

B. Balbi e A. Marasco, *Cultural Heritage for All with Virtual Reality: early findings of a Scenario-Based Design Approach*

Abstract

This work describes the findings of the early stage of a research aimed to design a virtual reality (VR) solution as a compensatory tool for improving the **accessibility** of cultural heritage sites for visitors with mobility impairments.

For the research the **Scenario-Based Design** method (SBD) is applied to identify user requirements of the VR interface, within the User-Centered Design approach used for the co-design of the visitor experience.

Based on this method different personas and corresponding scenarios are designed to represent the needs, motivations and behaviors of the main user groups and the applications of compensatory technological solutions.

Further, the SBD is used in the prototyping phase as a tool for co-design activity, which involved users with specific accessibility needs, designers and other stakeholders to identify the requirements of the VR solution.

The paper presents the preliminary findings relating to the functional and experiential requirements and discusses the methodological and practical implications to support the use of this approach for the co-design of digital solutions for cultural heritage accessibility

As tools for the co-design process, we have designed 4 personas (i.e. archetypes reassuming characteristics, behaviours and needs of a person or a group of people) based on three main features: 1) accessibility needs, 2) engagement with cultural heritage, 3) attitude and use of technologies in tourism/leisure activities, including VR. This allowed to design with a continued focus on the user/visitor. In relation to the four personas, four scenarios have been designed. The Figure below describes the correspondence between *personas* and *scenarios*.

Accessibility of the site	Personas' motivation and attitude towards technology	Scenarios' Storyboard
Totally inaccessible	Persona 1: High motivation to visit heritage, high attitude to use technology (included VR)	Persona 1 is a young woman with a permanent mobility impairment would go for a cultural visit and a friend proposes her to visit an amazing church that unfortunately is totally inaccessible... (to be continued).
Partially accessible	Persona 2: Medium motivation, medium attitude to use technology, low experience with VR.	Persona 2 (Fig. 2) is a man with a permanent mobility impairment, member of an association for people with disabilities, and he is looking for a site for the annual journey day. He finds an interesting partially accessible cultural site ... (to be continued).
Partially accessible	Persona 3: Low motivation, high attitude in use of technology, included VR.	Persona 3 is a young boy, with a broken leg, who is visiting a site with his classroom, but he is very bored and the partially accessibility of the heritage site is a barrier for him... (to be continued).
Totally or partially inaccessible	Persona 4: Medium motivation, low attitude in use of technologies, no VR experience.	Persona 4 is an old woman with a great desire of visiting a cultural site with her grandniece, but her mobility is limited, and the site is not totally accessible... (to be continued).

Personas

Group 1
informational
needs (pre-visit)
autonomous
planning
occasional
visitors
low-medium tech

Alfonso



Alfonso is part of an association an association that aims to support the personal empowerment of disabled people, and is, as a consequence, informed and aware of every critical aspects linked to the theme. He moves on a folding wheelchair. Concerning the theme of travels and cultural visits he's very downhearted, since his experiences have never been completely positive; but he still searches for accessible places and moments and he still collaborate, with his group, to their planning. His experiences with cultural visits that proposed devices for virtual and immersive visits, on the other hand, impressed him favourably, even though he's still critic of the scarce competence of the staff in the cultural sites and of the bad information concerning accessibility of the public structures.

The first point of his association's manifesto is:

Accessibility is an holistic concept that has significant importance for the life's quality of the whole humanity, for a complete society is inclusive and accessible in physical, mental and cultural terms.

Age
55

Traits
Informed and conscious

Employment
President of Disabled People
Association.

Curiosity for innovations



Willingness to cooperate



Involvement



From the app he expects:
not a special solution
for disabled people nor
a completely different
visit, but a way to fully
share the visit's
experience with others .

