



# ARCHES

H2020 – 693229

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## Deliverable D6.1 “Pilot Stage I – Preliminary studies”

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**Lead Author: Jonathan Rix and Helena García Carrizosa**

**Contributors: Tree, UBAH, SignTime, MN, MBBA, VRVis, KHM, WC, Thyssen, FLG, V&A**

**Reviewers: Carolina Pelaz Soto**

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***Abstract***

This document provides an outline of how the initial session for the London Exploration group were designed and the framework that was set for the data collection. As part of the data collection six different literature reviews were undertaken that will inform the technical partners as well as the museums about the existing studies. Furthermore, the report below shows the demographic data of the group and the collection process. Finally, the document also introduces the first few product testings with our partners Coprix and VRVis.

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Authors (Partner)	The Open University (OU)			
Responsible Author	Name	Jonathan Rix	E-mail	<a href="mailto:jonathan.rix@open.ac.uk">jonathan.rix@open.ac.uk</a>
	Partner	OU	Phone	+44 01908 655903

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## Abbreviations

**BSL:** British Sign Language

**BVI:** Blind and Visually Impaired

**Coprix:** (partner short name) Coprix Media

**FLG:** (partner short name) Fundación Lázaro Galdiano

**HI:** Hearing Impaired

**HoH:** Hard of Hearing

**IAG:** Interactive Audio Guide

**ICT:** Information and Communication Technologies

**KHM:** (partner short name) Kunst Historisches Museum Wien

**LD:** Learning Disabled

**MBBAA:** (partner short name) Centro Regional de Bellas Artes de Oviedo

**MN:** (partner short name) ArteConTacto

**OU:** (partner short name) The Open University

**QR:** Quick Response

**Signtime:** (partner short name) Sign Time GmbH

**Tree:** (partner short name) Treelogic Telemática y Lógica Racional para la Empresa Europea S.L.

**Thyssen:** (partner short name) Fundación-Colección Thyssen-Bornemisza

**UBAH:** (partner short name) University of Bath

**VI:** Visually Impaired

**VRVis:** (partner short name) VRVis Zentrum für Virtual Reality und visualisierung forschungs - GmbH

**V&A:** (partner short name) Victoria & Albert Museum

**WC:** (partner short name) The Wallace Collection

**WP:** Work Package

# 1 Introduction

The objectives of this work package can be outlined as:

- Ensuring a high degree of usability and perceived value added for the target audience through validation of hypothesis and expert input.
- Running pilot exercises to generate and implement feedback from the target groups.
- Assessing state of reached advancement.
- Identification of further research needs.

In order to generate real added value in the form of a higher degree of accessibility for people with differences and difficulties associated with perception, memory, cognition and communication we intend to validate our development over various stages throughout the project. The main focus is directly working together with the target communities through pilot exercises. They can provide valuable feedback and ensure that the project keeps track of the goal and develops highly usable and value generating platforms and applications.

The system validation has been envisioned as a phase divided into three different pilot exercises. The first pilot exercise will consist of weekly organised visits to museums for people with differences and difficulties associated with perception, memory, cognition and communication. The museums involved in this initial phase will be located in the UK due to their proximity to the experts from OU and University of Bath (UBAH), who will ensure activities are undertaken as outlined in Work Package 2 (WP2) “Working with participatory research groups”.

After the assessment of all the data gathered during the aforementioned visits the participatory research groups will elaborate a set of directives and recommendations to be used as inputs for refining the initial developments. It is anticipated that these directives will apply mainly to the software interfaces on how the information should be displayed in order to be as user-friendly as possible and reach as wider an audience as possible.

This deliverable reports on the first phase of this work package. It begins with a critical discussion of the establishment of the participatory research groups. Much of this material is also relevant to WP2, however given the close relationship between the pilot exercises and the running of the participatory research groups in these early sessions, it seems relevant to also include some material in this document.

## 2 Establishing participatory approaches to research and agreed ways of working

The first phase of this work package has involved the establishment and development of the London participatory research group and participatory ways of working. The first action was to develop engagement with potential partner organisations in order to engage participants, following a scoping exercise and establishing that our partner organisations were providing support to those with an intellectual and/or sensory impairment (see Table 1 for list of contacts).

A range of materials were produced in a variety of formats to enhance access for our intended participants (see WP2 ARCHES system), and were distributed through a range of online and print channels, with follow up face to face meetings or personal discussions. At this early stage potential participants, identified as pioneers, were invited to join the pre-planning meetings with the museums. Five participants with intellectual and/or sensory impairments attended the first three planning meetings with the coordinators from the Victoria and Albert Museum (V&A) and Wallace Collection (WC) and the researchers from OU and UBAH. At these meetings, the first issues associated with providing access began to emerge. This created the agenda for what became known as the London Exploration group, identifying issues of access and the best ways to support participants engagement within the project<sup>1</sup>. Given the diversity of the profile of the London Exploration group this remained an ongoing issue, which varies from meeting to meeting depending upon the spaces in which we have been working, who is in attendance and the nature of the activities which have been undertaken.

In addition, there was an initial meeting between the research partners from the Open University and Bath University to establish a research protocol. The following structure was developed [1]:

**Table 1: List of contacts.**

Name of Charity Organisation	NADP	Brent (too far away from participants)
Action for blind people	Nexus Support	Bromley
Action for hearing loss	OBAC (Organisation for Blind African and Caribbean)	Camden
Action on Disability	One-to-One	Ealing
Alliance for Inclusive Education	One Trust Wandsworth	Greenwich
Artsline	Outside Pathways	Hackney
Asian’s People Disability Alliance	Paddington Arts	Hammersmith and Fulham
Aurora Option	Phab	Haringey
Blind in Business	PLUS Support	Harrow
Blind Veterans	Real (Real DPO Ltd.)	Islington
Blindness and Arts	Remark!	Kensington and Chelsea
Certitude	Richmond Aid	Kingston
DABD (UK)	RNIB	Lambeth

<sup>1</sup> Access has been multifactorial - access to the museums, access to the technology and access to the group processes.

Deaf Access	Rosa Morison Day Centre	Lewisham
Deaf London	Royal Association for Deaf People	Sutton
DeafPlus	Royal London Society for Blind	Westminster
Deaf UK Jobs	Ruils	<b>Name of Other Organisation</b>
Deaf Works	Safety Net-People First	Action on Disability
Disability, Pregnancy and Parenthood International	shape Arts	Bridge School, Islington
Foresight	Sense	Maple Down School
Generate	Sound Seekers	Online magazine
HeartnSoul	Southwark Disablement Association	Shaping our Lives
Inclusion London	Three Cs	Sister of Frida
Independent Living Alternatives	Tower Project	TAG Youth Club for Disabled Young People
Jewish Deaf Association	Westminster Adult education services - SEN	The Salmon Youth Centre
London Deaf Information Service	West Ealing Deaf and hard of hearing group	The Squad Youth Club
Mencap	Whizz-Kidzz	The Westminster Society for people with learning disabilities
Mencap Golden Lane	<b>Name of Council</b>	
Merton Center for Independent Living	Barnet	

## 2.1 Why are we collecting data?

We have three types of outcome that requires evidence:

- Evaluation of process & method leading to recommendations in EU reports.
- Evaluation of technologies leading to recommendations to technology partners.
- Evaluation of activities sites leading to recommendations to museums.

Type A will be evaluated in relation to the Aims & Assumptions of the research, the Processes and Outcomes and their Reach and Fitness as evident in:

- Intersubjective validity: the extent to which research is viewed as being credible and meaningful by the stakeholders from a variety of perspectives (Evidence of Aims, Assumptions & Reach).
- Contextual validity: the extent to which the research relates to the local situation (Evidence of Aims, Assumptions & Fitness).
- Participatory validity: the extent to which all stakeholders are able to take an active part in the research process to the full extent possible (Evidence of Process and Reach).

- Catalytic validity: the extent to which the research is useful in terms of presenting new possibilities for social action (Evidence of Outcomes & Reach).
- Ethical validity: the extent to which the research outcomes and the changes exerted on people are sound and just (Evidence of Process & Fitness).
- Empathic validity: the extent to which the research has increased empathy among participants (Evidence of Outcomes & Fitness).

### Focus group questions

- What works for you?
- What does not work for you?
- What would you like it to do?
- How would you improve it?



**Figure 1: The accessible version of the questions for ARCHES after development with the Exploration groups.**

Types B&C will exemplify type A. These will capture the perspectives of the participants in relation to issues identified by the participants and our partners. In particular, we recognised a need to consider the Questions for ARCHES (see Figure 1):

- What works/does not work for you?
- What would you like to have done?
- How did/do we capture your experience/viewpoint?
- What do we do about it?

## 2.2 Collecting data

We have phases of data collection. Phases are related to particular research foci, or challenges/possibilities that the Exploration group wish to explore. We might have more than one phase going on at the same time, with different participants involved.

We envisage using:

- Observational narratives
- Personal narratives
- Creative narratives
- Macro and micro narratives
- Interviews

- Questionnaires
- Templates & protocols

We will capture and represent data using:

- Speech via dictation, signing, writing
- Images, via drawing, doodling, photographs, videos
- Writing, notes, reports, discourse analysis
- Mind maps
- Our Story
- RixWiki
- Online data collection
- Representation systems (such as AnswerGarden)

We will seek additional Sources of Type A Evaluation Data. This will be sought through:

- Meta perspectives of process from Jane Seale, Helena García Carrizosa, Participants (in supporters).

We will seek to ensure an accessible and appropriately secure storage of data. We will consider storing data in:

- Dropbox
- Google Drive
- Photos of documents (agreed as required)
- Our Story
- RixWiki
- OU server for personal details
- Archiving – with consideration being given to who uploads and where
- Hard drives as back-up

## 2.3 Analysis of data

We recognised that processes of analysing data needed to be relatively straightforward and accessible. We also recognised that our technological partners may bring with them particular analytical requirements of which we were unaware. From the point of view of the Exploration groups, however, we sought to ensure:

- Differentiated processes are necessary.
- In general sessions participants note the main ideas, serving a scribe roll.
- We synthesise evaluation session ideas into themes.
- Videos, narratives, images are collectively revisited and viewed and findings discussed and recorded.

- Our Story used to create an agreed thematic narrative (which includes evidence).
- At the end of each phase we have saturated themes and potential themes.
- Thematic spaces are created on the wiki.
- Postings on wiki serve to validate the themes.

We also recognised a potential need to provide training in relation to data collection and analysis. We tentatively suggested that:

- We provide it to those who are interested.
- We do not have a top down requirement of skills.
- It needs to be relevant to the moment.

In addition to this Bath meeting an additional discussion was undertaken at this early stage with an advisor to the project, Professor Andy Minnion. This revolved around a discussion about the purposes of video usage within the project. Three main uses of video were suggested:

1. To represent the overall project to the outside world.
2. To collect data which can serve as a data source or for personal reflection and pleasure.
3. To represent findings from data sources.

For Use 1, we need at the outset to agree the overall narrative which we are seeking to tell with the video. We then need to define how we will record the process in such a way as allows us to capture this narrative. This will involve developing regular procedures and ways of working and identifying particular roles that need to be undertaken in particular contexts.

Following the Bath meeting, the researchers from OU and UBAH to meet every Tuesday morning to plan and resolve issues, however we also needed to have a shared meeting with the other participants. This was therefore arranged for an hour after the Friday session, and from the third week involved any participants who wished to join us. Each week at least two of the participants has been at this planning meeting, informing discussions about the session just gone and intentions for the next week and beyond.

## 2.4 Planning the first sessions

At the initial Bath meeting we came up with suggested outlines for the first four sessions (see Table 2) and activities for the first four museum meetings to support participants understanding of collecting data (see Table 3).

**Table 2: The initial proposed plan for the first four sessions.**

Session 1 Taster session	Session 2, 3 & 4
11:00-12:00 am. Meet at museum. 12:00-1:00 pm. Explore. 1:00-2:00 pm. Lunch/discuss. 2:00-3:00 pm. Analysis/consent	11:00-12:00 am. Meet at museum. 12:00-1:00 pm. Explore + kit. 1:00-2:00 pm. Lunch/discuss. 2:00-3:00 pm. Analysis/consent. <ul style="list-style-type: none"> <li>• Future sessions</li> <li>• Reflection on methodology</li> <li>• Reflection on kit</li> </ul>

**Table 3: The initial proposed plan for the research approaches in sessions 2-4.**

Week 2 Options:	Week 3 Options:	Week 4 Options
Record or video: <ul style="list-style-type: none"> <li>• Interview</li> <li>• Quiz</li> <li>• Focus group</li> </ul> Initial assumptions, expectations & knowledge in relation to: Museums, technology, project, personal role.	<ul style="list-style-type: none"> <li>• Photos</li> <li>• Videos</li> <li>• Drawings</li> <li>• Recordings</li> </ul> The Story of My Visit: <ul style="list-style-type: none"> <li>• What works about these methods?</li> <li>• What does not work?</li> </ul> What would we like to focus on in next phase of sessions?	Record or video: <ul style="list-style-type: none"> <li>• Interview</li> <li>• Quiz</li> <li>• Focus group</li> </ul> The Story of My Visit: <ul style="list-style-type: none"> <li>• What works about these methods?</li> <li>• What does not work?</li> </ul> What would we like to focus on in next phase of sessions?

The outlines from the first Bath meeting were used as the basis for subsequent discussions with the museums and Exploration group pioneers. Of particular importance was the introduction of the issue of consent and its affirmation from all those who wished to join the Exploration groups. A range of accessible materials and forms were provided prior to the meeting to all those who attended and were then run through again at the first meeting at a pace and in a format suited to the participant's wishes. The consent forms were collected and it was noted if any participant did not consent to be photographed either within the project or as part of any public facing outputs. At the suggestion of one of the pioneers it was agreed that those who do not consent would have a symbol clearly visible upon their name badge. The issue of photography was of particular importance to a couple of potential participants. For one it was a barrier to participation. A series of lengthy, and fascinating, discussions was undertaken across a period of a few weeks with this potential participant. Amongst the issues raised by this individual were the following:

"The paperwork [related to Ethics] reads well, but it is not clear to me how the principles you expound can be carried through without some clarification about their practical application and some modifications to working practices".

.....

