Service co-design to envision the transformation of museums

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This paper presents an ongoing European project developing new services to make the cultural heritage accessible and engaging for older people with disability, even beyond the museums' walls. A group of stakeholders including museum operators and experts, older adults, healthcare professionals, designers, technology providers, and accessibility experts were involved in reflective and hands-on activities to develop a vision of barrier-free cultural experiences. Scenarios of future services were defined following a co-design methodology developed during the project and applied in collaboration with several museums and care homes in 5 European countries (Austria, Italy, Slovenia, Portugal, Switzerland). They include digital technologies available in the project allowing tactile explorations of artworks, descriptions provided by avatars using various European sign languages, accessible contents for blind and visually impaired people etc. The scenarios were clustered in 3 Service Delivery Models metaphorically named "The Bag", small and portable objects to bring the cultural heritage outside the museum, "The Box", a display case containing diverse tools and multimedia contents to perform creative laboratories at day-care centres and nursing homes, and "The Screen", a virtual experience of cultural heritage sustained by expert tour guides working remotely. The co-design methodology and the resulting outcomes are described in detail in the paper. The project serves the purpose to support the innovation of the cultural sector beyond the digital transformation: indeed, the new services are not limited to the adoption of key enabling technologies, they rather address new areas of intervention outside the traditional cultural contexts, and new audience engagement strategies.

Keywords: co-design; cultural heritage; seniors; engagement strategy

1 Introduction

Museums face several challenges to serve their mission for the benefit of the present and future generations. To deal with the ever-changing society and with possible contingent situations (like the COVID-19 pandemic, or the decline in public funding), they undergo a dynamic process of transformation that can radically change the museums at different levels: in the way the visitors are conceived (e.g., as an undifferentiated mass public, or as social groups with special needs), in the

strategies to engage diverse audiences, in the design of the exhibits, in the competencies of the personnel or the partnership with organisations in other economic sectors (ICOM, 2020, 2021).

This paper presents innovative museum services developed in the European project Beaucoup to accompany the transformation in the cultural sector towards the engagement of older people beyond the museums' walls. Beaucoup is an ongoing project to develop new Service Delivery Models (SDMs) to make the cultural heritage accessible and engaging for older people with onset or age-related disabilities in contexts like nursing homes, day-care centres, and meeting places of the local communities. The SDMs combine digital technologies, tangible artefacts, multisensory stimulation and new interaction modalities, to provide customised cultural experiences.

To ideate, develop and evaluate the SDMs, Beaucoup leverages the active involvement of different stakeholders: older people, museum experts, healthcare organisations, accessibility experts, public administrations, designers and technology providers.

This heterogeneous groups of people were involved in a series of co-design workshops to envision future services fulfilling the vision of the project to: a) enlarge the museum context beyond the museums' wall; b) enable participatory museum practices where older people are actively engaged; c) promote the cultural heritage through multisensory cultural experiences, considering the changing needs of the ageing population; d) define new audience engagement strategies through synergies with healthcare organisations and local communities.

The paper contributes to the ongoing debate on defining a new role for museums beyond the conservation of cultural heritage. By presenting new services for older people with disabilities, this paper provides insights for defining new engagement opportunities for this target, based on multisensory experiences and participatory practices.

2   Research background

Throughout history, museums underwent radical transformations in their mission and role (Macdonald, 2006): museums moved from being private collections of precious objects to convey the power or to serve the intellectual interest of their owners during the Renaissance, to be institutions devoted to the exhibition of the cultural heritage in the 18th century, but mainly for art students, scholars and the upper class of the society. In the 20th century, museums started to accept the mandate from government bodies and society to serve diverse functions for the benefit of present and future generations.

More recently, the museum mission is going beyond conservation, study, education and enjoyment, towards new functions: museums can act as sources of local pride, memory stores of cultural communities, and meeting places where cultural diversity, dialogue, tolerance, respect and inclusion are means to reach a positive impact on the society (Black, 2012).

Museums face diverse challenges to pursue this mission in the ever-changing society, while they compete against other cultural leisure services to engage the audience. To face these challenges,

museums are transforming their epistemology by moving from the collection-centred approach to the audience-centred approach (Hooper-Greenhill, 2000; Ballantyne & Uzzell, 2011): this new trend relies on a deep understanding of the needs and demands of diverse audiences, and on the design of tailored educational activities, exhibitions, tools and services.

Applying the audience-centred approach is more challenging when the goal is to engage the so-called non-visitors: those who never visit and never contemplate visiting a museum, those who have visited once but never again, and those who rarely visit museums (Davis & Prentice, 1995). This broad category of potential audience includes older people with disabilities who face diverse barriers that prevent them from having accessible cultural experiences.

They might experience barriers to reaching the locations of cultural institutions due to, for example, long travelling, hospitalisation, or motor disability (Kay et al., 2009). Once in the museum, they might experience sensory and cognitive barriers due to poor accessibility of culture-related contents and tools. Thus, the cultural experience might be impossible, inadequate or might require the assistance of other people like caregivers and museum personnel.

The accessibility of the cultural heritage represents a "wicked problem" (Rittel & Webber, 1974) that is complex, deriving from an interrelation among environmental, socio-cultural, organisational, technological and political issues, and thus it requires a holistic, systemic and future-oriented approach to explore possible solutions.

