This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870811

SPICE

Social cohesion, Participation, and Inclusion through Cultural Engagement

D7.6 CASE STUDIES FULLY OPERATIONAL

Deliverable information	
WP	WP7
Document dissemination level	PU Public
Deliverable type	R Document, report
Lead beneficiary	2 - Aalto
Contributors	DMH, AAU, FTM, OU, IMMA, UH, UNITO
Date	17/11/2022
Document status	Final
Document version	V1.0

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Project information

Project start date: 1st of May 2020
Project Duration: 36 months
Project website: https://spice-h2020.eu

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SPICE consortium

No.	Short name	Institution name	Country
1	UNIBO	ALMA MATER STUDIORUM - UNIVERSITÀ DI BOLOGNA	Italy
2	AALTO	AALTO KORKEAKOULUSAATIO SR	Finland
3	DMH	DESIGNMUSEON SAATIO - STIFTELSEN FOR DESIGNMUSEET SR	Finland
4	AAU	AALBORG UNIVERSITET	Denmark
5	OU	THE OPEN UNIVERSITY	United Kingdom
6	IMMA	IRISH MUSEUM OF MODERN ART COMPANY	Ireland
7	GVAM	GVAM GUIAS INTERACTIVAS SL	Spain
8	PG	PADAONE GAMES SL	Spain
9	UCM	UNIVERSIDAD COMPLUTENSE DE MADRID	Spain
10	UNITO	UNIVERSITA DEGLI STUDI DI TORINO	Italy
11	FTM	FONDAZIONE TORINO MUSEI	Italy
12	CELI	CELI SRL	Italy
13	UH	UNIVERSITY OF HAIFA	Israel
14	CNR	CONSIGLIO NAZIONALE DELLE RICERCHE	Italy

Executive summary

This document describes the final implementation and operational phase of the five (5) Case Studies in relation to the Design as well as the Research and Development Activities since the beginning of the SPICE project. It builds on a framework laid out for the Work Packages and Case Studies in the evaluation protocols (D7.1) and the socio-technical roadmap (D7.2, D7.4) as well as the previous annual report on the Case Studies' progress and plan (D7.3, D7.5). The customer journey maps and service blueprints of all the Case Studies are elaborated here taking key ethical aspects into consideration. Most importantly, this report describes all the co-designed activities conducted by the Case Studies with their communities and museum stakeholders between the periods of May to September 2022. Finally, the status of the SPICE infrastructure in each Case Study is highlighted in this deliverable.

Document History

Version	Release date	Summary of changes	Author(s) -Institution
V0.1	04/11/2022	First draft released	Aalto, DMH, UH, IMMA, FTM
V0.2	11/11/2022	Changes and iterations made by some partners and internally reviewed	Aalto, DMH, UH, IMMA, FTM, OU, UNITO
V1.0	17/11/2022	Final submission	Aalto, DMH, UH, IMMA, FTM, OU, UNITO

List of abbreviations and terms

- Attention-Deficit/Hyperactivity Disorder (ADHD)
- AI – Artificial Intelligence
- AR – Augmented Reality
- CoI – Communities of Interest
- CoP – Communities of Practice
- DMH – Design Museum Helsinki
- EuC – End-user Communities
- eCAALYX – Enhanced Complete Ambient Assisted Living Experiment
- GAM – Galleria D'Arte Moderna
- GDPR – General Data Protection Regulation
- GUI – Graphical User Interface
- HCD – Human Centered Design
- HCI – Human Computer Interaction
- HECHT – Hecht Museum
- IMMA – Irish Museum of Modern Art
- LDH – Linked Data Hub
- LGBTQ – Lesbian, Gay, Bisexual, Transgender, and Queer.
- MNCN – Museo Nacional De Ciencias Naturales
- PM tool – Project Management tool that will be used by WP7 for communication between the Case Studies and WPs to keep track of tasks and requirements.
- SSA – SPICE Semantic Annotator
- STS – Sociotechnical systems
- URL – Uniform Resource Locator
- UX – User Experience
- VR – Virtual Reality
- WP – Work Package