In the Ethics form it says:



Interventions and equipment will carry no potential dangers beyond those that the participants would typically face when carrying out such activities without the research taking place.

On one level this is true. On another level, it is not. Certainly, it is not true if participants ordinarily choose not to engage in social media, and do not permit themselves to be photographed or recorded, less still have such data uploaded to an internet application. For such participants, participating in this project, which in reality makes it extremely difficult to avoid exactly this sort of activity, clearly poses additional risks to their privacy.”

Despite extensive reassurances that no online or digital images would be taken if the participant did not wish and complete agreement with the vast majority of issues the individual raised, this particular taster session attendee chose not to return regularly. They were however reassured enough to join us at a particular session with one of our technology partners and wished to maintain contact with the project.

This exemplar serves to show not only the importance of consent and the issues it raises, but also the importance of responding positively to the views and ideas of participants. Both are at the heart of participatory research. As a result, the issues raised by this individual brought the issue of photography to the fore not only for the organisers of the project but also for their co-participants in the Exploration group and ensured that we are better prepared to resolve the challenges the issue presents.

The issue of consent took up an important part of the first session but was just one part of this introduction to ARCHES. In the original proposal, it was agreed that there would be three sessions at the V&A Museum followed by one at the WC. However, it was decided that it would make sense to introduce the participants to the two museums as soon as possible. A range of activities within the two museums were created to launch the project, with specific goals to be achieved. At the suggestion of one of the pioneers it was also agreed to introduce an online application AnswerGarden as a means to collate the views of participants. These activities were brought together so as to respond to a request from our technology partners. They had requested a selection of five objects from each museum. To ensure that the participatory nature of the project was adhered to from the outset, it was agreed that the museums would not select the objects, but would leave this up to the Exploration group. On the first session, we focused upon the European rooms in the V&A. Participants took photos of objects they liked; these were uploaded and shown over lunch; then using AnswerGarden we agreed upon our first item. It was recognised from the outset that this introductory activity was not the ideal solution to the selection process however; with thousands of objects to choose from such a process would soon become unmanageable. The museums therefore selected a range of objects within a number of rooms and over the next three sessions the participants used AnswerGarden to make their choices (see Figure 2), whilst being introduced to a range of data collection approaches (interviews, focus groups, video, photographs, audio recordings).



<https://answergarden.ch/415242>

Pass round the iPad. Everybody take turns. You each have one vote. Choose Yes or No

## Last week findings



Figure 2: Two slides using image, QR code and AnswerGarden to select museum objects for partners.

## 2.5 Communication and issues of access




The process of selecting objects continued across the first four sessions, serving to introduce the participants to the museums, to the process of collective activity and to each other. It was evident that a key issue was our collective capacity to develop effective forms of communication. This issue has been one for ongoing discussion. At the first meeting one participant asked why they had to enter an email address onto their phone. 'Why can't I have a QR code?'. This was resolved then and there, but as a consequence the vast majority of communications, audio description of texts and all links to information have consequently been supplied with a QR code link. Similarly, over a period of weeks concerns were raised about the capacity of many participants to access the images being used in the presentations. Adding to the challenge was that many of these images were being used to enhance access to complex ideas, creating Easy Read opportunities. Lengthy discussions took place around this issue, establishing a range of protocols related to the labelling of pictures and the distribution of all materials accessible to screen readers prior to each meeting. It was also agreed that whenever members of the project used social media, such as Twitter, they would ensure that images were captioned in whatever form the social media allowed.

During the early sessions, and at the first planning meetings involving participants, it was also agreed that we needed to establish a collective set of values and an agreed approach to working together. As a result, the following was produced through small group discussions and was affirmed through re-presentation to the wider group:

Our values and ways of working (see Figure 3):

- We need to enjoy ourselves
- We need to feel secure
- We need to feel in control
- We need to be informed
- We need to feel involved
- We work at different speeds
- We need to share our ideas
- We need to be as accessible as possible
- We need to plan together
- For each activity: Can we feel it? Can we hear it? Can we see it? Is there a shared understanding?
- We can all play enabling roles for others

### Our values and ways of working

1	We need to enjoy ourselves	 Picture: Two people sitting outside smiling
2	We need to feel secure	 Picture: Four people sitting together smiling
3	We need to feel in control	 Picture? Two people sitting on a table looking at a tablet. Third woman standing between them pointing at the tablet.

**Figure 3: First page of accessible “Our Values and Ways of Working” document.**

These values have a significant role to play in the working relationship with the technology and museum partners. They will have a profound impact, for example, on a partner who wishes (and is anticipating) to test an idea that seems appropriate to them but which does not seem relevant or appropriate to the Exploration

group. The importance of responding to the views of all involved has for example had a significant bearing on the way in which the meetings themselves have been organised.

An ongoing challenge for the project has been enabling access for people who use communication systems other than the spoken word. The project meetings have regularly included individuals who use British Sign Language (BSL), and a signing support has been provided by the ARCHES project and by a member of one of the participant groups. The use of BSL has not been a suitable resource for all our participants, however...

Some members of the Exploration groups are learning BSL or have a primary language other than English. For many of these participants, communication is a flexible and creative process which involves experience and good will. Similarly, challenges have emerged from the limitations of the loop system in a crowded situation with a variety of speakers. Because the loop systems cannot be relied upon we have tested a range of applications. In particular we have explored Virtual Voice, TextHear-Personal, AVA, UDTalk, Speechlogger, TextFairy, Eye-D, ICantHear and the generic speech to text functions from Google, Apple and Microsoft. We have also used Bluetooth headset with apps. Generally, the apps were too slow to record the pace of conversation and inaccurate and so as yet, we have not found an app that will work accurately at conversation speed. We have been attempting to fill this gap by providing what is referred to by Hearing Link as a ‘hearing buddy’. Each week a touch typist records the main details of a discussion which can be read by those who wish to have an alternative to speech. This has also provided a useful additional transcription function for many of the discussions. This is only a partial solution however. The challenge which this issue of access presents for some participants means we are still seeking solutions. We have had meetings with a provider of text based access, StageText, and agreed to work with them in the coming months. We have also explored the use of a palantypist or stenographer to provide verbatim transcription. This solution would be ideal if we had the budget to carry the cost. At approximately €350 an hour, this would work out at around €125,000 across the life of the project. If we had considered this solution at the outset of the project we may have been able to include this cost in the budget proposal, however at this late stage it means it is not a solution we can realistically provide.

As a consequence of these communication challenges the Exploration group have developed our own set of communication rules:

- We speak one at a time
- We put our hand up to speak
- We do not cover our faces when we speak
- We try to look at people when are speaking
- In a group of more than 8, each time we speak we introduce ourselves
- Speak clearly and slowly
- Think about the language so that it is as simple as possible
- Give an accessible, brief summary of a discussion every few minutes
- When we enter a new space, we give a visual description of the room and the numbers of people and layout

The Exploration group initially agreed to have a chair for each session who would ensure that these rules were followed; however, this was not always followed up and it was difficult to identify someone willing to

adopt the role each week. It was suggested recently that we might try a microphone during the larger group discussions. This has been trialled effectively.

A further solution which has emerged from the Exploration group is the possibility of restructuring the sessions so as to seek better solutions to issues of communication. A group of participants are planning a session which will explore this issue and see how we can build on our current strengths and seek further opportunities to enhance both communication and overall direction of weekly activities.

### 3 Meeting activity from Sessions 4-18

A range of activities have been undertaken in the opening four months of the project. Within the original proposal for the project a variety of actions were identified. The project aims to provide an evaluation of applications, software and multi-sensory activities. As such it was felt important from the outset to gain an overview of the technologies and applications which people use and for participants to experience talking about such issues and to gain a sense of each other’s experiences. A series of small group discussions was undertaken in which people talked about these issues and a detailed list of applications and technologies was produced. This list of activities was re-presented to the participants when they were considering how they might deal with issues they had identified within the setting or when considering their priorities for the development of new technologies and applications.

#### 3.1 Identifying Exploration group priorities

Inevitably, a participatory research project needs to be run according to the priorities of the members of the Exploration groups. A key factor in this process in a project such as ARCHES therefore is the participants’ evaluation of the museum experience, in regard to everyday provision and access offers, which themselves are multi-sensory and delivered through various technologies. In early meetings participants discussed their experiences of accessing the two museums. These discussions were undertaken in small groups or as occasional interviews. The findings were collated and then re-presented to the Exploration group for confirmation. As a consequence of this process they identified the following challenges:

- Creating a personal connection:
  - How do we create the physical guidance, expert guidance, respond to specific questions and manage social aspect, pace the tour and respond to interests of individuals and groups and be creative in the way in which the human being volunteer can do?
  - How do you create atmosphere & emotional connection?
  - How do you make each bit of info come alive?
  - How do you make a guide social and not isolating?
  - Museum rules - don’t touch
- Accessing ideas (see Figure 4):
  - The need to recall knowledge
  - Presumptions of prior knowledge
  - Text needs to be simplified
  - Finding objects in an unsearchable guide
  - Can’t access audio guide without support Issues of the loop vs other communication devices
  - Enlarging text on signs
  - Providing touch objects
  - How can someone have an enhanced capacity to see something (contrast, colour, magnification, etc.)

- Switching between technology and objects
- How do you access information if you don’t have a smartphone?
- Apps freeze + stop working+clog up with advertisements
- Need help to actual use some apps/instructions

### Key issues---Accessing Ideas

10. The challenge of switching focus between technology and objects



11. How do you access information if you don't have a smartphone?



12. Problems with technology - apps freeze + stop working +clog up with advertisements



13. Need help to actual use some apps or with instructions for a device



**Figure 4: Page from the accessible version of the “Key Issues” document.**

- Navigating the museum environment:
  - Identifying what is being described
  - Issues of seating
  - Poor lighting
  - Poor acoustics
  - How do you know that the European Gallery has a web accessible audio tool for some objects if you can’t see signs?
  - How do you know which objects have a commentary if you can’t see the symbol?
  - How to access audio for an object if you can’t see or read the keywords search term?




- How do you find the sensory objects if you can’t see them?
- How to navigate a cluttered environment
- How do you find toilets?
- How do you find lifts?
- How do you find the exit?
- Better signage
- Can we guide where we look?
- Can we guide where the camera is pointed?

### 3.2 Identifying possible applications


As part of this discussion the Exploration groups identified priorities and made initial suggestions for possible applications which would help them with these challenges. This discussion also included re-presenting the participants with the kinds of applications and technologies they had said they used (see Figure 5).

**The Next phase-The plan**


1. Choose our first key issue
2. Consider the existing apps, activities & offers
3. Choose which apps, activities & offers might help with a part of the key issue
4. Decide how to test the app or activity & offers
5. Test the app, activities & offers
6. Report back to each other
7. Identify issues which still need to be resolved
8. Ask our partners for their ideas



Picture to support text



Picture to support text



Picture: QR code leading to the plan points

**Figure 5: A slide used to guide a discussion of future planning.**

The participants’ subsequent suggestions about possible applications were identified from individuals’ notes and small group discussions. They were collated and affirmed through re-presentation to the participants. The suggestions were then shared with the partners to facilitate the development of appropriate applications. The suggestions from participants were:

- A directional app both to and within a space and to direct where one looks and can find information or objects.
- An app that enlarges text.
- An app that enlarges an object or aspects of an object.
- An app that reads text or simplifies text.
- An app that acts as a torch (even if it is not shining a bright light on delicate objects?) to make dark objects more visible.



- An app that ‘plays’ a short dramatization of the information about an object (i.e. it might show it being used, show ‘historical’ people doing something with it, or give indicate the historical period i.e. how long ago it was created).
- Some kind of app that would be able to tell the user the height and width of an object and then encourage them to inspect in more detail the bits that are easily missed e.g. the ornate carvings on the tops and bottom of objects.
- An app that shows images in photonegative.
- An app that can read a code or is GPS friendly, and can verbally image.
- An app to show touch objects/brightly coloured (VI friendly) images.
- An app that gives and changes to routes due to building or roadworks – important for wheelchair users too.
- An app to caption descriptions of tactile images that they also enjoyed and made comment on.

### 3.3 Identifying museum activities

The Exploration groups also expressed a wish to explore the access offers of the V&A and Wallace. In response, a list of all the activities (e.g.: audio described tours, sensory objects, StageText tours, availability of stool etc.) was supplied to the participants and an expression of interest sought. On the basis of the participants requests a programme of activities was organised, with the intention that each activity would be evaluated using the data collection processes created by the group. As a group, we came to realise after a few weeks, that each event on this programme of activities was generally enjoyable (but not always and not for everyone) however their frequency was such that appropriate evaluation was not taking place. The top-down organisation of the programme also reduced the sense of agency for a number of the participants, undermining a key component of authentic participatory research, to some degree reducing both intersubjective and participatory validity.

### 3.4 Developing group projects

Subsequent to identifying the issues of *Creating a Personal Connection*, *Accessing Ideas and Navigating the Environment*, a vote was taken on which area to focus upon first. Accessing ideas was selected. Some participants also made suggestions which might go some way to challenging these issues. Suggestions were to:

- Test links on google maps & have a brainstorming session about how to use them for access.
- Use QR codes as cheap access tool/Vimeo linked to QR codes.
- Create a Facebook live or Periscope trail of an exhibition/museum.
- Create a Facebook community that can share experiences.
- Use Siri and Cortina to search online guides.

It was also suggested that development sessions for these kinds of Exploration group projects should be short (an hour or so) and should involve a mixture of people with a range of access needs (unless it is a very specific issue/solution that they wish to explore).


In order to give people as wide a choice as possible, to ensure that the priorities of other partners were not ignored and to create a sense of overall responsibility, the researchers from the Open University and Bath University also identified a range of issues which applied to the project more broadly and/or they had noted as arising during the sessions. They confirmed these project priorities at a post-meeting planning session.

- Produce a video of project.
- Develop principles for project (inc issues of privacy and consent).
- Develop principles for the solutions we come up with:
  - e.g., prohibitive costs.
  - Prohibitive technology.
  - People like control.
  - People like to use their own devices.
- Accessing information in the manner that suits you.
- Testing the V&A & Wallace websites.
- Testing the Treelogic accessible websites.
- Testing the VrVIS equipment and objects.
- Testing the CoPRIX software.
- Testing the ArtoContacto avatar.
- Testing the V&A & Wallace Collection offers.
- Developing the Our Story app.
- Developing the Screen reader on RixWiki.