The introduction of digital technologies in museums partially provides a solution to this wicked problem. The design for accessibility should adopt a lifelong perspective to consider the changing needs and abilities of the people, addressing inequalities and exclusion. Temporary disabilities, onset and age-related disabilities require the design of multiple tailored and customizable solutions instead of a one-size-fits-all instrument.

Moreover, the transformation of the museums towards effective engagement strategies can be driven by the design of accessible services beyond museums' walls, to reach people where they live, meet and spend time.

Based on these considerations, the Beaucoup project addresses the need to bring cultural heritage outside the traditional cultural contexts, using digital technologies, multisensory stimuli and participatory practices which empower both the museums and the audience.

3 Technologies for audience engagement

With the recent advancement of digital technologies, museums employ digital technologies as key resources for engaging the audience by offering innovative museum experiences (Mohd Noor Shah & Ghazali, 2018). One trend is focused on the augmentation of the museum collection with visual contents using mixed reality technologies, to stimulate the visitors' interest and to convey information about the heritage. Another trend promotes hybrid and multisensory experiences.

For example, the GIFT project (Black et al., 2018) developed a wide range of solutions to create hybrid museum experiences that combine the physical and digital realms. The M5SAR system makes a step further by integrating multimedia contents, olfactory and gustatory stimulation into a mobile device to experience the museum collection in a novel way (Rodrigues et al., 2019). These projects make use of innovative technologies to enhance the visitor experience inside the museum contexts, without specific reference to accessibility and inclusion policies.

Other initiatives specifically address the accessibility of cultural heritage. For example, the project "Access to Heritage" experiments with diverse tools to make the cultural heritage accessible for people with learning disability, using a combination of physical and digital tools: e.g., tactile reliefs, sensory gloves, picture frames showing digital images while playing songs.

However, the majority of projects using technologies for the audience engagement provide engaging cultural experiences inside the museum. For people who are unable to access the museum due to limited mobility or sensory and cognitive impairments, all these new opportunities for engagement remain inaccessible.

3.1 Enabling technologies for BeauCoup

The Beaucoup project is carried out in partnership with 3 research institutes/universities, 4 high tech companies specialised in developing assistive technologies, 3 home care associations, and 5 museums in Europe. The vision of the project is supported by a set of enabling technologies used as a design trigger to define and implement future museum services with a participatory and human-centred orientation.

In the following we first describe the technologies and later introduce the co-design methodology defined to advocate for inclusive design practices within the consortium and the stakeholders involved in the process with the ultimate goal to define new services for older people engagement.

3.1.1 Visual enhancement of screen base technologies

Although the screen readers are widely available, people with low vision still face difficulties when it comes to consumption of digital video content. The software OptiVID was developed to make the videos fully accessible for the visually impaired: it is a software solution that allows adjustable visual enhancement of digital contents to improve visibility for people with low vision or colour blindness. The solution is highly customisable and allows live adjustment, parametrisation of filters and optimization techniques of digital contents. Based on a range of image manipulation techniques, the person can set the preferred filters, to adjust the contrast, saturation and grey scale (Sackl et al., 2020; 2021).

3.1.2 Tactile tablet

The tactile tablet is a commercial solution (available off the shelf by the company Feelif) designed for blind and visually impaired people, to explore digital contents through tactile and auditory feedback. The tactile tablet has a special tactile grid - a transparent embossed grid of dots laid over the smart

devices screen. It enables people to discover what is visualised on the screen through auditory and haptic stimuli (Figure 1).

The tactile tablet can be used to explore interactive images of artworks, to draw pictures, and to take photographs with the automatic recognition of the objects. This opens new possibilities to design engaging cultural experiences for blind and visually impaired people.

Figure 1: co-design participants exploring the tactile tablet. Source: BeauCoup project.

3.1.3   Tactile Multimedia Guide
The Tactile Multimedia Guide combines the exploration of tactile reliefs combined with multimedia contents (e.g., sounds, videos, audio narrations, sign language videos, easy-to-read texts) that reacts to touch thanks to the detection of the hand movements over the relief.

It is based on a HP Sprout that uses projection to enhance tactile reliefs of paintings: the projection returns the original colour image of the artwork, or an enhanced version for people with visual impairment (e.g., colour blindness).

This technology enables museums to "augment" the artworks with additional layers of multimedia contents which can be adjusted based on the users' preferences.

3.1.4 3D Prints

Recently 3D printing technology has become more and more ubiquitous. In Beaucoup, 3D-printed replicas of sculptures and artefacts are used to make art tangible. The use of 3D scanning, 3D modelling and 3D printing provides a fruitful opportunity to allow tactile exploration of art (Figure 2).

Figure 2: co-design participant exploring a 3D printed replica. Source: BeauCoup project.

3.1.5 Virtual Sign Language Agent

By using a Virtual Sign Language Avatar, textual contents are translated into different European sign languages to make texts accessible for deaf and hard of hearing people who communicate in sign language. The communication of the cultural contents is performed by a digital animated avatar. This makes the production process efficient and cost-effective in comparison to sign language produced by real interpreters because no film studio and no interpreters are needed.

3.1.6 Virtual Museum Guide

A web-based museum guide is built as a Progressive Web App. It offers the possibility to show free and paid content, in different languages. It integrates an audio and video player that showcases artworks with accessible representations, for example by providing audio descriptions of paintings. Unlike native apps, Progressive Web Apps do not have to be downloaded from the app stores but can be accessed by simply scanning a QR code. The Virtual Museum Guide is specially designed for museums.