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1 – INTRODUCTION TO THE CASE STUDIES

The sites of the SPICE H2020 project cover diverse landscapes including geographic, cultural, and linguistically distinct contexts. These are Finland in the Nordic region, Ireland and the United Kingdom in Northern Europe and Spain, Italy and Israel in Southern Europe and the Mediterranean respectively. There are five (5) Case Studies in the project and each one of them involves a museum in a different European or Associated country and they include:

- Design Museum, Helsinki (DMH), Finland
- Irish Museum of Modern Art (IMMA), Dublin, Ireland
- Hecht Museum (HECHT), Haifa, Israel
- Galleria D'arte Moderna (GAM), Turin, Italy
- Museo Nacional de Ciencias Naturales (MNCN), Madrid, Spain

In addition to heritage institutions, there are seven (7) research institutes located at universities of renown accompanied by three (3) business partners that play roles in the work being carried out.

Short name	Institution name	Country
DMH	DESIGNMUSEON SAATIO - STIFTELSEN FOR DESIGNMUSEET SR	Finland
GAM	GALLERIA D'ARTE MODERNA	Italy
HECHT	HECHT MUSEUM	Israel
IMMA	IRISH MUSEUM OF MODERN ART COMPANY	Ireland
MNCN	MUSEO NACIONAL DE CIENCIAS NATURALES	Spain

Table 1: Case studies with their short name.

WP7 is coordinating with the Case Studies the course of their development to integrate exploration, development, use and testing of tools and methods for citizen curation. The timeline in Table 2 below illustrates the deliverables of WP7 and the case study activities; the current stage of the timeline is also highlighted in green.

DELIVERABLE (WP7)	DELIVERABLE	DUE DATE (IN MONTHS)
D7.1	Evaluation methods and protocols.	6
D7.2	Socio-technical (STS) roadmap with project management (PM) tool integrating the Case Studies with SPICE systems.	9
D7.3	Case studies progress and plan.	12
D7.4	Review of Socio-technical roadmap with project management tool.	24
D7.5	Case studies progress and plan.	24
D7.6	Case studies are fully operational.	30
D7.7	Case studies final progress and plan - final version.	36

Table 2: WP7 list of deliverables.

Bonding and bridging capital

Each Case Study is focused on researching how methods and tools for citizen curation can facilitate inclusion and social cohesion. This is carried out using co-design wherein an approach to inclusion is implemented so that excluded groups and other citizens can for example engage with artefacts, create stories, and express opinions. These types of contributions help to build so-called *bonding capital* within diverse groups (D7.1 – Evaluation Protocols). Similarly, the accumulated interpretations and reflections can be interconnected and shared to build the bridging capital which helps in promoting tolerance and thereby facilitating social cohesion. The bonding and bridging capital in each Case Study is described in Table 3 below.

Case Study	Bonding capital	Bridging capital
DMH	Enable senior citizens and other people living far from museum services to engage with culture and share their personal stories and interpretations of culture and Finnish design heritage with their communities.	Make artefacts and interpretations available and invite new contributions in virtual and touring galleries to generate dialogue and increase understanding across generations and geographical communities.
GAM	Enable Deaf people and other visitors to actively participate in cultural interpretation and storytelling and connect and share their interpretations through social media functions.	Enable the contributions of Deaf people to be digitally accessible to others in the museum and online. Interconnect contributions using story features such as characters and emotions.
HECHT	Enable members of religious and secular communities, in particular minority populations, to express and share their viewpoints and appreciate the variety of opinions even within a community.	Provide support in the museum for accessing and exploring opinions across different communities to find similarities as well as respect and understand differences.
IMMA	Support groups who are less able to visit the museum physically, such as asylum seekers and children with serious illnesses, to access collections and share their own perspectives.	Make their perspectives available online and in the museum. Encourage visitors to think about universal, personal themes such as family to make interconnections across groups.
MNCN	Actively engage children, including those from lower socio-economic groups who may not consider science interesting or a career option, through activities such as games and puzzles.	Make anonymized contributions available across groups to explore differences of opinion on biodiversity and what individuals can and should do to protect the environment.