At the sixth and seventh sessions participants had these range of options explained to them (and possible timetables for working with technology partners), and then in small groups discussed what they would like to work upon (see Figure 6).

**The Next phase-The plan**


1. Choose our first key issue
2. Consider the existing apps, activities & offers
3. Choose which apps, activities & offers might help with a part of the key issue
4. Decide how to test the app or activity & offers
5. Test the app, activities & offers
6. Report back to each other
7. Identify issues which still need to be resolved
8. Ask our partners for their ideas



Picture to support text



Picture to support text



Picture: QR code leading to the plan points

**Figure 6: Slide outlining activity selection.**

Consequently, three projects emerged:

- Testing the V&A & Wallace website (see Figure 7).
- Produce a video of project (see Figure 8).
- Using QR codes linked to YouTube & Vimeo etc. (see Figure 9 &10).

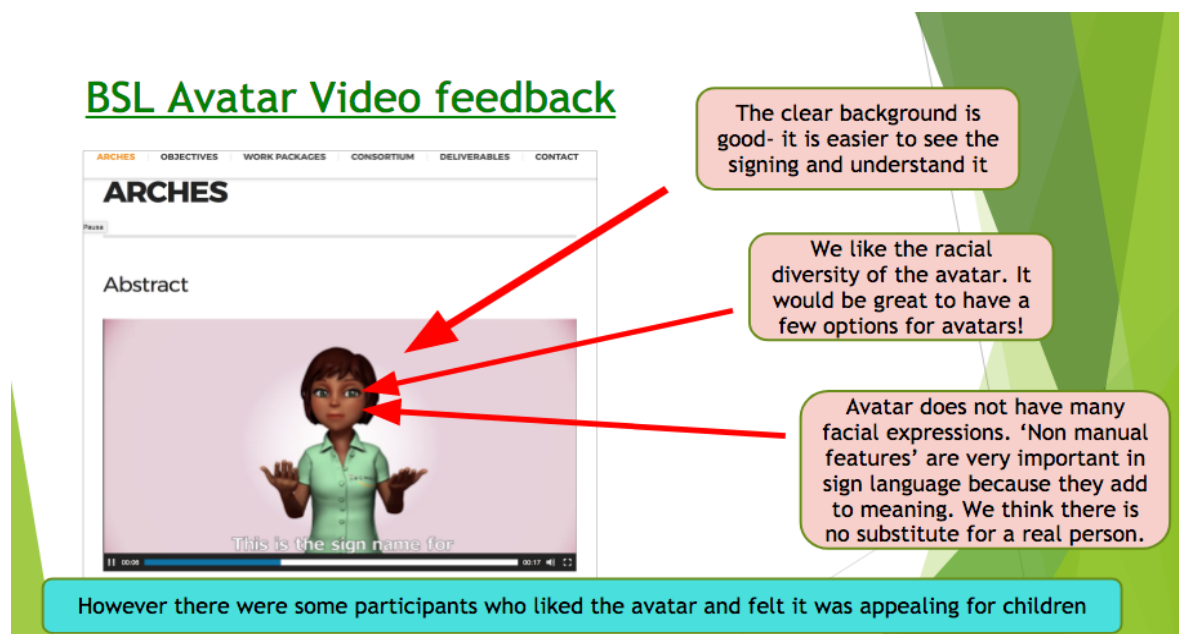


Figure 7: Screenshot of website group presentation.

## A typical visit to ARCHES session



Figure 8: Screenshot of video group presentation.

## The QR code project

There would be a QR code for  
 Technical information  
 Simple and audio description  
 Historical information  
 Creative equivalent



Figure 9: Screenshot of slideshow presentation from the QR code group.

### The bell poem

Abbey in the green land.  
 Where rural buildings hear the music from  
 across the water.  
 A line of kings stretch strong across the green.  
 An old dark place where you feel the history.  
 Into the old musty room.  
 Where the dust hides armour under the  
 sheets.  
 And between drinking horn and virgin with  
 child,  
 An intense experience awaits you.



Figure 10 Screenshot of slideshow presentation from the QR code group.

These projects are ongoing. Slides in Figure 7-Figure 10 used when presenting on the progress of the Participatory Research groups to the other partners.

### 3.5 Organising the Development and Research Process

At the early sessions it was agreed that we needed to develop a way of working to ensure that these projects were developed in a way that was both manageable and authentically participatory. At the seventh session, therefore a series of small group discussions took place to discuss how best to deliver the projects and an overall protocol was created for the research and development process. This was collated and presented back to the Exploration group. In reality, the complexity of some of these concepts were unlikely to have been appropriately explained to all participants at this stage. It was anticipated that the mixed nature of the groups would ensure that the suggested process was collectively understood and could inform planning in each of the groups.

#### Development and Research Process

Question to keep asking:

- Are there decisions we must make now and some we can leave for later?
- How do we ensure that what are doing is not overly complicated?
- Who is doing what?
- What is our timetable?
- How do we involve latecomers or absentees?
- How are we organising our ways of working, decision making and communication so it fits with our values?

Developing the output:

- What issues are we trying to solve?
- What ideas do we have already about what we could do?
- What will our output be? How are we going to produce it?
- What will it look like?
- Will we make changes to the output based on the results of the research?
- Will we test changes if we make them?

Researching the output:

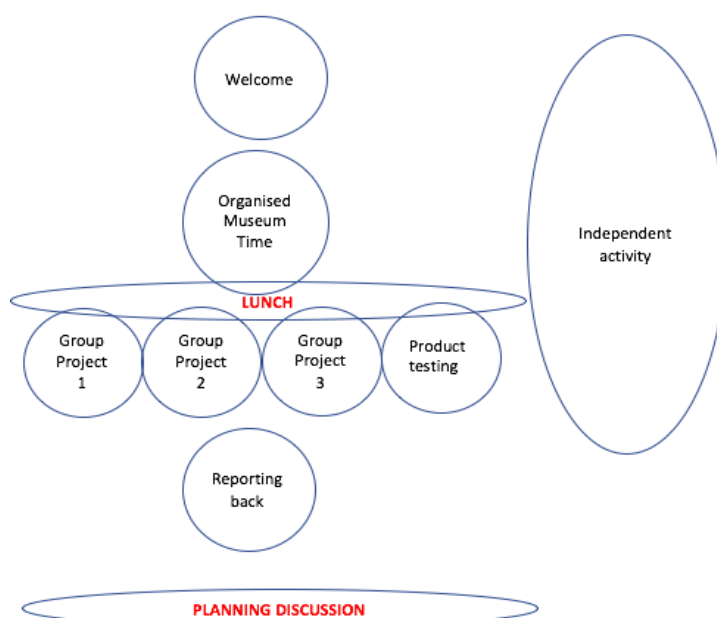
- What is our research question in relation to what we have developed?
- How do we test what we have produced?
  - Do we do observations?
  - Do we ask people to produce personal narratives, macro and micro narratives?
  - Do we conduct individual interviews?
  - Do we conduct focus group interviews?
  - Do we design and undertake questionnaires?
- Who do we use as our research sample – who do we test our idea on?

- How do we define ourselves and our sample to an external world that is interested in overly simplistic impairment categories?
- How many times do we test our idea?
- How do we analyse the data from the test?
- How do we share our findings of our analysis?

These questions of themselves also lead to the participants seeking to develop further tools. A key part of this was a development of the demographics questionnaire, which we will turn to in a later section.

As a consequence of this initial series of decision making meetings subsequent meetings were able to focus upon three core activities. Working on one of the three group projects, undertaking an activity in the museum and working upon an activity related to a technology partner. Another core activity was also being eagerly sought by the participants too. Perhaps unsurprisingly, the participants quickly expressed a wish to familiarise themselves with a wider range of technological solutions and other museums. They wanted to see what other companies were offering and the kinds of solutions which were already in place, some of which people had already experienced or had heard about. This is one of the strengths of the participatory approach since it provides a far richer knowledge base that bears relevance to the needs of this population base. It was always a likely consequence of the participatory approach that the Exploration groups would wish it to explore processes and approaches which sit outside the narrower brief of the current partners, and so when a request was made to these partners it was roundly accepted. Not only would this enhance the participants’ capacity to evaluate the ideas of the partners it would also help them to develop their own suggestions and aspirations. As a consequence of these priorities three models of sessions was identified for these subsequent sessions (see Figure 11-Figure 13).

## Session style A



**Figure 11: Session style A, which emerged with the development of the projects.**

## Session Style B

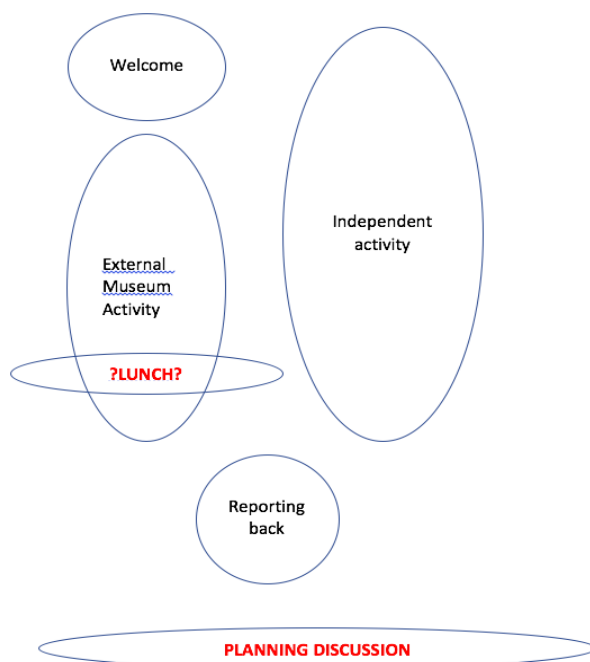


Figure 12: Session style B, designed to make the session less ‘top down’ and planned to be undertaken in June 2017.

## Session Style C

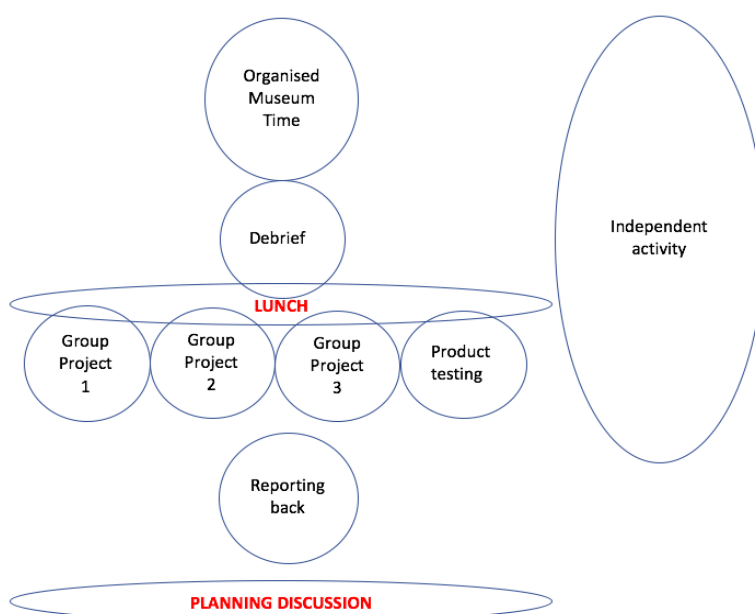
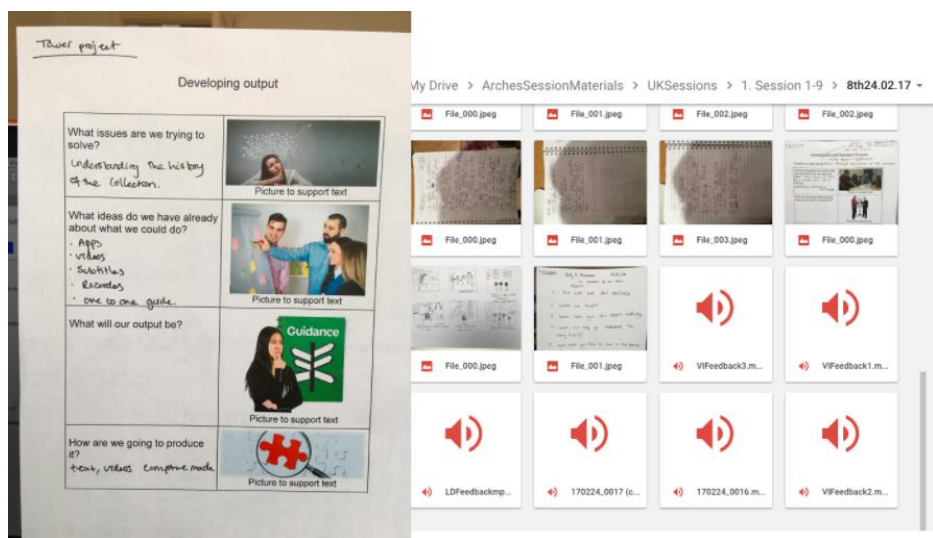


Figure 13: Session style C, which emerged as an alternative approach towards the end of March 2017.



### 3.6 Storing data and the process of ongoing analysis

The original intention for the project was that we would use two main spaces for capturing and storing our data, the Our Story app and the RixWiki. The Our Story app has been undergoing development over the first few months of the project to ensure its capability to work across operating systems, and at the time of writing - as discussed below - we have just begun the process of testing the Android version. The RixWiki was introduced to the participants in the first couple of weeks, with a series of activities, but it soon became clear that it did not work with screen readers in the way intended. This has meant that it is not accessible to many of the participants. This has created a number of issues for us. There was a sense that we were willing to introduce non-accessible technology and that this particularly marginalised those with a particular access requirement. In attempting to resolve this problem we have also come face to face with the difficulties companies face in resolving technological issues. The developers of the RixWiki have as yet been unable to resolve the screen reader issues despite many conversations and affirming their commitment to do so. As a consequence of this we have had to rely upon a range of other storage and sharing strategies, which we had either planned as back-up or as administrative storage. Extensive discussions took place around creating individual spaces within cloud storage systems for participants within the project, however we were unable to do so and provide security and flexible access of the kind built into the RixWiki. After discussions with the participants it was decided that the most relatively accessible cloud storage system was Google Drive and that a couple of sites with access through a general password would have to suffice (see Figure 14). All data was then backed up on a portable hard drive and any personal or sensitive information moved to the secure Open University network.