4 The co-design methodology

A major challenge of the project is to orchestrate the perspectives of different stakeholders namely primary users (seniors with disability), secondary users (museum and home care staff), and tertiary users (managers, decision makers, political institutions) playing a role in defining new museum services and engagement strategies for "non-visitors". Co-design was chosen to address this challenge and to actively involve all stakeholders in the design process to define new services that meet their unique needs, expectations and strategic visions.

Our approach was grounded on key principles.

- Understand needs and assume different points of view
  This implied conducting thorough research to understand the specific needs, challenges, and aspirations of older people, their caregivers, museum experts and local institutions.
- Inclusive representation
  Co-design teams were established in 5 European countries including representatives of primary, secondary and tertiary users. Their direct involvement in the design process brought authentic perspectives and ensured their voices were heard in the envisioning process.
- Empathy and active listening
  Practising empathy and active listening is crucial when co-designing, especially with older people. The facilitators were trained to show genuine interest in their experiences, concerns, and ideas, and this feedback was used to inform the service design.
- Accessible communication
  Communication within the teams was facilitated through participatory making and hands-on activities to accommodate sensory or cognitive impairments of older participants. The facilitators were recommended to use clear language, avoid jargon, and provide alternative formats if necessary. A manual was delivered to clarify the recommendations.
- Adapted design methods
  The activities carried out during the co-design workshop were adapted considering the physical and cognitive capabilities of participants. Tools and techniques were developed to be comfortable and accessible to everyone.
- Collaborative workshops
  We organised three cycles of co-design workshops in 5 European countries involving in total 55 people. Older participants actively collaborated with designers and other stakeholders. These workshops were designed to foster creativity, collaboration, and co-creation of ideas for future services.
- Age-friendly design principles
  Age-friendly design principles were adopted, such as clear typography, appropriate colour contrast, and ergonomic considerations in designing the toolkit supporting the workshops.
- Respect and value the expertise of all stakeholders

Designers facilitated the activities without imposing the project's view so that participants could bring a wealth of knowledge and life experience to the co-design process.

- Address diversity within the older population
  A recognition of the fundamental diversity of the older population with various disabilities was fundamental to prioritise personalisation and adaptation of the new services.
- Advocate for inclusivity
  We used the co-design experience to advocate for inclusive design practices within the teams working for several months in different European countries. We continuously shared the insights gained during the workshops to promote age-friendly design of future services.

4.1   Co-designing new museum services

To develop accessible and engaging cultural experiences outside the museum contexts, the service design process in Beaucoup was truly collaborative combining the reflective practice with hands-on activities: group discussions were used to engage the participants in knowledge sharing and collective reflections, while card-based design, visual maps, and the demonstration of prototypes were proposed as experiential activities to enable the participants to generate, combine and improve ideas.

The co-design workshops were organised in five countries (Austria, Italy, Slovenia, Portugal and Switzerland) and engaged various stakeholders (museum experts, seniors, accessibility experts, managers of the cultural sector) to design new SDMs bridging the museums' mission with the needs of the older people (Figure 3).

The first round of workshops involved the museum staff (e.g., directors, curators, educators) who started the ideation process. The second round of workshops involved groups of older people and healthcare professionals who discussed, combined and improved the ideas that emerged in the previous workshops. The third round of workshops involved cultural institutions, care organisations and technology providers to detail the design of the SDMs. This co-design process enabled an incremental and collaborative definition of the project solutions.

To support the co-design activities a methodological toolkit was developed to respond to the design challenge of the project, formulated as a "How might we question" (Rosala, 2021): "*How might we design new services to better promote the cultural heritage by making it accessible and engaging for older people with disability, beyond the museums' walls?*"
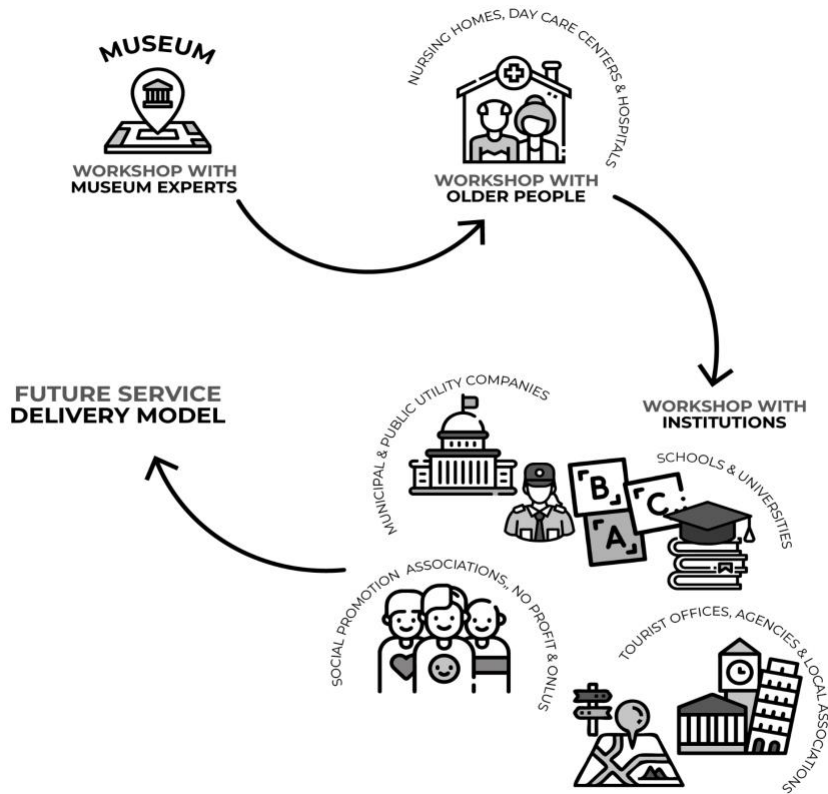
Figure 3: rounds of co-design workshops. Source: BeauCoup project.