Group 2
availability of
tourism services
frequent visitors
High tech



Maria

Maria is a young woman very active on the front of accessibility overall. Affected by a pathology that prevents her from moving her legs and, partially, her arms, she manages to move independently thanks to a “evoluted wheelchair”, as she likes to refer to it. She’s very active and lives a life rich of interests which she doesn’t limit because of her pathology. Traveling is a passion that she transmit to those she loves, who is often, in her opinion, much less active than her... she has already dealt with the theme of accessibility to the cultural heritage with a project on the expanded routes of Pompei, of which she has been a testimonial.

***Accessibility is mostly found in information.
Visiting places of culture is a moment of awareness of one’s
own cultural identity.***

Age
30

Traits
Active and curious

Employment
....cyborg...

Curiosity for innovations



Willingness to cooperate



Involvement



From the app,
she expects:

The possibility of
knowing as many
details as possible on
the places she visits
using immersive
systems as well.

Group 3
physical
accessibility
barriers onsite
Frequent visitors
Elderly people
Low tech



Marina

Marina is a 73 years old woman, retired from work since a long time ago, and she still has many hobbies such as painting. This is why she loves walking through the city to see new places. Even tho she can't walk long distances because of her age,she always tries to visit new places: the last trip on a tibetan bridge left her astounded!
She usually travel with a group of friends of her age, but sometimes she's accompanied by her nephews.
She loves hearing stories about places she visits, and she likes that it's someone passionate telling them.
Her relationship with technologies is almost inexistent, but she doesn't turn back if she needs to try new things even tho she finds them superfluous to all real experiences.

Technologies don't tell good stories!!

Age
73

Character
Cheerful and open

Occupation
Grandmother

Curiosity for innovation



Willingness to cooperate



Involvement



From the app she wants:
she's curious about virtual reality, but the experiences she had with it never amazed her, so she wants the app to show her something completely different and if possible to tell her a good story!

Lorenzo



Lorenzo is an high schooler, but volleyball is his real passion and he plays in a team since he was ten. Unfortunately, he often had incidents and the last one forced him to use plaster and crutches because of a broken leg for three months . During that time his classmates went on a school trip in another city... “a real tragedy”, he says.

He’s curious and he loves travelling until now almost always with his family, but he’s not that interested in cultural trips: museums and similar annoy him, and so he spends most his time watching them from behind a smartphone and taking selfies... He likes a lot spending time with his friends and generally sharing is part of his cheerful and open attitude. Just as for most people of his age, videogames and new technologies aren’t a secret!

I’m ashamed to say so... but sometimes you only need google maps to visit a museum!!

Age
17

Character
Cheerful and open

Occupation
Student and Volleyball player

Curiosity for innovation



Willingness to cooperate



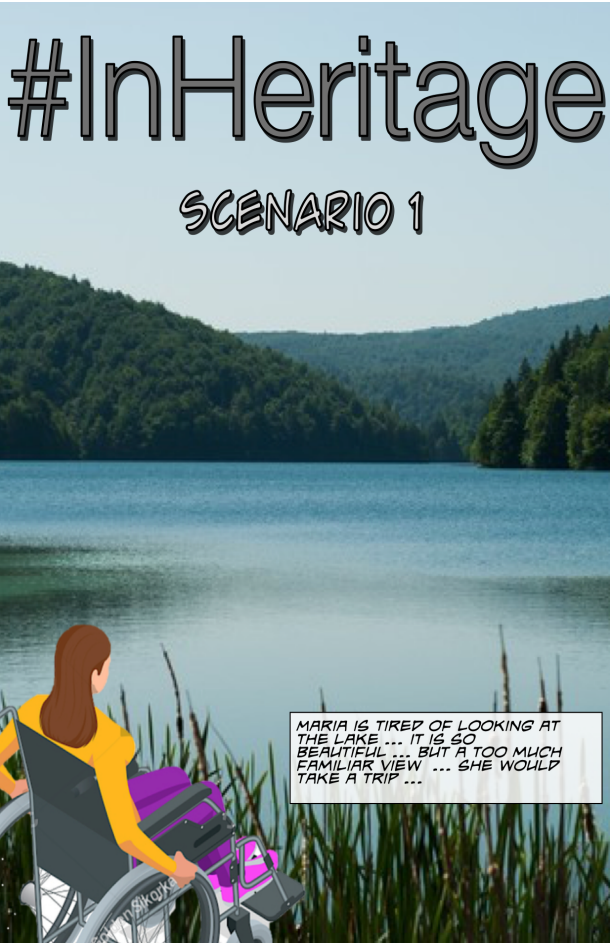
Involvement



He’s fascinated by virtual reality in general, if the app could be similar to a videogame it would be perfect for him.