Table 3: Bonding and bridging capital of the Case Studies.[1]

The current deliverable (D7.6) describes how the Case Studies are fully operationalized. Developments prior to these periods have also been reported in the other deliverables (D7.1 – Evaluation Protocols, D7.2 – Socio-technical Roadmap with Project Management Tool, D7.3 – Case Studies Progress and Plan, D7.4 – Socio-technical Roadmap with Project Management Tool, and D7.5 – Case Studies Progress and Plan) along with the evaluation protocols and the role in the socio-

[1] These descriptions about the bonding and bridging capital have been derived from the project's grant agreement.

technical roadmap. The next chapter provides a summary of the case studies' progress reported in the previous (D7.1 – Evaluation Protocols, D7.2 – Socio-technical Roadmap with Project Management Tool, D7.3 – Case Studies Progress and Plan, D7.4 – Socio-technical Roadmap with Project Management Tool, and D7.5 – Case Studies Progress and Plan) WP7 deliverables.

2 – SUMMARY OF PREVIOUS DELIVERABLES

Evaluation Protocols (D7.1)

The D7.1 – Evaluation Protocols deliverable provided an elaborate description and recommendations of how the different aspects and components of SPICE project can be evaluated. This was the first time the complex organizational structures of SPICE were examined as a socio-technical system consisting of dynamic interactions occurring between people and technology within the entire system.
The social and cultural infrastructure(s) at SPICE consists of:

1. End-user communities (EuC)
2. Communities of Interest (CoI)
3. Communities of practice (CoP)

Each of these communities were identified and categorized based on the actors involved in them, their types, and their relation to the relevant Case Studies. Metrics were also proposed to be used for evaluating these social and cultural infrastructure(s) (D7.1 – Evaluation Protocols, p.6 – p.33).
The technical infrastructure(s) at SPICE are the software and network systems aiding and enhancing the process for citizen curation by providing a technological foundation for the museums involved and they include:

1. User and Community Modeler
2. Semantic Annotator
3. Social Recommender
4. Linked Data Hub (LDH)
5. Ontology specifications
6. Value, thematic, and emotional reasoner
7. Scripting devices
8. Interfaces for interpretation, reflection, and scripting
9. Content materials in museums, created by end-users and members of the public.
10. Additional data gathered such as demographic, location-based, textual, and more.

There are several requirements from the Case Studies for each technical infrastructure that needs to be adhered to. Metric were also proposed to be used for evaluating these technical infrastructure(s) (D7.1 – Evaluation Protocols, p.6 – p.33).

A concise description of the requirements involving the processes and elements in the use of citizen curation methods were provided along with their considerations. These considerations included mechanisms for accessing, exploring, selecting, interpreting, reflecting, sharing, saving/archiving content. Along with these considerations, specific regulatory concerns related to cultural and physical accessibility as well as privacy-oriented concerns such as GDPR were examined in D7.1 – Evaluation Protocols. Finally, the chapter on the Case Studies delved into each Case Study based on their existing infrastructures, activity objectives, rules and discourses, and special considerations in relation to their context.

Socio-technical roadmap (D7.2 and D7.4)

Based on the view of complex organizational development through the interaction between people and technology, the socio-technical roadmap described the instantiation of the distributed co-design ecosystem in D7.2 – Socio-Technical Roadmap with Project Management Tool. A network visualization was provided illustrating the overall state of the project and the interconnected networks between the targeted communities (end-user, of practice, and of interest), case studies, work packages, and organizations and institutions. In addition to the distributed network, the overall pattern was gauged using activity models showing the different components such as actors/actants, tools, object of activity, activity outcome, rules, community, organization, and their structural relations under the weight of production, consumption, exchange, and distribution.