**Figure 14: An accessible data collection sheet and the online storage of audio clips and images of notes.**

For each activity, there are a range of data collection options. All small group discussions are audio recorded, are sometimes filmed and will have one or two people taking notes. If there is a particular activity being undertaken which has a set series of questions, then an accessible worksheet is also provided and will be filled in as well as that activity being photographed, written about, audio recorded or videoed by various different participants in ways which suit them. As yet this has not created any issues in relation to consent and the importance of people's right to privacy is recognised and revisited. All participants are invited to make notes about their experiences across the day and to share those via email with the Open University and Bath University researchers. These notes and worksheets are photographed for storage alongside the audio and video files for each session and saved within their own folder (see Figure 4). Any additional notes



or emails are also saved within this folder. At the end of each collective discussion or small group discussion, there is feedback which is audio recorded and recorded as notes. There is also a debrief discussion at the end of each day which is audio recorded and for which notes are taken. The use of typed interpretation for some of the Exploration group creates an additional record of much of the day. At this stage, there has not been a systematic re-examination of all the data sources to identify cross activity themes. Current findings have been based upon the overlapping sources of data, confirmed as necessary by reference back to recordings or notes, by sharing summary records, reframing findings as lists, questions and observations, then representing these back to the Exploration group for confirmation or further development.

## 4 The literature reviews

At the initial Bath Meeting it was agreed that it was important for the academic researchers to provide our partners at the technology companies and museums with a sound evidence base for as much of their work as possible. Given the scale of the project and the diverse nature of both the participants and our intended outputs, it was recognised that we would not be able to provide an evidence base for everything, but we could give a useful overview about technology, pedagogy and participatory practice. Consequently, we came up with six foci for the literature reviews:

1. The design characteristics of technologies for people with sensory impairment or learning disabilities.
2. The process of designing technologies for people with sensory impairment or learning disabilities.
3. Embedding technologies and inclusive/participatory processes into heritage sites beyond the life of the project.
4. Augmented reality and museum access.
5. Pedagogical frameworks for engaging disabled users with heritage sites through the use of technologies.
6. Effective approaches for gathering and analysing data with people with sensory and intellectual impairments.

It was agreed that reviews 1 & 2 & 4 would be the priorities for the technology companies during this pilot development phase and that 3, 5 & 6 would have greater resonance for the museums and participatory research groups as they began working in the second year of the project. Question 4, however was not one of the original questions and so delivery of this output has also been targeted to inform work at the start of the second year. An original review was planned to examine methods and approaches to supporting access to information, in particular to consider what has been done already in relation to supporting access to information for people with learning difficulties or people with sensory impairments, so that common principles could be distilled to inform ARCHES. Early findings suggested that the number of studies that was relevant to supporting access was so small that there would be over-reliance upon interpretation of theoretical and non-real-world sources.

A similar, systematic process was undertaken for each review (see Table 4 and Table 5). For most of the studies (except 6) a range of databases were searched in order to reflect the multidisciplinary nature of research in the field of learning disability, heritage and technology design. In relation to literature review 6, it was felt that the field of participatory research was unified within a smaller number of databases. A range of keyword terms were used to search for outputs in order to reflect the national and disciplinary differences in labels used to categorise this group of people and the terminology associated with heritage, pedagogy and research. Studies 1-5 used a restricted date range in anticipation that they would not benefit from seeking older out of date technologies designed and evaluated prior to 2006. Study 6 went back to 1996 to ensure it engaged with foundational studies within participatory research. Each study is being led by one of the Open University and Bath University researchers, with a second researcher moderating findings.

At the time of writing the first review is complete and findings are being shared with partners. The second review is close to completion. The searches have all been undertaken for reviews 3-6, the process of moderation has taken place and the data extraction and analysis process has begun.

**Table 4: Inclusion criteria and keyword terms for Reviews 1-3.**

THEME	The design characteristics of technologies for people with sensory impairment or learning disabilities	The process of designing technologies for people with sensory impairment or learning disabilities	Embedding technologies and inclusive/participatory processes into heritage sites beyond the life of the project
Sub-theme	Usability/ Accessibility Design for all	Participatory design Inclusive research	Sustainability Ecosystems
Questions we want the review to address	<p>What has been done already in relation to accessible technologies in museums for the intended user groups?</p> <p>What common design principles can be distilled out from previous projects and technologies?</p>	<p>What lessons can be learnt from the ways that other projects have approached designing products for the intended user groups? (what worked or did not work?)</p> <p>For projects where there was a mix of users/needs what were the challenges and how were they resolved? (with regards to meeting all needs or conflicting needs of different user groups)</p> <p>How was the relationship between researchers, developers and users managed- how were differences between the three resolved?</p>	<p>What lessons can be learnt from the ways in which education departments in museums have tried to engage with disadvantaged users?</p> <p>What factors influence the longevity or sustainability of museum 'outreach' programs with disadvantaged users?</p> <p>How are such outreach programs evaluated? What counts as success?</p> <p>What are the gaps in knowledge that ARCHES might address?</p>
Data range	2006-2016	2006-2016	2006-2016
Language (s)	English Spanish German	English Spanish German	English Spanish German
Literature databases	CiteSeerX Association for Computing Machinery Digital Library IEEE Explore	CiteSeerX Association for Computing Machinery Digital Library IEEE Explore	European Reference Index for the Humanities (ERIH) Project MUSEArts & Humanities Citation Index JSTOR

THEME	The design characteristics of technologies for people with sensory impairment or learning disabilities	The process of designing technologies for people with sensory impairment or learning disabilities	Embedding technologies and inclusive/participatory processes into heritage sites beyond the life of the project
Journal databases	SpringerLink Science Direct Journals Elsevier ProQuest dissertations (PhD only) SCOPUS	SpringerLink Science Direct Journals Elsevier ProQuest dissertations (PhD only) SCOPUS	Sage Journals Ingenta Connect Taylor and Francis online ProQuest dissertations (PhD only) SCOPUS
Inclusion criteria	For all reviews- papers must be evaluative as well as descriptive- enabling lessons to be drawn from the results or experiences		
	Must involve either LD or SI Must involve one of the following technologies: General Software Serious games Virtual reality- avatars Augmented reality Haptic devices Mobile technologies	Must involve people with either LD or SI in the design process Does not matter what technology –it’s the process we want to learn from	Must involve museums or other heritage sites Must involve a disadvantaged group of some kind Must involve a technology of some kind

THEME	The design characteristics of technologies for people with sensory impairment or learning disabilities	The process of designing technologies for people with sensory impairment or learning disabilities	Embedding technologies and inclusive/participatory processes into heritage sites beyond the life of the project
Keyword terms	<p>Learning disabilities Learning difficulties Intellectual impairment Cognitive impairment Sensory impairment Visual impairment Deaf/Hard of Hearing</p> <p>Mobile technology Games Virtual reality Augmented reality Haptic device software</p>	<p>Learning disabilities Learning difficulties Intellectual impairment Cognitive impairment Sensory impairment Visual impairment Deaf/Hard of Hearing</p> <p>Technology Computers Assistive technologies Mobile technology Games Virtual reality Augmented reality Haptic device Software</p> <p>Participatory design Inclusive Design Co-design User-centred design</p>	<p>Museum Heritage site Disability Impairment Socially excluded Socially disadvantaged Hard to reach Disengaged Learning disabilities Learning difficulties Intellectual impairment Cognitive impairment Sensory impairment Visual impairment Deaf/Hard of Hearing</p> <p>Mobile technology Games Virtual reality Augmented reality Haptic device software</p>

**Table 5: Inclusion criteria and keyword terms for Reviews 4-6.**

THEME	Augmented Reality and museum access	Pedagogical frameworks for engaging disabled users with heritage sites through the use of technologies	Effective approaches for gathering and analysing data with people with sensory and intellectual impairments.
Sub-theme		Pedagogy	Research processes

THEME	Augmented Reality and museum access	Pedagogical frameworks for engaging disabled users with heritage sites through the use of technologies	Effective approaches for gathering and analysing data with people with sensory and intellectual impairments.
Questions we want the review to address		<p>What pedagogies underpin museum education?</p> <p>What pedagogies underpin education through the use of technologies?</p> <p>What pedagogies underpin teaching and learning of learners with disabilities/special educational needs</p> <p>Is there an overlap in these pedagogies that might inform the ARCHES approach- can ARCHES contribute to the development of a hybrid pedagogy?</p>	<p>What lessons can be learned from other participatory projects to inform the development of practice in the participatory research groups?</p>
Data range	2006-2016	2006-2016	1996-2016
Language (s)	English Spanish German	English Spanish German	English Spanish German
Literature databases	Association for Computing Machinery Digital Library Science Citation Index Social and Behavioural Current Content Library, Information Sciences and Technology Abstracts	Social Science Citation Index Psyc Info ERIC- Education Resource Information Centre British Education Index	CiteSeerX Association for Computing Machinery Digital Library IEEE Explore
Journal databases	Emerald Wiley Online Library SpringerLink ProQuest dissertations (PhD only) SCOPUS	Ingenta Connect Sage journals Taylor and Francis online ProQuest dissertations (PhD only) SCOPUS	SCOPUS
	For all reviews -papers must be evaluative as well as descriptive- enabling lessons to be drawn from the results or experiences		

THEME	Augmented Reality and museum access	Pedagogical frameworks for engaging disabled users with heritage sites through the use of technologies	Effective approaches for gathering and analysing data with people with sensory and intellectual impairments.
Inclusion criteria	Must relate to people with either LD or SI	Must involve one of the following: museums or other heritage sites people with LD or SI (to link to inclusive pedagogies) a technology of some kind (to link to e-learning pedagogies)	Must involve either LD or SI Must involve qualitative or quantitative data collection Must involve participatory/inclusive/emancipatory approaches (the research is directed by participants)
Keyword terms	Learning disabilities Learning difficulties Intellectual impairment Cognitive impairment Sensory impairment Visual impairment Deaf/Hard of Hearing  Information Information services Access Communication	Museum Heritage site  Learning disabilities Learning difficulties Intellectual impairment Cognitive impairment Sensory impairment Visual impairment Deaf/Hard of Hearing  e-learning learning technology online learning mobile learning computer assisted learning	Disabilities Difficulties Disabled Blind Deaf Disability Difficulty Impairment Retard Handicap  Inclusive research Emancipatory research Participatory research

## 5 Demographics

The collection of demographic data started on the 3<sup>rd</sup> March 2017 during the 9<sup>th</sup> and 10<sup>th</sup> Exploration session. As part of the participatory research we introduced the participants to the collection of data by explaining to them the type of information we would like to collect: quantitative and qualitative. It was important to highlight to the participants the possible usage of the information such as sharing internally with partners. Clear distinctions between the different types of data were made and it was collectively decided to begin with the formal collection of quantitative data.

Two exercises were undertaken by the participants in small groups in which we asked the participants: What do we want to tell outside people about us? The result of the first exercise informed the second exercise in which we presented the group a mock survey and asked them to consider: Are all the questions necessary? Are some questions missing? In what order do we want to present the questions? and How are we presenting it to each other? The participants decided on the collection (electronically using Google Forms as well as paper-based) as well as the presentation of the questionnaire (large images, clear and simple language). Each question was designed by the participants (see examples in Figure 15 and Figure 16):

### 1. Please indicate your gender (Please tick your answer)

- Female
- Male
- Non-Binary
- Prefer not to say

### 2. Please indicate your age (Please tick your answer)

- 18-29
- 30-39
- 40-49
- 50-59
- 60-69
- 70-79
- 79>
- Prefer not to say

### 3. Where do you live? (Please tick your answer)

- Central London
- Greater London
- Other please specify:

### 4. What is your level of education? (Please tick your answer)

- Qualifications at 16
- Qualifications at 18



- Undergraduate
- Postgraduate
- Tech/Trade/vocational training
- None
- Other please specify:

**5. Please indicate your access needs (You may tick more than one)**

- Audio description
- Blue badge parking
- Braille text
- British Sign Language
- Captioning
- Different language; please specify:
- Guide dog
- Guiding support
- Induction loops
- Large guides
- Magnifying glasses
- Makaton or signalong
- One-to-one support
- Pictures, symbols or easy read
- Raised line floor plan
- Scanning pen
- Screenreader software
- Simplified information
- Sound enhancement equipment
- Step-free access
- Gallery stools
- Tactile books
- Torches
- Walking frame
- Wheelchair
- Other please specify:

**6. How often do you visit a museum? (or If you are part of ARCHES - how often did you visit the museum before joining ARCHES?)**

- At least once a week
- At least once a month
- At least once a year
- Less than once a year
- Never

**7. How do you visit the museum? (You may tick more than one)**

- Alone
- With Friends
- With Family
- With school
- With a project
- Don't visit museums
- With supporter
- Other please specify:

**8. Why do you visit museums? (You may tick more than one)**

- For enjoyment purposes
- For educational purposes
- Don't visit any outside the project
- Other specify:

**9. Why did you join ARCHES? (or why do you keep coming?)**

**(You may tick more than one)**

- To learn about museum
- To learn about technology
- To make museums more accessible
- To meet new people
- To advocate for disabled people
- Other please specify:

**10. What is your role within Arches? (Please tick your answer)**

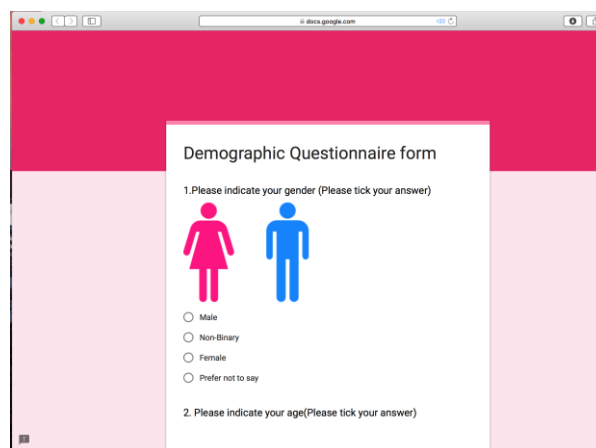
- Museum staff
- Participant

- Supporter
- University staff
- Other please specify:

## 11. What technology do you use?

(You may tick more than one)

- Android smart phone
- Android tablet
- Audio recorder/dictaphone
- Chrome tablet
- iPad
- iPhone
- Kindle
- MacBook
- Windows laptop
- Windows phone
- Windows tablet
- None
- Other please specify:



Demographic Questionnaire form

1. Please indicate your gender (Please tick your answer)

☐ Male





☐ Non-Binary

☐ Female

☐ Prefer not to say

2. Please indicate your age (Please tick your answer)

Figure 15: Picture of first question of the quantitative questionnaire (Google Forms version).