In the first round of workshops, the museum staff were involved in the following activities.

1. During the photo safari (Borberg et al., 2011), the participants walked around in the museum and selected some items from the collection to promote with the new services. They took pictures of the selected items and discussed the reasons for the selection. The selected cultural items were then used for the other workshop activities.
2. The participants explored the technologies available for the project to understand how they work, the kinds of experience they can deliver, and possible improvements to better support the project vision.
3. Card sorting: The participants performed a collage combining cards depicting images of artworks, technologies, multimedia contents, and the five senses. The cards served as inspirations (Lucero et al., 2016) to creatively imagine new ways of promoting cultural heritage beyond museums' walls.
4. Based on the collage, the participants elaborated the "raw" and abstract ideas as future scenarios describing people, context, tools, and activities in the form of services provided by museums.

In the second round of workshops, older people and healthcare professionals were invited to discuss the ideas that emerged from the previous workshops. To support this process, we performed the following activities.

1. They selected some artworks from the photos collected during the photo safari sharing the reason for their choice.
2. As for the previous round of workshops, they explored the technologies sharing opinions about the experience of use.
3. The scenarios were presented visually and discussed for improvements.
4. Material cards with diverse sensory properties (e.g., engraved wood, diverse fabrics, smells and perfumes) were used to inspire a tactile and multisensory modality to access and explore the cultural heritage.

The third round of workshops served to select and structure the ideas collected during the previous workshops, moving from divergent thinking to convergent thinking. To this end, we used a prioritisation matrix to choose the most relevant/feasible/viable scenarios. The initial list of 12 scenarios was condensed in 5 main scenarios to develop in the form of new museum services e through the use of User Journey Maps and the Service Blueprint Maps (Stickdorn & Schneider, 2011; Kalbach, 2020). The mapping activity was shared with the stakeholders, and improved to accommodate the perspective of the museums, the older people and the healthcare professionals.

The methods employed during the workshops served two purposes: they stimulated the participant to generate and visualise the ideas, easily combining, discarding and enriching the proposals; they acted as communication tools to discuss the ideas and build a common understanding among the participants.

5   Service Delivery Models

The challenge faced during the definitions of the new museum service was to combine the vision of the project to make the cultural heritage accessible and engaging beyond the museums' walls, with the expectations of older people to access cultural experiences, and the need of the museums to pursue their mission to be inclusive and accessible to all people.

Some conflicting perspectives emerged during the process mainly due to the heterogeneity of the target audience of the project (older people with different kinds of impairments including sensory, motor and cognitive or a combination of impairments, different cultural backgrounds and habits). Similarly, cultural institutions have different identities, collections, established partnerships, business models and audience engagement strategies.

In order to accommodate the diversity of target which includes our primary users (seniors), secondary users (museum and home care staff), and tertiary users (managers, decision makers, political institutions), we developed services which can be personalised based on diverse users, purposes and contexts of use.

To design the new Service Delivery Models, the first step was focused on the selection of the cultural contents to be promoted through the new services, while the second step was focused on the activities, people and tools needed for the new services.

5.1 Selection of cultural contents

The selection of the cultural contents was based on diverse criteria, to consider not just the well-known masterpieces made by famous artists nor artefacts with an intrinsic artistic value, but rather a combination of tangible and intangible characteristics.

The criteria proposed by the museum staff during the photo safari were further elaborated during the second round of workshops with the older people, and then consolidated with the stakeholders during the third round of workshops. These include:

- curious artefacts which seem unusual and wired, to stimulate the interests of the people (e.g., Figure 4);
- the "invisible collections" conserved in the museum deposits that cannot be exhibited due to maintenance, lack of exhibition spaces, strict requirements for their preservation;
- the artefacts that have the potential to stimulate emotions such as curiosity, fun, nostalgia, serenity, surprise (e.g., Figure 5);
- the artefacts that can stimulate the reflection and dialogue about historical events and relevant themes (e.g., how the role of women changed in history), acting as means for the intercultural and intergenerational dialogue (e.g., Figures 6 - 7);
- artefacts related to old traditions, habits, and know-how which are at risk of being lost over time.

Peter Flötner, "Stolpernder Putto", 1530-1535
https://www.khm.at/objektdb/detail/91725/?offset=0&lv=list

This sculpture is very different from the norm and it shows the beauty of diversity.

It also symbolizes that failing is allowed. To remind this, the participant has a button with the image of this figurine still lying on her desk to remind her that all of us can trip once in a while but still continue on.

Figure 4. Example of artefact selected from the collection of the Kunsthistorisches Museum in Vienna. Source: BeauCoup project.

