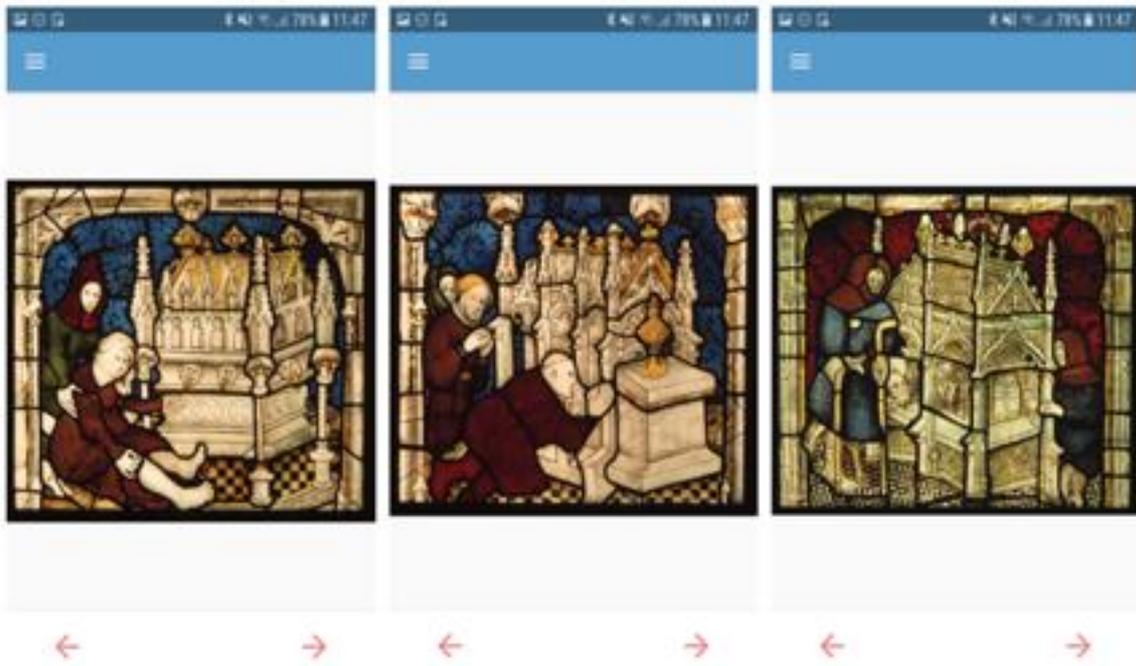


Figure 43. York Minster Visitor-Led Tours - Screenshots of the Minster windows used as inspiration for storytelling.

The experience was made possible through collaboration between the following EMOTIVE partners, with support from the Collections Team at York Minster:

- the University of York team who were involved in conceptual development and scriptwriting and liaison with York Minster;
- the ATHENA team who also aided in the conceptual development and scriptwriting and implemented the SBE for the digital mobile aid, delivered through the Storyboard Player.