<b>1. Please indicate your gender</b> <b>(Please tick your answer)</b> Female Male Non-Binary Prefer not to say	
<b>2. Please indicate your age</b> <b>(Please tick your answer)</b> 18-29 30-39 40-49 50-59 60-69 70-79 79+ Prefer not to say	
<b>3. Where do you live?</b> <b>(Please tick your answer)</b> Central London Greater London Other please specify:	
<b>4. What is your level of education?</b> <b>(Please tick your answer)</b> Qualifications at 16 Qualifications at 18 Undergraduate Postgraduate Tech/Trade/vocational training None Other please specify:	

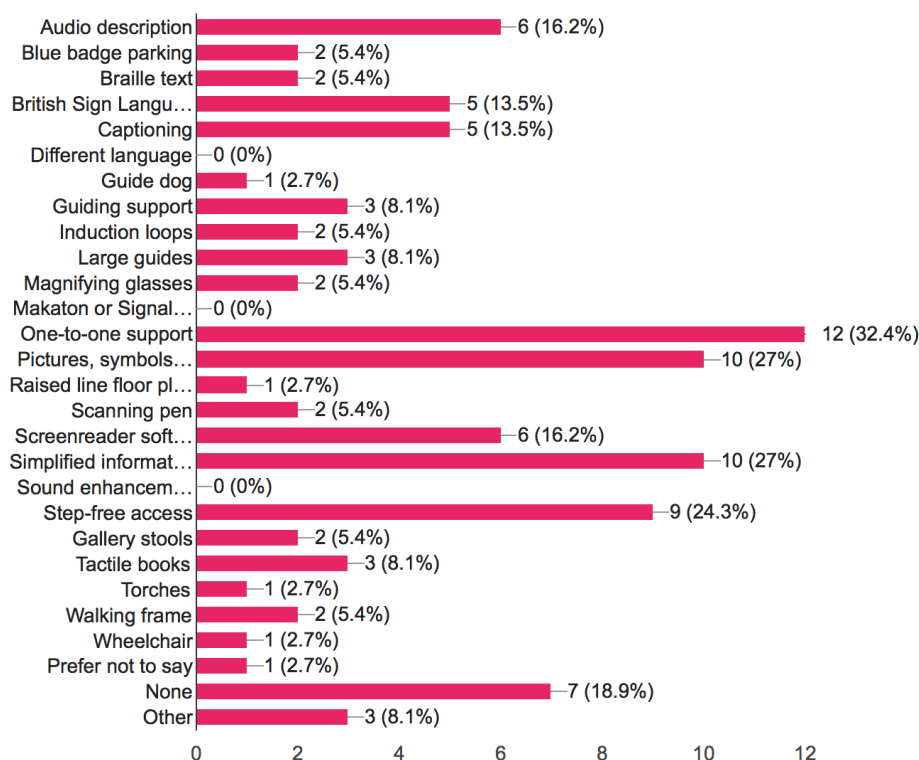
The project leading to this application has received funding from the European Union's Horizon 2 research and innovation programme under grant agreement No 693229

**Figure 16: Picture of first page of the quantitative questionnaire (hard-copy version).**

The questionnaire was sent out to the participants in three different formats: electronically as Microsoft Word docx (screen reader friendly), pdf and giving the hyperlink to the Google Forms page. In addition, participants had the opportunity to fill out the form with help of a member of staff during the sessions. Museum staff, volunteers as well as university staff were asked to fill out the survey as they are equally participants of the Exploration group. The data presented in the following section shows the results of 38 survey responses up to the 10<sup>th</sup> May. It should be noted that the participants were not obliged to fill out the entire questionnaire. The group in total has over 45 participants who have signed the consent form.

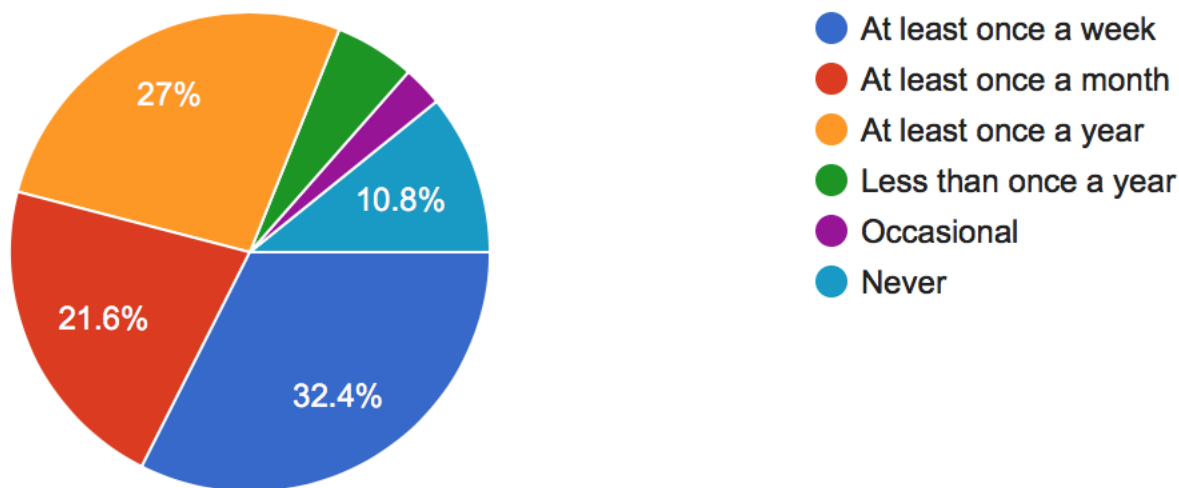
Of the participants who completed the questionnaire, 71.1% are women and 26.3% men (n=38). 31.6% of the participants are between the ages of 30-39, 21.1% are between the ages of 40-49 and the same amount of people are between the ages of 50-59 years old (n=38). 17 group members come from the Greater London area and 14 from the Central London (n=34). Though the group's majority (45.9%) have a postgraduate degree, 13.5% of the participants have no qualification. 4 participants do not have any formal education beyond the age of 18 (n=37).

The most important and relevant question was the 5th question (n=37, see Figure 17). In designing this question, the participants were adamant that they did not wish to qualify themselves into disability categories. This was to some degree because of support for a social model understanding of disability, but more because it was not felt it would accurately capture the diversity of the population and perhaps most importantly would not provide a clear insight into developing provision. As a result, this question is framed around access requirements and allow for participants to indicate more than one need to avoid generalisations.



**Figure 17: Graph showing the various access needs from the participants (n=37).**

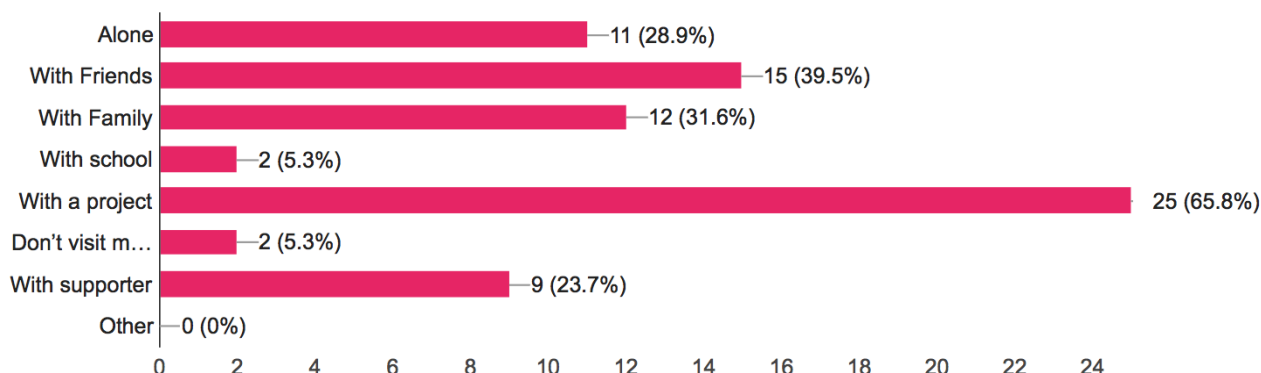
The group has 32.4% who visit museums weekly and 10.8% never visit museums outside the project (n=37; see Figure 18).



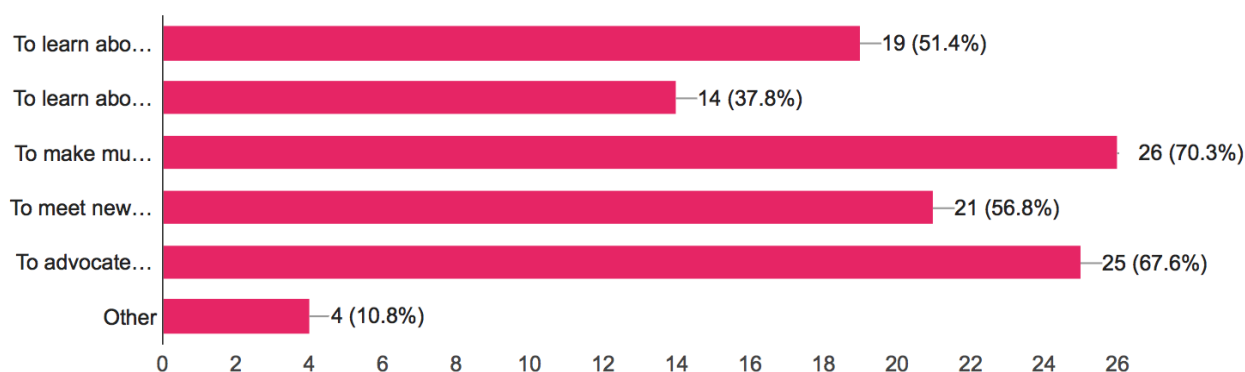
**Figure 18: Graph showing how often participants visit the museum (n=37).**

However, 65.8% of the participants visit museums with projects (n=38). From discussions with participants it can be said that there is a more complex layer to this data. The data indicates the provision required for participants to visit a museum. For example, a total of 9 participants need a supporter to accompany them (see Figure 19). Equally, some participants are unable to afford visiting Central London regularly (either they do not have the financial resources or do not have the support available that they need). This may be the

reason why 2 participants cannot visit a museum. But at the same time out of discussion with participants we can say that participants simply have/had no interest in museums. The principal reason for participants to visit a museum is for enjoyment 70.3% (n=38, see Figure 20).

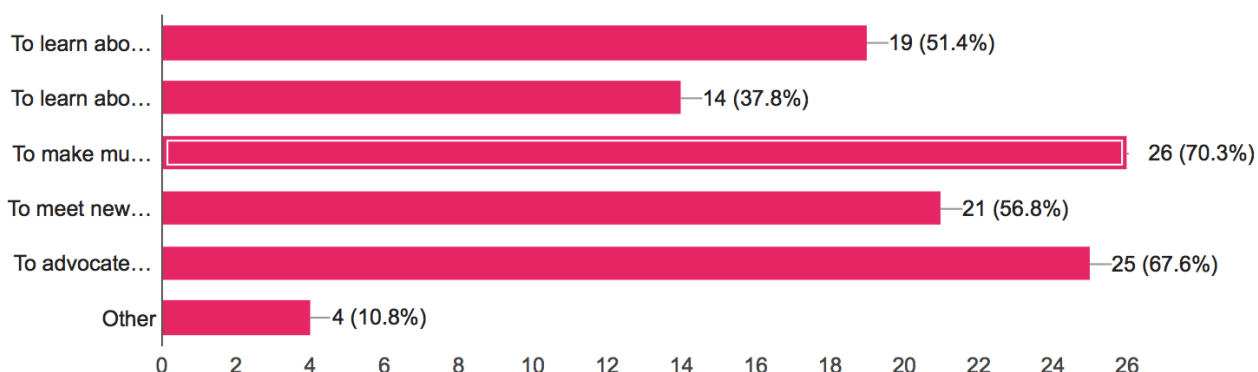


**Figure 19: Graph highlighting the different modes of visiting the museum (n=38).**



**Figure 20: Graph showing the different reasons for participants to visit museums (n=38).**

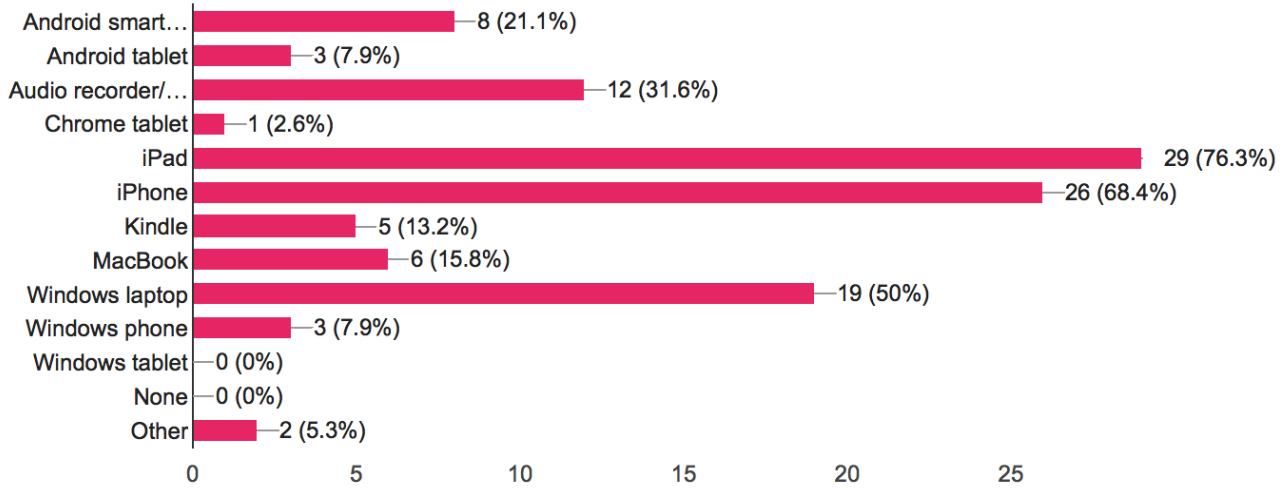
The participants indicated in the 9<sup>th</sup> question their main reason(s) for continuing and joining ARCHES project (see Figure 21). The two principal reasons for it are ‘to make museum more accessible’ (70.3%) and ‘to advocate for disabled people’ (67.6%) (n=37).