Set of Roca and dressing images

Images primarily sacred, conducted in procession and dressed in cloth garments. Unlike the pieces that existed in the churches and to lighten the burden, the images were only partially carved, with finishing only in the parts that should be seen by the public, like hands, head and feet, and the rest of the body consisted of a simple slatted structure or hollow frame covered by fabric clothing.

These pieces were chosen for evoking the traditional processions and religious festivals, moments of joy and community coexistence. Also alludes to childhood games.

Figure 5. Example of artefact selected from the collection of the Museu de São Roque in Lisbon. Source: BeauCoup project.

"Secular Madonna" and "Sacred Madonna":
photograph of a woman breastfeeding a baby from the Museo della Mezzadria; painting by Lorenzetti called "Madonna del latte" (Madonna of the milk) from the Museo di Arte Sacra.

This is a combination of two different artefacts selected by the group of participants, to be strictly connected to promote a reflection by the visitors, building a bridge between the religious figures and the common people.

Figure 6. Example of artefact selected from the collections of the Sharecropping Museum and Museum of Sacred Art in Buonconvento. Source: BeauCoup project.

Melted bullets

Traces of the fighting on the Isonzo Front in the First World War are still visible in the natural environment.

Participant's intent is to draw attention to the impact of the First World War on nature: in the highlands we can still find discarded military equipment that has a negative impact on the natural environment - rust seeps into the ground and thus pollutes the soil. The image of the landscape has changed because of the cannon fire; ditches and caverns built by soldiers are still visible today.

Figure 7. Example of artefact selected from the collection of the Gorenjska Museum in Kranj. Source: BeauCoup project.

5.2 New services to bring cultural heritage to seniors

When ideating the future services outside the museum contexts, we referred to three main real-world metaphors to better convey how the new SDMs will work using familiar concepts (Blackwell, 2006):

- "The Bag" is a set of small and portable objects to bring outside the museum or to take home after the museum visit;
- "The Box" is a display case containing diverse tools to perform creative laboratories at day-care centres and nursing homes;
- "The Screen" is a virtual experience of cultural heritage, available wherever and whenever you want.

These metaphors were useful to give structure and shared meaning to new and abstract concepts elaborated during the co-design workshops. The metaphors enabled the co-design participants to cluster the scenarios around specific concepts (Figure 8).
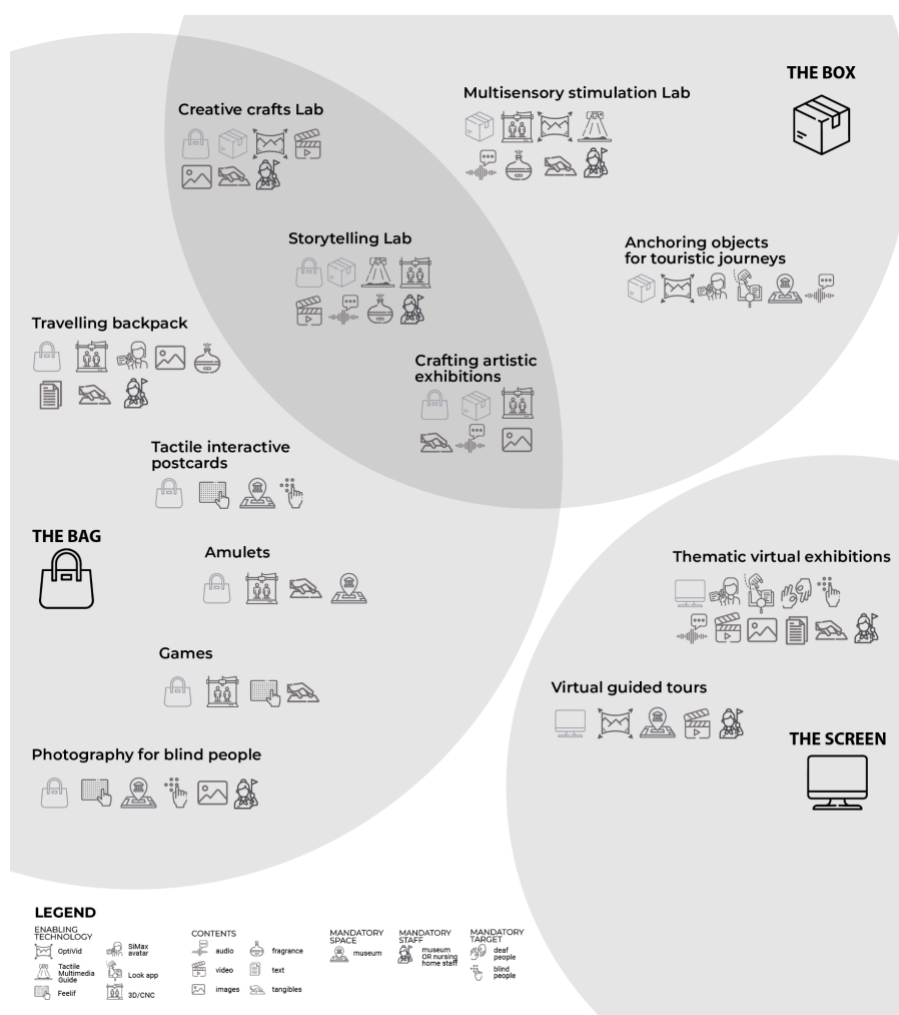

Figure 8. Overview of the three SDMs and related scenarios. Source: BeauCoup project.