A literature review briefly examined the timeline of evolution in the discourse of socio-technical systems bearing a range of concerns (D7.2 – Socio-Technical Roadmap with Project Management Tool). These are chiefly targeting the optimization of labor such as search for representations that afford an understanding of the technological and societal change to explorations regarding the situated nature of human knowledge and activities. This review also delved into the apertures in the late 20th century focusing on gender, race, and multicultural discourses. Based on these views, the socio-technical roadmap needed to accommodate the present social and environmental situation characterized by rampant disruptions that could easily lead to the erosion of complex organizational structures if not designed and retrofitted considering it. Therefore, the commitment of SPICE is towards co-design and inclusivity to broaden the scope to accommodate sustainable transitions that afford several constructive opportunities and innovative endeavors.

Timeline of Development (D7.2, D7.3, and D7.4)

The Case Studies' timeline of development elaborated on the proposed activities planned by each between January 2021 and April 2023 (end of the project). Each Case Study was provided with a questionnaire wherein they described their plans for every six (6) month period and the final (4) month period, i.e., Jan-June 2021, July-Dec 2021, Jan-June 2022, July-Dec 2022, and Jan-April 2023. The Case Studies have proposed several online (considering COVID-19) and physical co-design workshops with their end-user communities and mediators. The questionnaire also sought to understand the hindrances in development due to COVID-19, strategies proposed to adapt to the current situation (temporal, societal, environmental), and the influence of the SPICE toolkit on the objectives of their museum. WP7 has been tracking and monitoring these proposed activities and assistance will be provided to the Case Studies in case they are facing certain challenges.

Ultimately, to grapple with the complexities and create smooth communication as well as workflow, the PM Tool was created within SPICE SharePoint using Microsoft Planner. The objectives of the tool were to create project activities and enable task definition for the Case Studies and WPs. These provide a live view of development of all the SPICE systems, thereby making it easier to monitor, understand and carry out periodic analysis. Each Case Study and WP monitor their *board* containing *buckets* of activities and finer tasks. Several features in the tool allow task definition, delegation, setting deadlines, and descriptions/comments. Overall, the STS roadmap and the PM Tool play a crucial role in enabling the interaction and communication between the social and technical aspects that is inclusive of all actors in the system. They have been described further in D7.2 and D7.4. The

PM Tool works well only if all the partners are regularly contributing to it by defining tasks and delegating work to others. The deliverables mentioned in this chapter, i.e., D7.1, D7.2, D7.3, D7.4, and D7.5 are all accessible here to members of the SPICE consortium as well as the heritage institutions.

Case Studies Roadmap (D7.3 and D7.5)

These deliverables described the co-design activities and workshops in the Case Studies and within the consortium during the first two years as well as work carried out by WP7 targeting the Case Studies. There were significant delays and challenges posed due to the ongoing COVID-19 pandemic, however they were also countered through several new forms of collaboration and strategies, and these were proposed in D7.3 – Case Studies Progress and Plan. Finally, a timeline illustrating the roadmap for the Case Studies in relation to the scope of the SPICE project was outlined (see D7.3 – Case Studies Progress and Plan, p.31) and this was revised a year later (see D7.5 – Case Studies Progress and Plan, p.13).

3 – CUSTOMER JOURNEY MAPS

Customer journey maps outline a customer's interaction with a specific product or a service. Earlier, in D7.5, we presented user-experience (UX) maps co-designed for a persona in each case study. These maps visualized behaviors such as users' actions and emotions while interacting with museums during workshops and other activities.

A clear delineation between experience maps and customer journey maps has been provided by Sarah Gibbons (2017) in her article titled *UX Mapping Methods Compared: A Cheat Sheet*. The author makes this comparison by outlining four (4) types of mapping, namely 1. Empathy mapping, 2. Customer journey mapping, 3. Experience mapping, and 4. Service blueprinting. She notes that an experience map "is a visualization of an entire end-to-end experience" that is "agnostic of a specific business or product" and used to "understand a general human behavior". On the other hand, the author also mentions that a customer journey map "is a visualization of the process that a person goes through in order to accomplish a goal tied to a specific business or product" (Gibbons, 2017). In SPICE, the specific products are the pilot applications being co-designed in each Case Study and the customer journey maps were created keeping them in mind.