Scenarios

Scenario 1.
Totally inaccessible site + user 2.



Scenario 2.
Partially inaccessible site + user 1.



Scenario 3.
Partially inaccessible site + user 4.

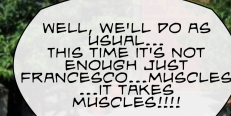
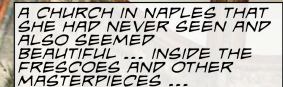
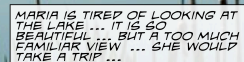


Scenario 4.
Partially inaccessible site + user 3.



#InHeritage

SCENARIO 1

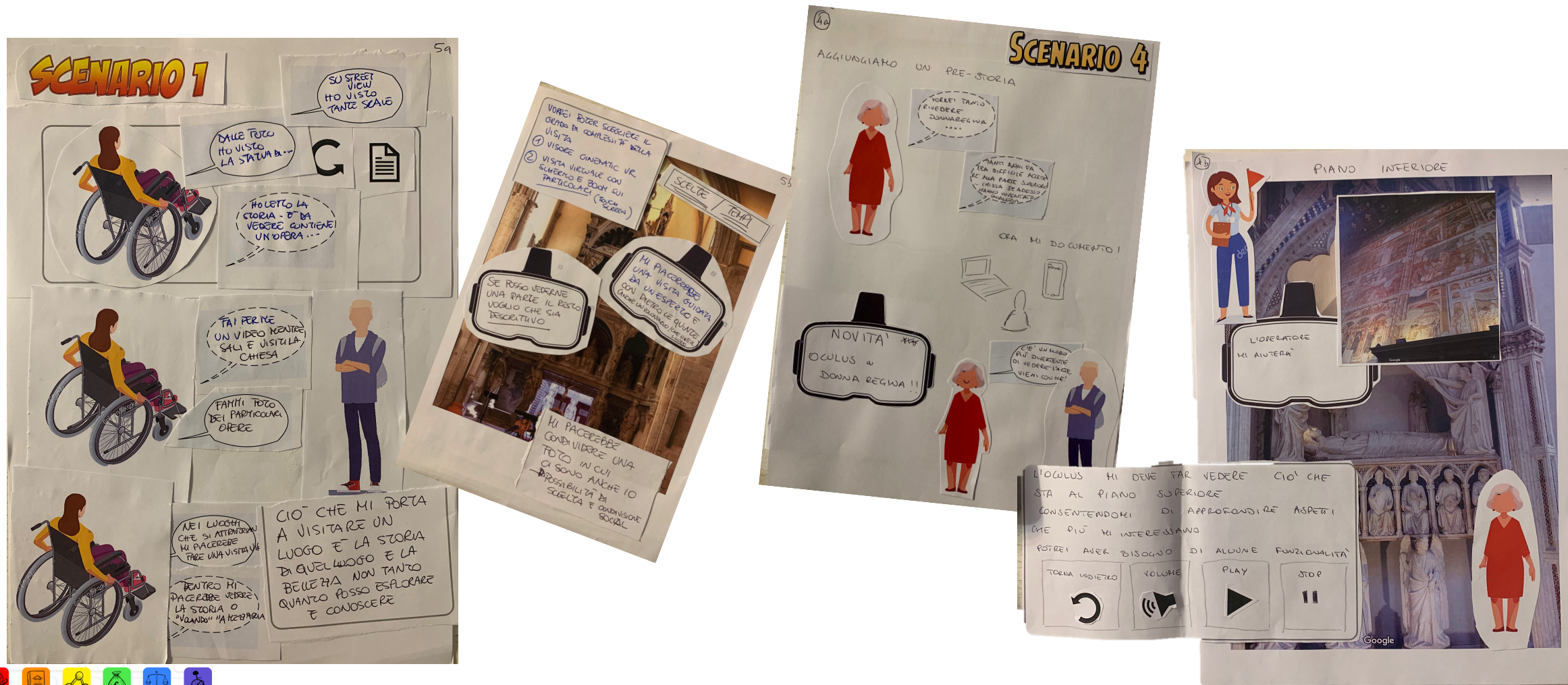


Scenario-Base Design method: the focus group

Participants		Time: 1 day	Goals	Activities
U1	president of a disability association		Empathy	Know each other
U2	user with permanent mobility impairment	Method: Pairs of users and designers involved in a Co-designing activity of VR experience through Scenario based design methods.	Evaluation of involvement and specific skills on the key issues proposed by the project.	Acquire informations on the level of involvement and knowledge on the proposed themes
U3	user with permanent mobility impairment			Accessibility Cultural Heritage Use of technologies
U4	old user with mobility impairment/		Presentation of the Activity of Co-Design, development of scenarios.	Sharing of design tools design. Scenario presentation
U5	founder of a start-up for accessible tourism experiences			
U6	accessible tourism expert		Co-Design activities, scenario development Experience Design and VR Experience Design	Co-design of the follow-up of the storyboards aimed to imagine the experience with the technological solution and Co-design of some of the pragmatic requirements of the VR solution.
U7	hardware developer			
U8	the designers of experience			
U9	the designers of VR interface			
U10	UX Designer			

Scenario-Base Design method: the focus group output

Each pair imagined the storyboard continuation visualizing the usage scenario of the application with its functional requirements.



The preliminary results of the co-design activity provided useful elements for VR development regarding both experiential and functional requirements.

Experiential requirements

1. Universal Solution - The experiential elements should provide for requirements of users with different accessibility needs in line with *Design for All* principles.
2. Cultural engagement - Curiosity for the cultural experience is the driving force of every imagined scenario, independently from the level of cultural motivation.
3. Connectedness - The possibility to share the experience with users with full access possibility is a fundamental element and it is imagined as the live streaming of contents during the visit.