5.2.1   The Bag - Travelling backpack

The "Travelling backpack" is based on the use of a transparent backpack (Figure 9) containing physical objects (e.g., 3D printed replicas of sculptures) and digital tools (multimedia contents, including sign language avatar), that is worn by the museum educator and used to bring cultural contents out of the museum.

The educator will walk around the city, in the suburbs, and at meeting points of the local communities to get in contact with the people. In the envisioned "The Bag" exhibitions in the streets, the people shall take time to talk and share their imaginaries and reflections inspired by the museum artefacts.

Apart from museum professionals, we envision that the backpack can be also used by citizens, for example, people who are retired and want to contribute to the development of the community, as part of their active ageing process. This volunteer can bring "The Bag" to interested communities, in this way, the older people are not only the beneficiaries but also the key actors involved in the service delivery.

Moreover, the backpack can be also used by school students serving as art ambassadors to stimulate intergenerational dialogue (Figure 10).

Another way to better engage the audience is based on a performance associated with the travelling backpack: the artist/actor who carries the backpack can stop at specific locations for a short theatrical performance, lecture, or poetry narration inspired by the cultural heritage exhibited in the backpack.

The engagement of older citizens, school students and artists/actors who mediate the exploration of the cultural heritage through the travelling backpack represents a form of participatory practice in which the museum and the citizens co-produce the cultural experience (Simon, 2010).

It is noteworthy that this participatory practice requires specific planning and training to enable the citizens/artists to take the role of cultural mediators with a mutual benefit for themselves and for the audience.

Figure 9. Prototype of the travelling backpack. Source: BeauCoup project.

Figure 10. Visual representation of the travelling backpack. Source: BeauCoup project.

5.2.2 The Box - Storytelling laboratory

The "Storytelling laboratory" is focused on storytelling activities to engage older people in eliciting and sharing narratives about historical events and cultural traditions for conservation and exhibition in the museum.

The experience is envisioned to take place at daycare centres or nursing homes, facilitated by museum educators and caregivers. The museum educator provides the participants with a magic casket containing materials to use as inspirations for recalling memories and sharing stories. Inspired by these materials, the participants rediscover cultural traditions, historical events, and personal memories (Figure 11). The stories are recorded by the museum educator and to ensure a suitable quality the captured media undergo a post-production process, and subsequently, the collected memories can be exhibited in the museum (e.g., through the audio guide) or integrated in the multimedia contents of the other BeauCoup scenarios to bring the stories outside the museums.

The Box of BeauCoup is not merely a packaging to store objects, nor a system to activate audio files as the "Museum in a Box". Rather it is a magic casket that reveals a set of multisensory stimuli to be used as inspirations for remembering and telling stories (Figure 12): a smelling kit, the NFC tag reader to play music and audio narrations, the tactile tablet to explore interactive images, tactile stimuli such as embroidery made of laser cut felt, 3D printed replicas of sculptures.

The stimuli included in the magic casket can be personalised. Specifically the service is based on an online catalogue containing pre-defined toolkits based on different themes (e.g., a collection of paintings, sculptures, songs and traditions related to rural life), and characteristics of the users (e.g., accessibility preferences, cultural interests).

Figure 11. Visual representation of the storytelling lab. Source: BeauCoup project.
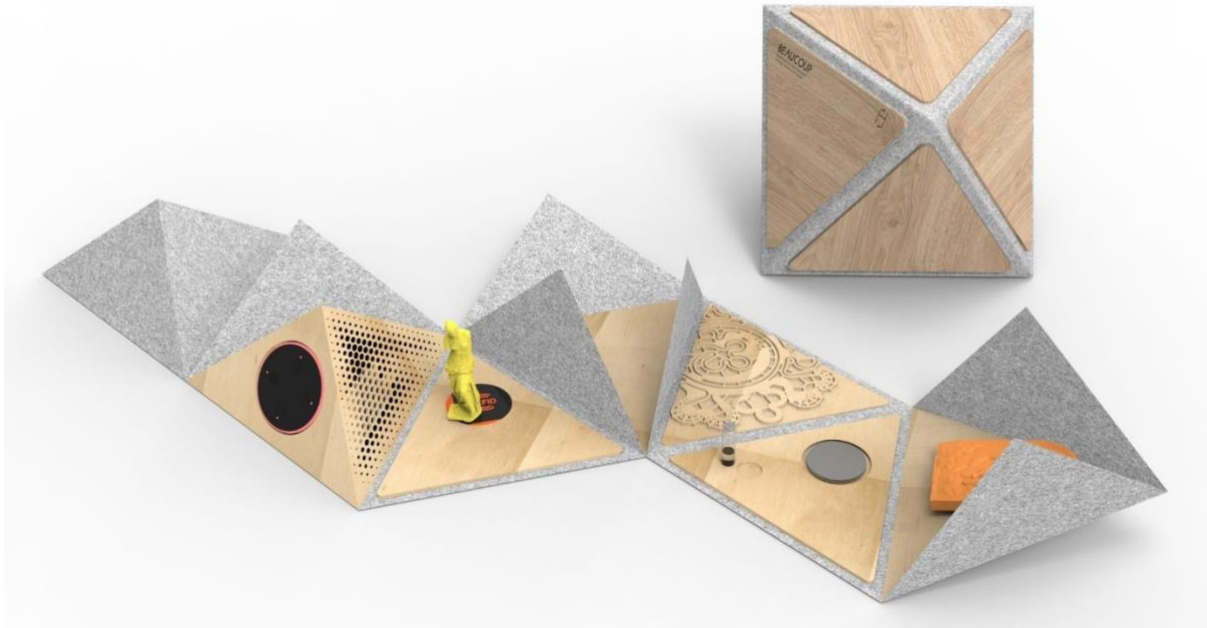
Figure 12. Prototype of the magic casket for the Storytelling lab. Source: BeauCoup project.