**Figure 21: The different reasons why the participants have joined and continue with the ARCHES projects (n=37).**

The participants usage of technology is predominantly Apple products such as iPads and iPhones, according to Figure 22. Yet, when analysing the data, one should consider that participants may have used their current

experience with the project where they have Apple Products available rather their own private usage. As mentioned above the participants had the option to ‘tick more than one’ and this should be remembered. Speaking with participants most of the participants either do not own a piece of technology or use alternatives like Android.



**Figure 22: Graph shows the different technologies the participants use (n=38).**

In the coming weeks, we are hoping to undergo a number of activities that aim to understand participants’ access needs and participants’ perception and experiences of perceiving museum objects and the museum space. This session will be designed and led by three participants. The activities are game based and set-up in small stations.

## 6 Working with partners

### 6.1 VRVis

Our colleague Andreas Reichinger approached us to do a follow-up research experiment as an extension of a paper he had presented at the ASSETS conference in 2016. The aim of the follow-up study was to test whether and to what extent the Audio-tactile tool could benefit people with different disabilities. We presented his offer to the participants on the 10<sup>th</sup> March prior to his visit the following week (see Figure 23).

### Before we start working...

Next week we will have a special session. Our partner Andreas Reichinger from VrVis will come to visit us:

- He will introduce himself
- Let us test what he has done so far
- He will tell us what he wants to do for ARCHES



**Figure 23: Screenshot of introduction to partners visit on the following week.**

For the VRVis visit, we invited a total of 8 visually impaired to join the session and subsequently the project. During this session, we had four different stations set-up. One containing the Sprout; one presenting his pasta-based models; one presenting his previous reliefs using wood and lastly one presenting two reliefs from the Museum of Fine Arts in Boston<sup>2</sup>. The session did not record any formal data for the follow-up study. It was purely for the participants to get to know our partner.

For the follow-up study, we opened up to participants the opportunity for one participant to write and coordinate the testing. The participants all created a questionnaire via Google Forms. We wanted the participant to have an interview like opportunity to go through the questions with one of us. The questionnaire consisted of questions listed in the next sub-sections.

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<sup>2</sup> The two reliefs were brought by Barry Ginley for the participants to have a chance to compare and contrast what is being used in other museums. We do not have any direct affiliation with the museum in Boston



## Before we start working...

Andreas has asked whether we would be happy to test his Gesture-Based Audio Guide.

- He wrote a paper on it which was published
- He would like us to test it out and evaluate it

**Would you like to test it out?**



Figure 24: PowerPoint presentation to the participants to introduce the follow-up study.

### 6.1.1 Technique of the interactive audio guide

**1. How did you find using the interactive audio guide?** (using a linear scale from 1-10. 1=not good and 10=very good)

Why?

**2. How understandable did you find the instructions?** (using a linear scale from 1-10. 1=not understandable and 10=very understandable)

**3. How simple were the gestures for you?** (using a linear scale from 1-10. 1=very hard and 10=very simple).

**4. What would you change about the gestures?**

**5. How easy was it to select certain parts?** (using a linear scale from 1-10. 1=very hard and 10=very simple).

**6. How happy were you with the number of parts described?** (using a linear scale from 1-10. 1=not happy and 10=very happy).

**7. Did you try any descriptions?**

- Yes
- No

**Were they unnecessary?**

- Yes
- No
- If so, which?

**8. Would you prefer different types of description?** (For example: music; poetry; storytelling)

- Yes
- No
- Maybe
- Don’t mind
- Don’t know
- If so, what would you prefer?

**9. How important is it for you that the audio guide is triggered only by certain gestures and does not talk all the time?** (using a scale from 1-10. 1=not important and 10=very important).

**10. How did you find the material?** (using a scale from 1-10. 1=not good and 10=very good).

**11. Would you prefer different material? If so, which?**

**12. Would you like colour/texture represented by sound as you move your fingers over the relief?**

- Yes
- No
- Maybe
- Don’t mind
- Don’t know

**13. Would you like to have a haptic response?** (i.e. vibration)

- Yes
- No
- Maybe
- Don’t mind
- Don’t know

**14. How does the tactile element enrich your experience of the object?**

**15. What would you like the sprout to project on the relief?** (please tick appropriate. You may tick more than one option)

- Animation
- High contrast modes
- Original colours
- Simplifications
- Nothing

**16. How would you rate the added value of projections on the relief?** (using a linear scale from 1-10. 1=not good and 10=very good).

## 17. Would you prefer a relief or a 3D model?

- Yes-I would prefer a 3D model
- No-I prefer a relief
- I don’t know
- I don’t mind

### 6.1.2 Relief of “The kiss”

**1. What was your impression of the relief?** (using a linear scale from 1-10. 1=not good and 10=very good).

**2. Which parts did you particularly like or dislike**

**3. How well could you get a sense of the whole painting?** (using a linear scale from 1-10. 1=not well and 10=very well).

**4. How well could you get a feeling for the details of the painting?** (using a linear scale from 1-10. 1=not well and 10=very well).

**5. How would you rate the amount of detail?**

- Too much
- OK
- Too little

### 6.1.3 The application of this technology

**1. Have you used tactile reliefs before?**

- Yes
- No
- Maybe-I don’t remember
- If yes, how does this one compare?

**2. Would you find it useful to have such technologies in a museum?** (using a linear scale from 1-10. 1=not useful and 10=very useful).

- **3. Would you rather go to a museum that offers such audio guides?** (using a linear scale from 1-10. 1= doesn’t matter and 10=much rather).

### 6.1.4 Demographic questions

The demographic questions used in this context were the same listed in section 5.

Over the course of 2 full days we conducted the research with 14 people (10 female, 4 male, 18-75, avg. 45)<sup>3</sup>. The approach taken in this study was based on the concept that people cannot be neatly allocated in disability

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<sup>3</sup> Some of the responses only include 13 answers rather than 14 this was due to the constraints within the participant-led mixed group (i.e. need of a BSL interpreter having to leave earlier).

categories: they instead have access needs that may relate to one or more categories of disability or impairment. For example, a participant who would be typically classified as visually impaired may prefer the sort of one-to-one support typically associated with those who have learning difficulties. Asking participants about their preferred access needs and not their disability not only enables catering for those needs but also furthers the creation of a universal tool that can be enjoyed by everyone regardless of category or need.

In general, the response was positive: it was “fun”, the multi-modal approach “made the information easier to process” and participants felt they “connected” to the painting and got to “explore it more deeply”. Several people said that they liked having the background information about the painting as this helped put it in context. The tactile element helped them pick out details they would otherwise have missed. Participants particularly responded to the detail in the base and clothing where the shapes were very distinct and intricate. However, it took time and focused support for the participants to understand the process of navigating the IAG. After the first session one participant requested a clear training mode. The training mode that was created was well-received but it only allowed participants to explore the gestures - it did not give them the step-by-step guide that was needed. Also, it became clear that audio or descriptive instructions do not work for everyone: “With learning disabled people you cannot just tell them what to do, you need to show them what to do”. This comment from a supporter shows that there is a need to create a more social training mode with videos and images. In particular, people with learning difficulties took more time understanding the process. They had not used tactile elements previously and were therefore not used to it. Overall, it seemed that those with the most severe level of visual impairment appreciated the system more, as people with sight do not have equivalent dependence on touch and audio. Of course, it is important to note that those with visual impairments are often more used to using touch as a means of learning and orientation, so this is not necessarily a direct or fair comparison. The learning curve on navigating by touch and audio was far greater for some participants than others.

In response to participant feedback in the first testing session, several additions and improvements had been made to the Interactive Audio Guide (IAG): a training mode, sound cues for the boundary areas of the relief and text captioning of audio descriptive content. These were then tested in the second session.

The IAG has the potential to further enrich the experience for non-blind and visually impaired users. When asking participants about possible projections onto the relief, 13 participants indicated that they wanted the original painting; 4 wanted a more simplified version; 3 wanted high contrast; and 3 asked for have an animated version of the painting. None of the participants said that they would rather have it blank (Figure 25).

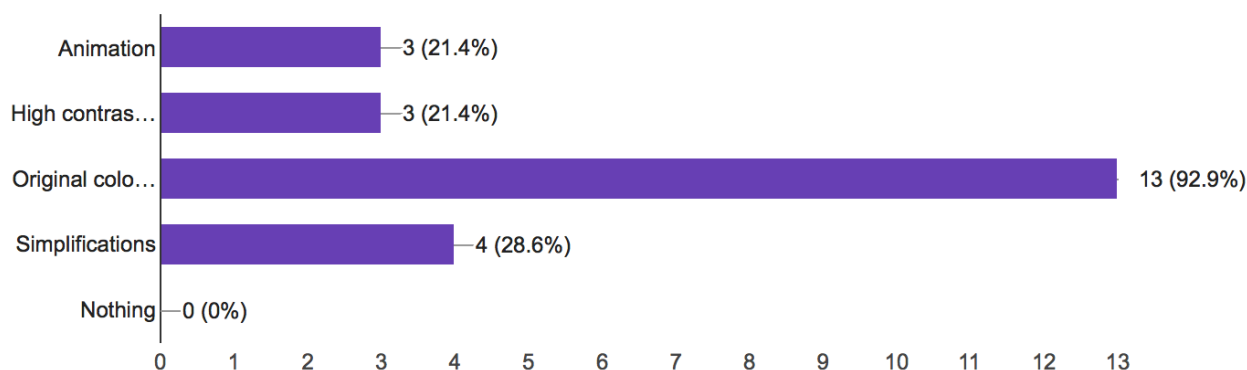
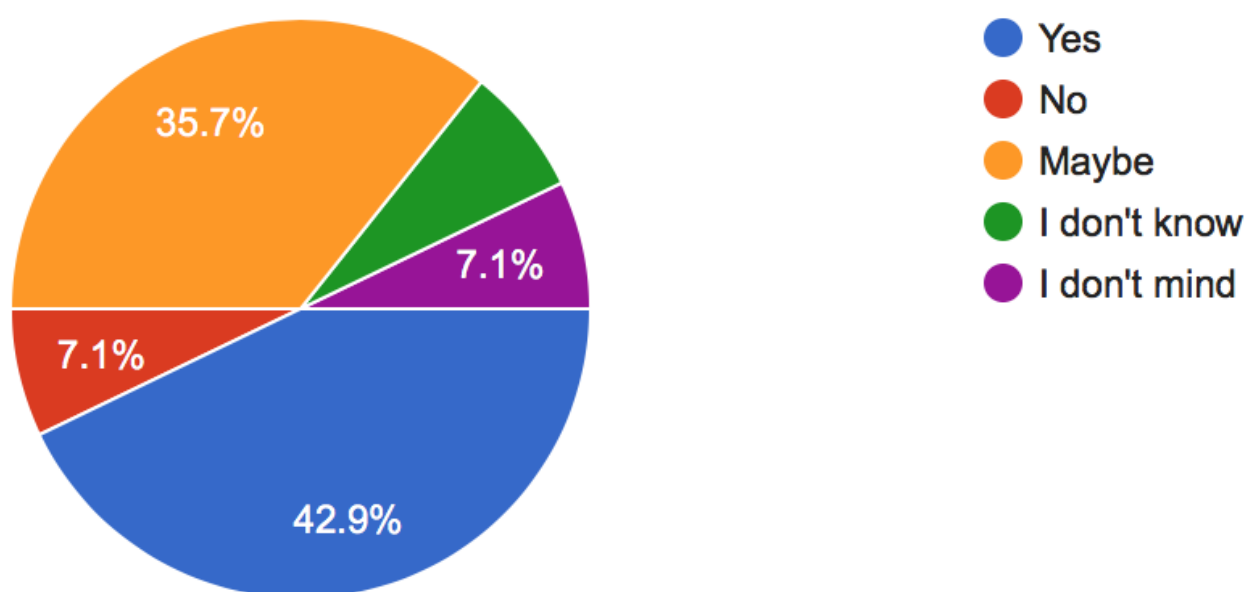


Figure 25: Graph showing the preferences for Sprout projections.

35.7% of the participants think that a projection would very much add to the value of the relief. For future applications, these results will have to be taken into consideration and implemented, especially if aiming to widen the application beyond BVI users.

When asked about a haptic response (such as vibration) 42.9% indicated that they would like to have it (Figure 26). Vibration could help participants with orientation but also help those who have both hearing and vision loss: such intersectional needs are currently rarely catered for and providing this would set IAG apart. Participants who currently use technology such as smartphones (and particularly those who use the accessibility features for low vision and hearing loss) were already familiar with this technology and keen to see it used in this context.