4. Intellectual stimulation - The virtual experience is a trigger to arouse the interest and motivation of users to learn about the site. It is stressed that it should be promoted during the pre-visit phase in order to engage users with different accessibility needs.
5. Storytelling – The narrative modality emerges as an important element; the involvement through an engaging storytelling is requested by users, especially in the initial moments of the on-site visit.
6. Autonomy – Personal smartphone is preferred to head-mounted displays in relation to the possibility to use it more autonomously.

Functional requirements

1. Multimodal interaction. Narrative modalities of contents are strictly linked with the devices' functional requirements: for a more immersive visit with the possibility to explore many details, mixed reality and the use of different device is preferred;
2. Minimal action/Minimalist design. The immersive modality is requested in the first moment of the visit, but, aim to autonomous use, the users need an interface menu useful to navigate in all directions and zoom on details of site through basic controls;
3. Capacity of immersion/Use of diegetic and extradiegetic Sound. In relation to the point of view, generally it is described as very close to artifacts, even "inside" them, i.e. the visitor wants to be immersed into the scenes of a painting. In addition, sharing the point of view of those who are not in the same part of the site via streaming. A voice over of an expert is requested to fulfill intellectual needs;
4. Capacity of immersion/user participation - For improved accessibility, the functional requirement should provide for details of the site, such as the presence of inaccessible areas as well as details regarding impediments and difficulties (floors, ceilings) in the areas that the user can visit;
5. Application Access. For increased autonomy, no profiling is preferred, but just automatic link when the visitor is onsite through personal devices;
6. Ease of use. Headsets/headphones are not preferred as they could not be handled independently;
7. Co-located collaboration/ Remote collaboration. The designed scenario includes the sharing of the experience through various modalities: the posting of photographs after the visit through the application, during the visit via chat (i.e. in the form of call out), through a form of interaction like multiplayer.