As highlighted by the co-design participants, the storytelling lab supports the concept of the museum "as a place of discourse" where the dialogue among people (of different ages and from different cultural backgrounds) is stimulated by the exploration of cultural heritage. The idea of performing the storytelling lab in different Countries, and then sharing the stories among different museums and stakeholders, supports the intercultural dialogue. Moreover, when the storytelling lab is performed in nursing homes and day-care centres, it can be an opportunity for strengthening the relationship between older people and healthcare professionals.

There are multiple challenges related to this scenario. First, the storytelling lab shall follow a program tailored to the needs and preferences of the participants. Second, it is essential to carefully design the tools (both contents and technologies) to evoke memories and facilitate the narrations, considering also the diverse interests of the people (e.g., national historical events, local traditions and craftsmanship, figurative art, etc.). Third, the duration of the activities is a critical factor, and the entire lab should not exceed two hours of duration, to prevent participants from getting tired. And finally, effort, resources, and skills are required for the editing, post-production, and translation of the stories in multiple languages.

The exhibition of stories, interpretations and memories of citizens and local cultural communities is one of the models to apply the concept of participatory museum (Simon, 2010). Some initiatives involve expert participants in the authoring of the stories (e.g., resident artists, art history students) (Roussou et al., 2015), while other initiatives engage non-expert participants as in the case of the

project "Factories of Stories" developed by the Uffizi Galleries in Florence (Italy). In this project, citizens and immigrants are involved in a collaborative meaning-making process about some universal themes (e.g., family, journey) inspired by the artworks of the museum collection. The stories collected during the workshops are then narrated by theatre actors and the audio files are published on Spotify as freely accessible podcasts.

Compared to these initiatives, the scenario of the Storytelling lab proposes a long-term service to employ the storytelling as a means to pursuit two complementary objectives: a) to enrich the museum interpretative framework with personal and collective stories inspired by the museum collection; b) to engage the older people in the preservation and communication of the intangible cultural heritage, as a way to promote their active ageing.

Storytelling is also addressed by the GIFT project: using a smartphone app museum visitors could record stories and share them with others, thus also bringing stories outside the museum context (Black et al., 2018; Løvlie et al. 2019). The main difference to the storytelling lab proposed in this work is that in the GIFT project museum visitors can create stories while inside the museum and share them with people outside, while we aim to conduct storytelling labs that are conducted outside of the museum, with a focus on special user groups like people living in retirement homes or people with age-related disability.

5.2.3 The Screen - Virtual guided tour

The "Virtual guided tour" envisages the organisation of remote visits to museums led by a museum educator. The guide introduces the museum collection and together with the remote participant, they explore the virtual space together. This enables older persons to enjoy the exhibition from home (Figure 13).

The main benefit of this scenario is related to the possibility of engaging people who cannot visit the museum due to temporary or permanent motor disabilities, who are hospitalised or residents of nursing homes. This scenario is highly valued to enable museums to "extend its wall" and reach visitors where they live.

Moreover, by establishing a network of museums through connections among their collections, the virtual tour can offer thematic explorations that combine different museums into one virtual tour. For example, the Sharecropping Museum in Buonconvento (Italy) and the Gorenjska Museum in Kranj (Slovenia) could jointly provide a virtual exhibition on the depiction of saints in paintings, showcasing diverse artefacts linked together in one virtual tour.

This service does not propose the substitution of the onsite museum visit with the virtual experience, but rather an additional opportunity to promote the cultural heritage and engage the potential audience of non-visitors where they live.

Figure 13. Visual representation of the virtual guided tour. Source: Source: BeauCoup project.

With the diffusion of the COVID-19 pandemic in 2019, digital collections and virtual tours spread as additional museum services to enable the remote exploration of the collections (Burke et al., 2020). The scenario of the Virtual Guided Tour builds on the best practices of virtual museums to make a step further: the service will enable remote visitors to interact with the museum educator and with the other remote visitors through a synchronous communication, and this is essential to meet the visitors' motivation for social interaction. The experience of the virtual guided tour represents an occasion to reinforce the existing social ties with relatives and friends through a cultural leisure activity performed together (even if at distance); to engage in the dialogue with other people to socially construct the meanings about the cultural heritage; to build new relationships with people with common interests.

6   Discussion

The co-design activities led to diverse design alternatives to stimulate and sustain the transformations of the cultural sectors, which are formulated as scenarios and blueprints of future services. The design alternatives share some common elements which act as drivers of change in the way the museums pursue their mission and engage the audience.

6.1   Personalisation of the experience

Nowadays, the trend in goods and services provisioning relies on customised experience and this trend is relevant also for the cultural domain given the diverse audiences to engage (Ardissono et al., 2012).