In her article, Gibbons (2017) also provides a visualization of a customer journey map for "Switching Mobile Plans" as an example based on a user's scenario and expectations. As shown in Fig.1, the phases/touchpoints used in this map include: i) Define, ii) Compare, iii) Negotiate, and iv) Select. The user's actions are also represented in the map. Therefore, the parameters for the journey include: 1. Touchpoints and, 2. Actions. Although the scenario and expectations of the user are well-defined, the visualization lacks clarity, for example it is unclear as to what the curved line or the speech bubbles represent as well as why they are positions on the map. The map would also benefit from including the user's emotions and potential breakdowns.

As another example, in their article *Walking a Mile in the User's Shoes: Customer Journey Mapping as a Method to Understanding the User Experience*, Marquez et. al (2015) introduce customer journey mapping in libraries and the role it can play in visualizing a user's journey. The aim of these customer journey maps is to help library staff (stakeholders and CoP) to better understand and optimize the user's experience. The parameters used in their mapping (Fig.2) include 1. Touchpoints (as columns) and 2. Stages (as horizontal sections) (Marquez et.al, 2015). Yet again, from our point of view, although these maps illustrate users' action, they seem to be lower common denominator for a user's experience. For example, the library staff would surely benefit from a deeper understanding of users' emotions, potential breakdowns, and perhaps even ethical considerations such as accessibility issues.

Therefore, to be more comprehensive in the SPICE Case Studies and highlight essential aspects of a user's journey, we decided to use the following parameters: 1. Touchpoints, 2. Actions, 3. Emotions, 4. Potential breakdowns, 5. Ethical aspects, and 6. Recommendations. We used the same personas from the UX maps, having understood their behaviors well through workshops, activities, and testing the pilot applications in each Case Study.