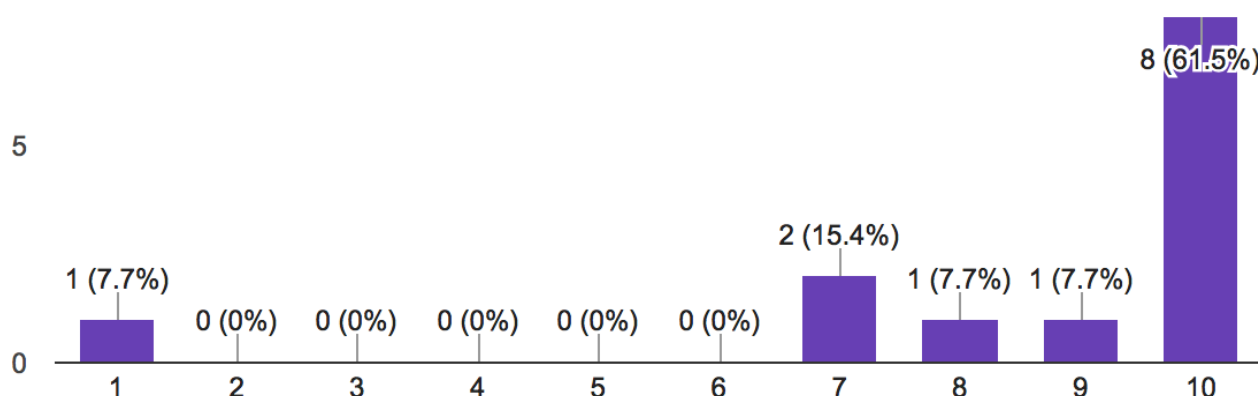


**Figure 26: Chart shows the interest in haptic response.**

The majority of participants (78.6%) were interested in sonifying the relief - representing colours and materials through sound. 6 (42.9%) wanted this feature added and were excited by the idea - "it would be the final piece of the puzzle, making it a complete experience". Such a development has the potential to enable participants to relate to paintings based on personal experience. Even participants with complete sight loss are likely to have had some sight at some stage in their life and therefore have some memory and knowledge of colour [2]. For those who have been blind since birth colours can be translated into temperatures (blue equalling cold, red as hot etc.), so this feature has a wide applicability. Again, this might be introduced as an on/off switch option to give the user more control of their experience.

All but 3 participants had never tried a similar technology before. This number is not necessarily surprising as a participant said 'I would have never tried it. I am used to the visual learning and that's it'. Compared to similar experiences participants said; 'Good because it is live but not enough explanations compared to other reliefs e.g. Living paintings.'; 'Great improvement on others.'; 'Very different experience (never done paintings)'. 61.5% stated that this technology would be very useful within the museum environment (Figure 27)<sup>4</sup>. Only one participant said that it would not be useful for them.

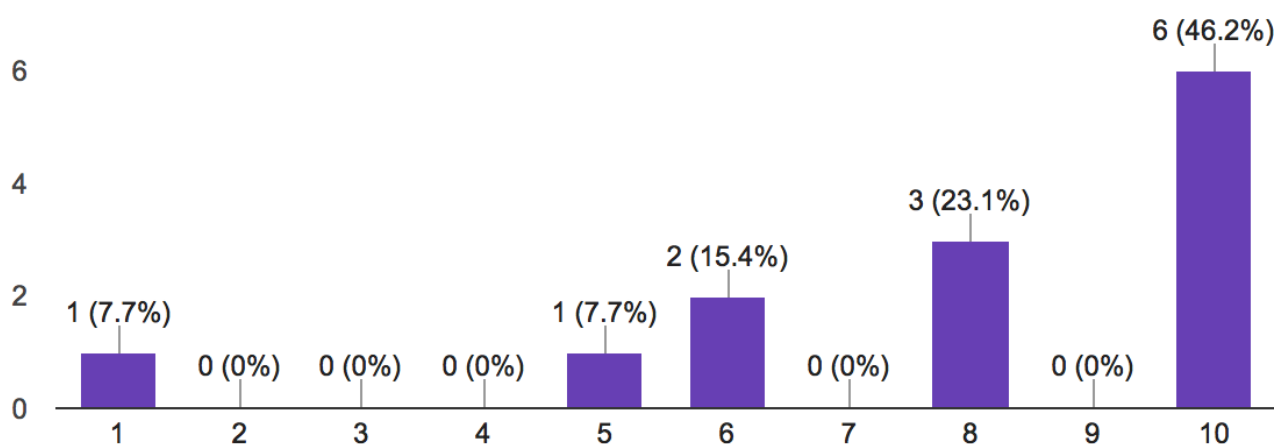
<sup>4</sup> Living paintings is a charity that produces touch to see books for BVI <http://www.livingpaintings.org>



**Figure 27: Graph showing the usefulness in the museum environment.**

Therefore, the feedback on the IAG specifically and this sort of technology in museums generally, was coming from participants familiar with using technology in everyday life. Therefore, it is important not to assign unfamiliarity with technology in general as a too significant factor, especially in analysing the more critical comments or noted problems in navigating the IAG. In the future more time and a clearer, layered and social tutorial should be offered to them and would support a confident and competent use of the IAG.

Six participants said that they would strongly (point 10 on the Likert scale) rather go to a museum if this would be available to them, three who rated 8 and three who remained rather neutral between 6 and 5 (Figure 28).



**Figure 28: Graph points out the interest of participants would have if an IAG would be included in the museum environment.**

Though half the participants visit museums at least once a month, we had 2 who visited museums less than once a year and 2 who indicated they would never visit a museum. It is also important to note the conditions under which participants visit museums: the half who visit infrequently are much less likely to go outside of a project or organised trip and require support in physically getting to the museum as well as one to one support once on site.

This highlights that even with high-tech solutions to accessibility such as the IAG, there remains a social element that is vital, especially for those who have the greatest access needs. However, it remains the case that innovations such as the IAG open up new potential for these participants in seeing museums as relevant

for and accessible to them. We just need to make sure the social support is also in place. A future study to focus entirely on people with learning difficulties and the IAG is planned.

## 6.2 Coprix

The development with Coprix has been hugely instructive for all the partners. Not only has the testing experience revealed a range of challenges for the technology companies in working with a participatory research group in a participatory manner, but also in relation to the importance of drawing upon the knowledge and experience of the museum partners. After the first phase of testing described below, Coprix took a proactive decision to go back to the drawing board and restart their development work. This flexibility was received with enthusiasm from the members of the London Exploration group.

The first Coprix testing was conducted on the 24<sup>th</sup> February. The version that we received was based on two objects within the Fundación Lázaro Galdiano collection<sup>5</sup>. The application was firstly available on an Android tablet. The first testing was conducted with a focus group of two learning disabled participants and two visually impaired participants, who experienced great difficulty. The participants with learning difficulties found the works of art chosen ‘scary’ and were unable to answer the questions. The information provided was too complex and the questions unrelatable. People with visual impairment had difficulty navigating the app (placement of fingers) and using the inbuilt voiceover.

It was not until the second testing (a week later) that the participants had the chance to play with the iOS version. The participants fed back that they would like to have from the beginning the option to add access needs (for example voiceover, captions etc.). The participants also said that they would like to have layered information as well as no games.

The demands were met when we received the V&A version at the beginning of March but only to certain extent. It has so far been tested with 20 participants ranging with a variety of different access preferences. The versions of testing (in the context of participatory research) Opportunistic sampling; Focus group; self-selecting sample. The application has not been tested with D/deaf participants or participants with severe learning disabilities. The reason for that is that Coprix has not scripting their texts until it is finalised and recorded.

At the moment, the entry point is Figure 29. Participants are still limited. What if participants have several needs or want to add/remove access offers in the middle of the game? The settings option is not enough (Figure 30).

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<sup>5</sup> The museum in Madrid has not started their participatory research group. The reason why it was given to us before the London museums was ‘a technical reasons’. The reason is that the clearest picture with most diverse objects is the “Witches Sabbath” out of all the paintings we got.’



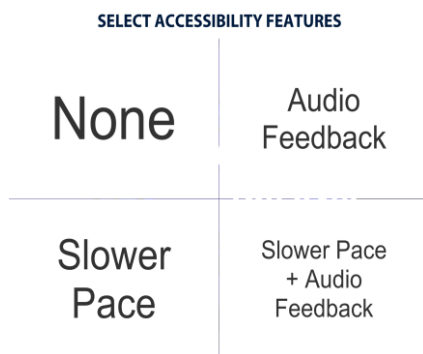


Figure 29: Screenshot entry screen to the Coprix V&A app.

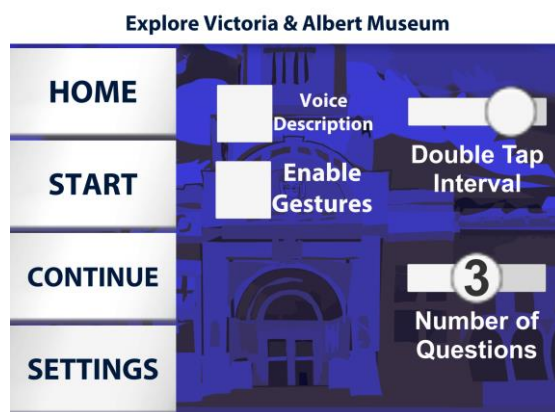


Figure 30: Screenshot of settings options.

After having the entry option participants start getting an introductory talk about the museum’s history. The participant has the option to continue with the game or listen to more information (Figure 31).



Figure 31: Screenshot of app where the player has the option to continue with the game or listen to more information about the history of the museum.



The game automatically assumes that the participant wants to ‘play’ and gives the player the option to choose one of two art objects. After choosing the object the player is directed through a ‘map’ of the gallery.

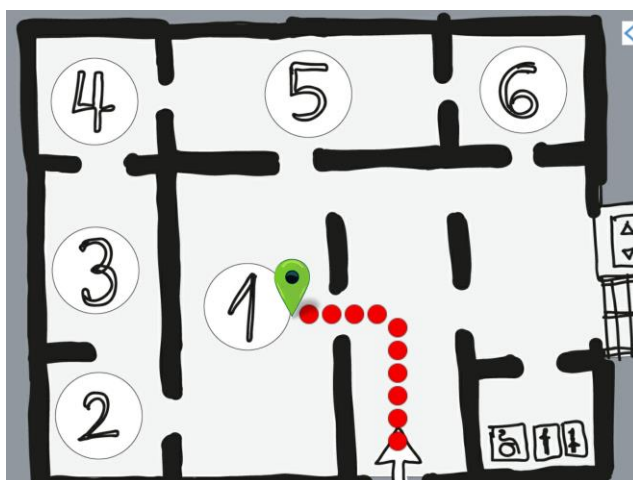


Figure 32: Screenshot of gallery map.

The gallery map is shown at the beginning ‘going to the object’ and at the end of the object-test the participants are asked to recall the room number (see Figure 32). This game according to the company is supposed to be a ‘memory game’ and while one participant liked the task, the majority did not remember the room number nor found it relatable and relevant.

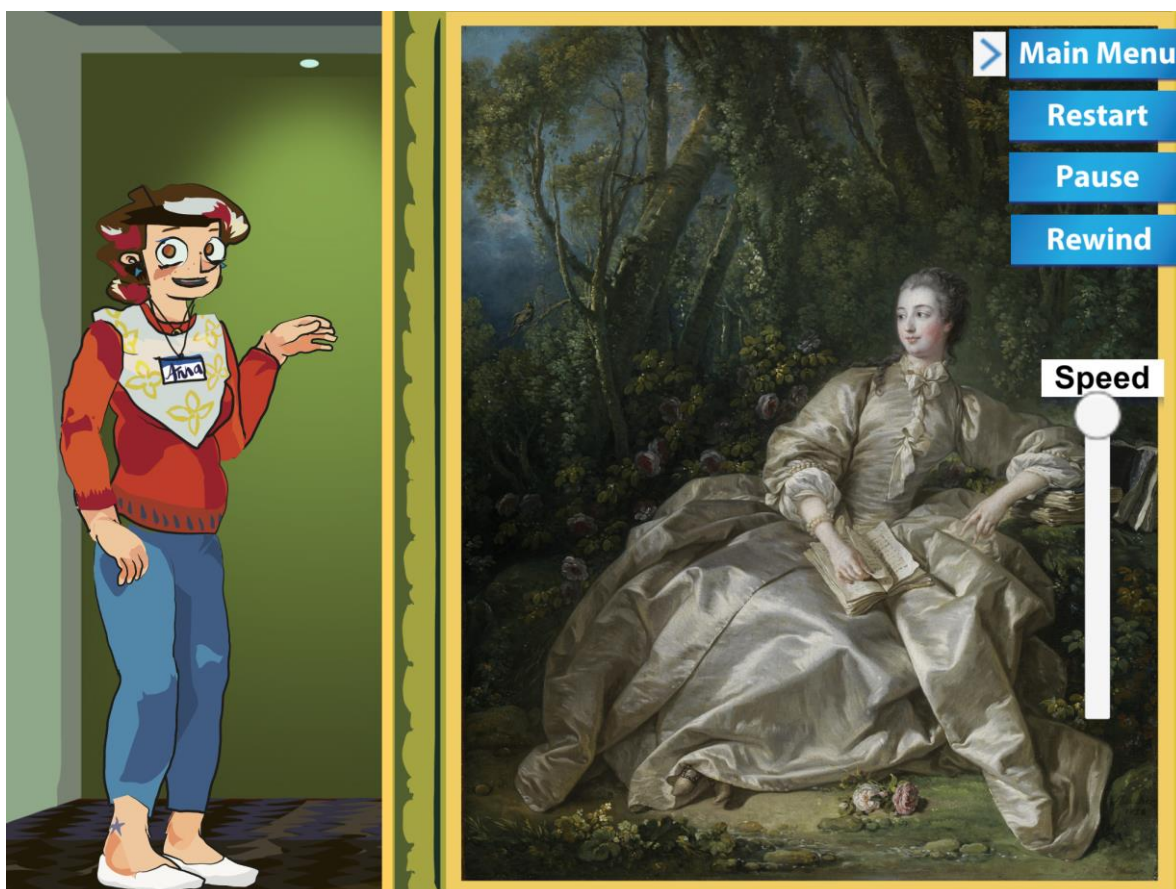
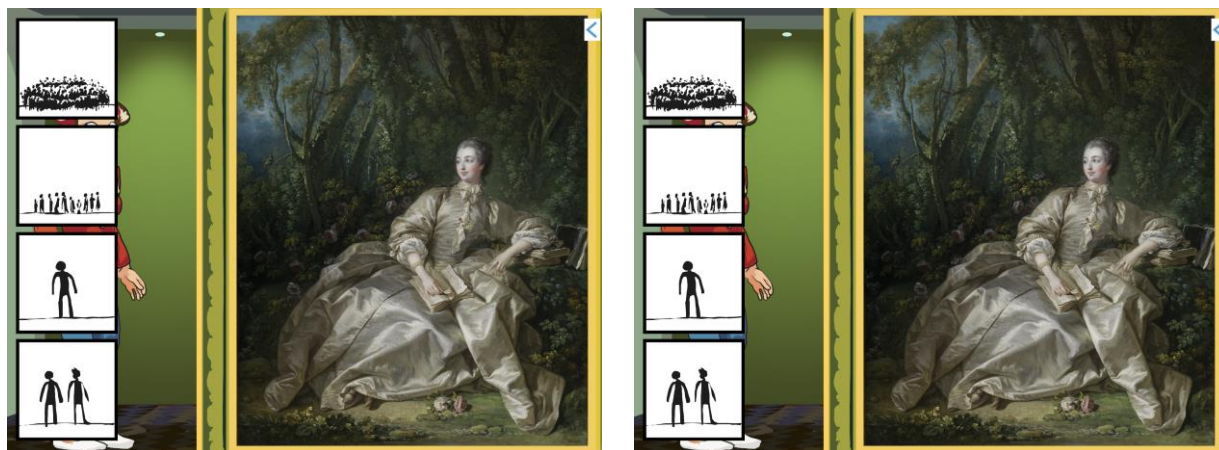


Figure 33: Image of guide in front of the object.