During the co-design workshops of BeauCoup, the participants were invited to think about the diverse needs and preferences of older people. In most cases, instead of a unique solution for a specific target group, the participants envisaged multiple channels, tools and interaction modalities which can be

personalised by the user based on their needs and preferences. Indeed, from a life-long perspective, personalisation is a key feature to address the changing needs and abilities of people in different life stages and contingent situations (e.g., temporary impairment, period of hospitalisation) (Giraldo et al., 2022).

The diverse technologies available in the BeauCoup project enable the museums to provide tailored cultural experiences to diverse audiences and in diverse contexts and situations.

6.2   The importance of storytelling

Storytelling was considered pivotal for several reasons. First of all, it is a way to stimulate the interest of the people towards the cultural heritage and to convey the meaning and value of cultural items since every piece of the museum collection has an unending amount of history, context and intangible elements behind it. Having a good story makes the artwork more memorable, but a proper balance is needed to avoid providing too much information which is difficult to follow and understand.

When storytelling is performed by the audience (e.g., by the older people in nursing homes during the Storytelling lab), it is a way to preserve and practise reminiscence, as well as a means to activate intergenerational dialogues among older people and the young generations. From the perspective of the museums, it is a way to enrich the interpretative framework of the museum collection with "multi-vocal interpretations" (Simon, 2010).

When collecting and exhibiting stories related to intangible cultural heritage, the fair management of intellectual property rights is challenging. As Wendlang (2004) pointed out, local communities sometimes argue that their intellectual property-related rights are not always safeguarded when their cultural materials are recorded and documented and then displayed and made available to the public by museums. To deal with this issue, the negotiation of this participatory practice should be transparent and fair, and museums should dedicate effort to establishing a relationship based on trust with their partners.

6.3   Augmenting the museum collection with multisensory stimulation

One of the key elements recurring in the various scenarios is the combination of digital multimedia contents and physical objects to touch and manipulate, fragrances to smell. This is in line with the "sensory turn" emerging in the museum domain: museum professionals have started to question the multiple restrictions imposed by the museums and to imagine ways for soliciting all the senses (Levent & Pascual-Leone, 2014; Naumova, 2015), also taking advantage of innovative technologies (Harada et al., 2018). Thanks to this "sensory turn", museum visitors can experiment with bodily experiences to perceive the objects and the museum space with the entire body (Naumova, 2015), with the stimulation of the sense of smell in addition to hearing and touching (Ucar, 2015), and even with tasting edible installations (Levent & Mihalache, 2016).

Of course, in some cases the conservation poses limitations to the possibility of experiencing all sensory properties of the original artefact. In those cases, the BeauCoup project proposes to "augment" the original artefact with additional objects to touch, hear, smell and even taste. The

multisensory stimuli can be made of 3D printed replicas, pieces of fabric, crafting tools, fragrances and sounds, all inspired by the original artwork.

6.4 Socially-mediated cultural experiences

It is acknowledged that the museum visit is a socially mediated activity since visitors learn as they talk with, listen to and observe other visitors (e.g., Allen 2003; Hein 1998). Thus, cultural items are important with respect to their role in supporting dialogue and sense-making among people. As the socially-mediated cultural experience is pivotal in the museum context, it plays a fundamental role even outside the museums, in places where people meet and socialise like the day-care centres.

Moreover, social interaction, in addition to the sense of personal achievement, is one of the motivations of the large number of volunteers who collaborate with the museums in management and education activities (Holmes, 2010). This social aspect of the cultural experience, between those who mediate the experience and those who are the beneficiaries of the experience, should be exploited as a way to prevent isolation and loneliness of older people and to stimulate social interaction among diverse social groups including peers, families and intergenerational communities.

7   Conclusions

In this paper, we present innovative museum services developed within the European project BeauCoup that aims to engage the older people in the promotion of the cultural heritage beyond the museums' walls.

Based on multiple co-design workshops with diverse stakeholders (older adults, museum guides, experts on cultural heritage, caregivers, etc.) three Service Delivery Models were defined, "The Box", "The Bag" and "The Screen" with the intent to engage older people with disability to access and enjoy the cultural heritage. The implementation of the three museum services is ongoing and submitted to an iterative and incremental design process based on recurring cycles of evaluation with stakeholders.

The museums involved so far in the project acknowledged the need for widening the museum's role as a bridge toward social institutions and care associations. They also showed interest and availability in delivering new services outside the museum to reach the potential audience of "non-visitors" who do not visit museums for several reasons (including temporary mobility impairment), engaging the audience in other contexts such as homes, day-care centres, and nursing homes.

The new services developed in Beaucoup are specifically designed to engage the non-visitors in the contexts where people live, meet and spend time, enabling them to experience the cultural heritage through a combination of digital technologies and multisensory stimulations.

The new services require the orchestration of processes, people and tools (Moritz, 2005), as well as the diffusion of a new participatory approach among cultural professionals. Indeed, acting outside the museum context and allowing the citizens to participate in the valorisation of the cultural heritage requires sharing authority and power, and to value new and multiple perspectives in the fruition of the cultural heritage.

In future work, the proposed SDMs will be implemented and evaluated to gather further insight into the overall user experience and the specific needs of older adults as well as the stakeholders from cultural institutions and caregiving facilities.

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