Once the participant arrived at the object it received an introduction of the game as well as the option to listen further to it. The text used for the explanations were not adapted to the audience testing it. We can also see in Figure 33 that the company built in a setting menu whilst playing. The problem with it is that it is too small and hard for participants to see and to know where to press. It remained impossible to use it with VoiceOver. The side menu still lacks ‘forward’ bottom for example that was requested by the participants.

The ‘game’ consists of answering questions after hearing the introduction to the art object. The questions cards are hard to decipher and the questions are unrelatable to the introductory text. Questions like ‘how many people do you see in the painting?’. If the participant gets it wrong the guide says ‘no, no, no’ and since there is no forward bottom the player is stuck. This has led to frustration amongst the testers (Figure 34).



**Figure 34: Images of two games tasks.**

When the player finally finishes with the questions s/he is guided to the ‘artist’ studio (see Figure 35).



**Figure 35: Image of visit to the ‘artist’ studio.**

The player does not actually get to meet the artist but a colleague and has to recollect the painting just described. Once the artist ‘recognizes’ the object in question it gives a brief yet complex description of the making-off the object.

The game was on two sessions not tested by participants due to the lack of interest.

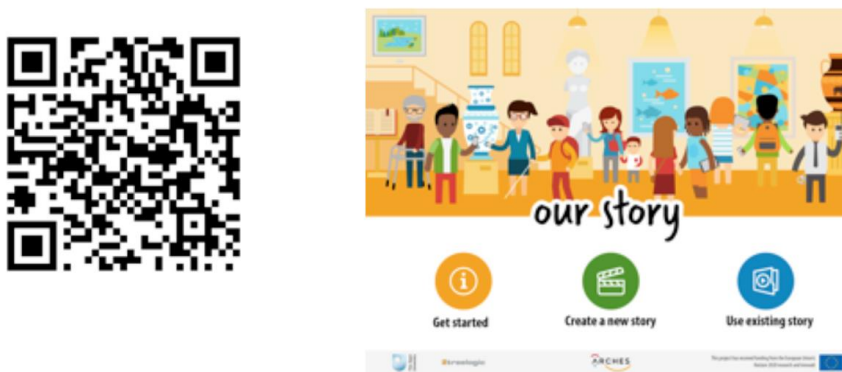
The questions that need to be answered when designing a game for our group are: Who is the app for?; in which context is the app supposed to be used?; Should we offer different types of ‘experiences’? and how can the game reflect the participants’ interests and wishes. These results were presented to the partner during the partner’s meeting in May 2017 and Coprix decided to stop developing the the current version. Coprix has begun this work by visiting the participants, exchange of ideas and seeking suggestions.

It has been evident from this process that the technology partners need to start from the interests, knowledge and experience of the participants and also of the museum partners. If technology partners do not engage with these partners early on in the development process then they risk wasting considerable time and expense producing something which is not relevant to their needs and interests. It seems essential that the partners work in small steps. Sharing their ideas and seeking ideas for initial thoughts and then giving opportunities for feedback at each small stage along the way. This will not only ensure that they have feedback in an ongoing manner but it will also produce a manageable workload for the Exploration groups in assessing and responding to the developing technologies. In order for all the partners to work in this way, efficient lines of communication must be opened and maintained. A clear time line of production also needs to be created and revisited to enable each partner to effectively plan their part in the process.

### 6.3 Our Story

When the application was redesigned for the project the topic of the logo was an important discussion in which we included the participants. During the 6th session (on the 10th February) we presented the participants with the image in Figure 36.

## Our Story is being developed. Do you like the logo?

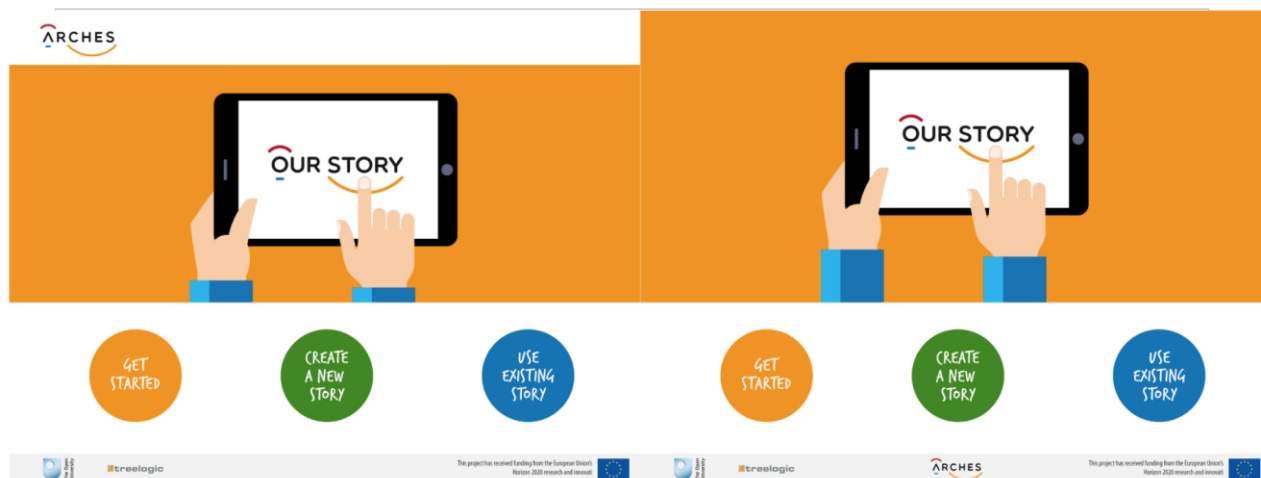


**Figure 36: Screenshot of PowerPoint presentation shown to the participants on the 10<sup>th</sup> February.**

We explained to the group openly the doubts of the consortium; how they wanted the product to be neutral (so it could be used outside the museum environment); diverse but not disability specific. As a result, the participants suggested stripping the logo and to just have hands holding a tablet.

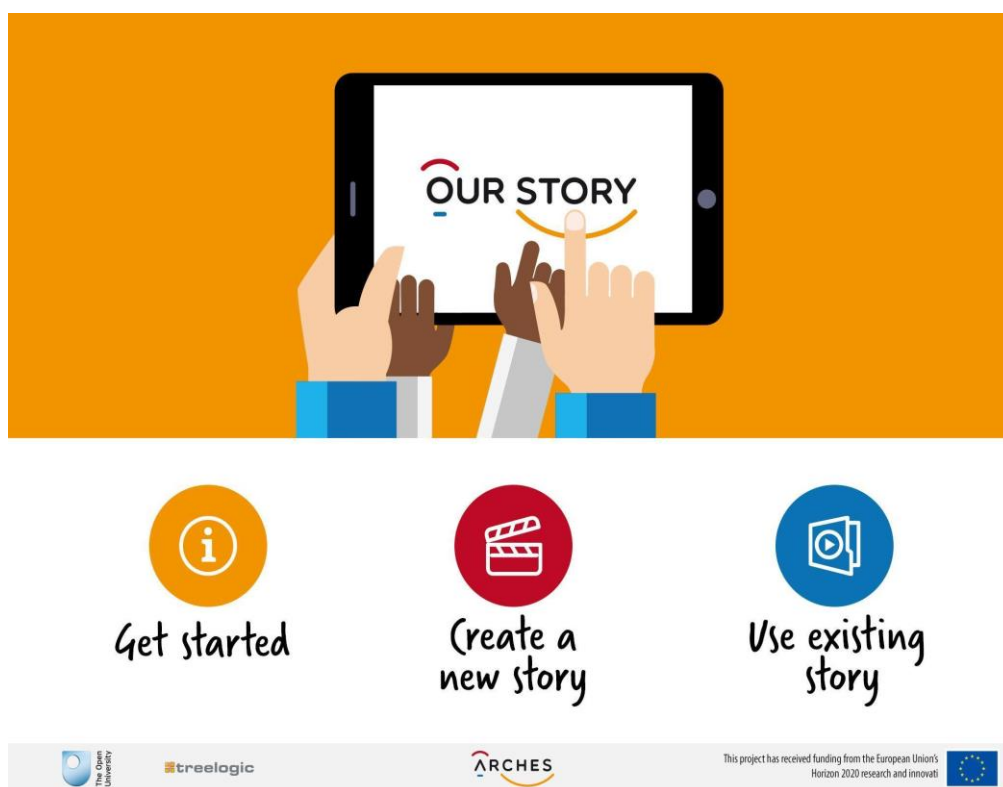
By the 8<sup>th</sup> session (on the 24<sup>th</sup> February) the participants were presented with the following two options illustrated in Figure 37.

## Our Story logo



**Figure 37: Screenshot of slideshow presented to the participants on the 24<sup>th</sup> February.**

This final slide resulted in the participants making their final comment: that they wanted more diversity in age range and in ethnicity. So, the designer from Treelogic created the final logo in Figure 38.



**Figure 38: Final logo for Our Story.**

Our Story has only been tested on Android tablets during the course of one session on the 5<sup>th</sup> May. The participants found it difficult to get used to the application particularly with the option of saving and taking photographs. After the session was conducted we decided to report back to Treelogic, the developers, before continuing the testing. The application is due to come out in iOS version in the summer. Previously,



participants have been encouraged to see Our Story as a diary to use, especially when doing external museum visits.

## 6.4 RixWiki

Working with the Rix Centre has proven to be difficult. In November 2016, prior to the start of the participatory sessions, we were assured that the application would be screen-reader friendly. Only to discover that it was not. We introduced RixWiki to participants right from the start during the second session (12<sup>th</sup> January). The application was introduced for the participants to have a platform to store and share their museum findings.

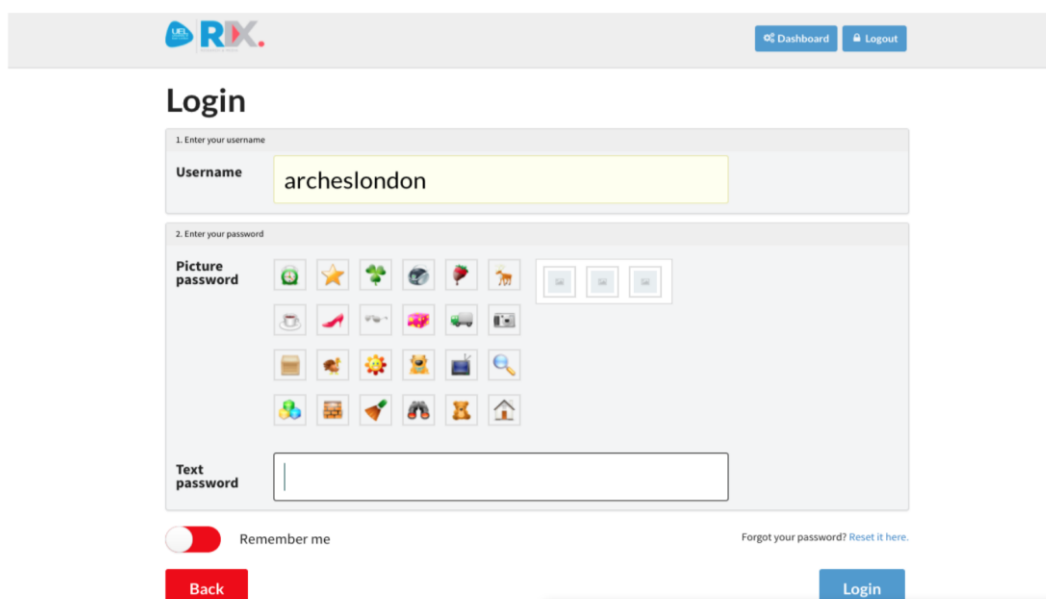


Figure 39: Screenshot of RixWiki login page.

## Your views of the data collection methods Talk to someone and record your ideas

- What did you think of the way you recorded your visit? (Photos/video/talking/notes/audio recorder)
- What did you think of working with the iPad or Amazon Fire or Android tablet?
- What did you think of recording the interview with audio or video or doodleart?



Figure 40: Screenshot of presentation to participants.

## Homework slide

Can you find a way to upload your recording of the visit to the museum on your RixWiki?

<https://www.rixwiki.org/account/login/>

Username: archeslondon

Password: archeslo



**Figure 41: Screenshot of homework slide for participants.**

During the week when participants explored RixWiki, we received comments of how the application was not screen-reader friendly and how difficult it was to be used. The participants upon that comment received an audio-descriptive, instructive video as well as a written 'How to Guide'. This information was provided by us and not Rix Media. Rix Media received a detailed explanation from one of our participants who uses screen readers as to what was and was not working. As a result, the centre decided to work on it and have been discussing with technicians the changes since. One employee came on two occasions to visit the group as well as our blind colleague Barry Ginley to understand the struggle people were having. These visits occurred in April. We will continue to support Rix Media by providing feedback for their redevelopment, however at this stage we will not be using the RixWiki as originally intended.

## References

- [1] Seale, J. (2016). “How can we confidently judge the extent to which student voice in higher education has been genuinely amplified? A proposal for a new evaluation framework”, *Research Papers in Education*, 31 (2): 212-233.
- [2] RNIB, n.d., “Key information and statistics”. Available online at (1<sup>st</sup> April 2017): <http://www.rnib.org.uk/knowledge-and-research-hub/key-information-and-statistics>