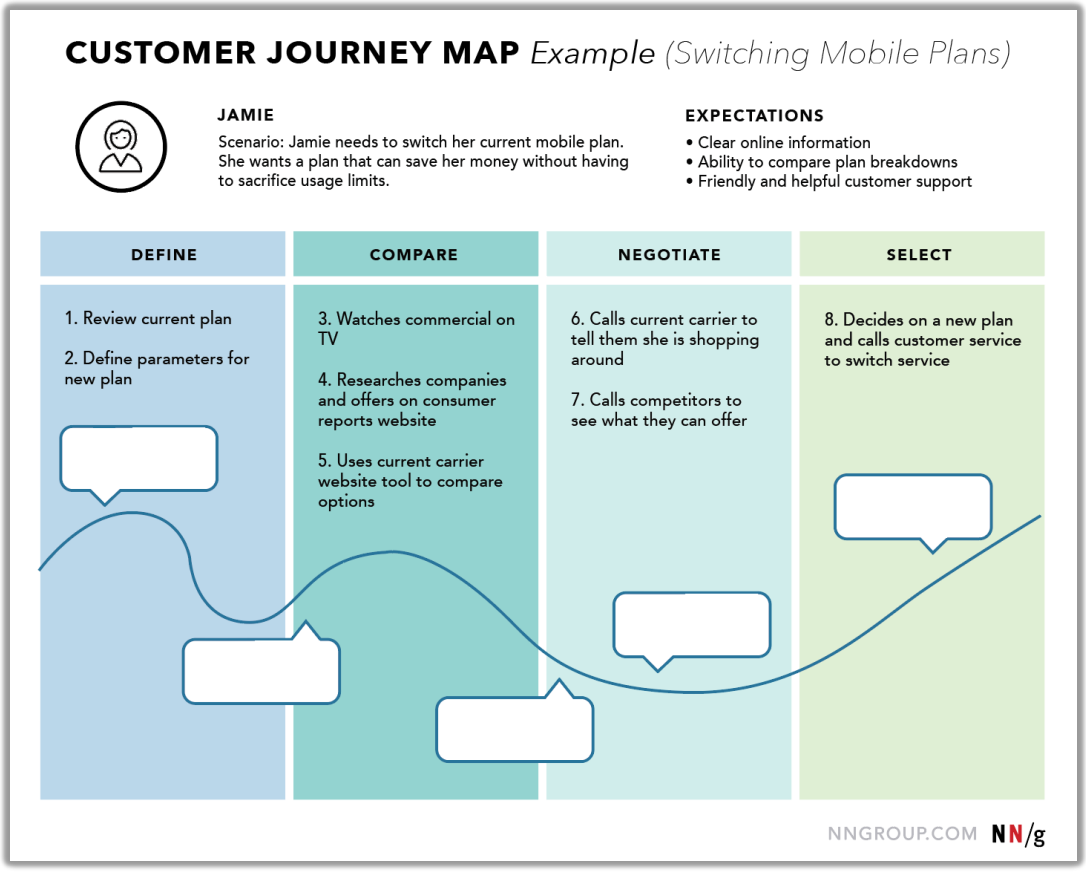

Fig.1: An example of a customer journey map for a mobile operator service (Gibbons, 2017).

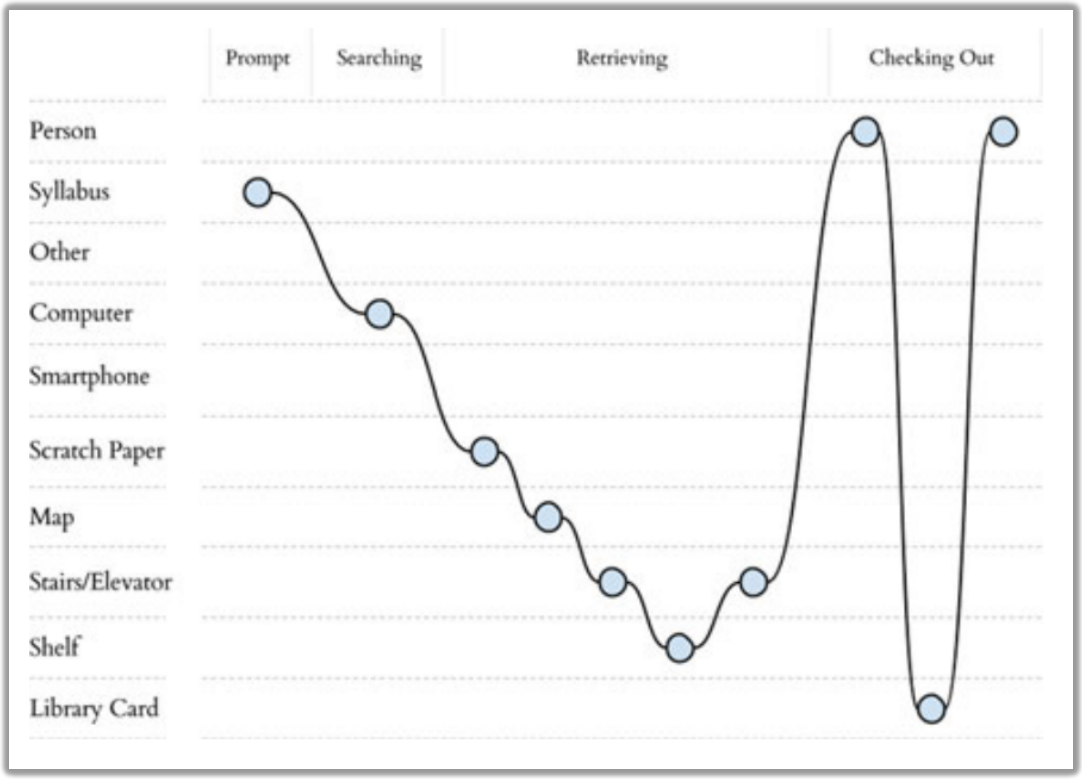

Fig.2: An example of a customer journey map representing a user's journey in reserving and checking out books in a library (Marquez et. al, 2015).

The images (Fig.3 – Fig.13) in the subsequent pages demonstrate significant selections of customer journey maps **outlined in each Case Study by members articulating the points of view of different personas**. To see the full extent of the customer journey maps developed, please visit the SharePoint folder linked here (available to all consortium members and heritage institutions).

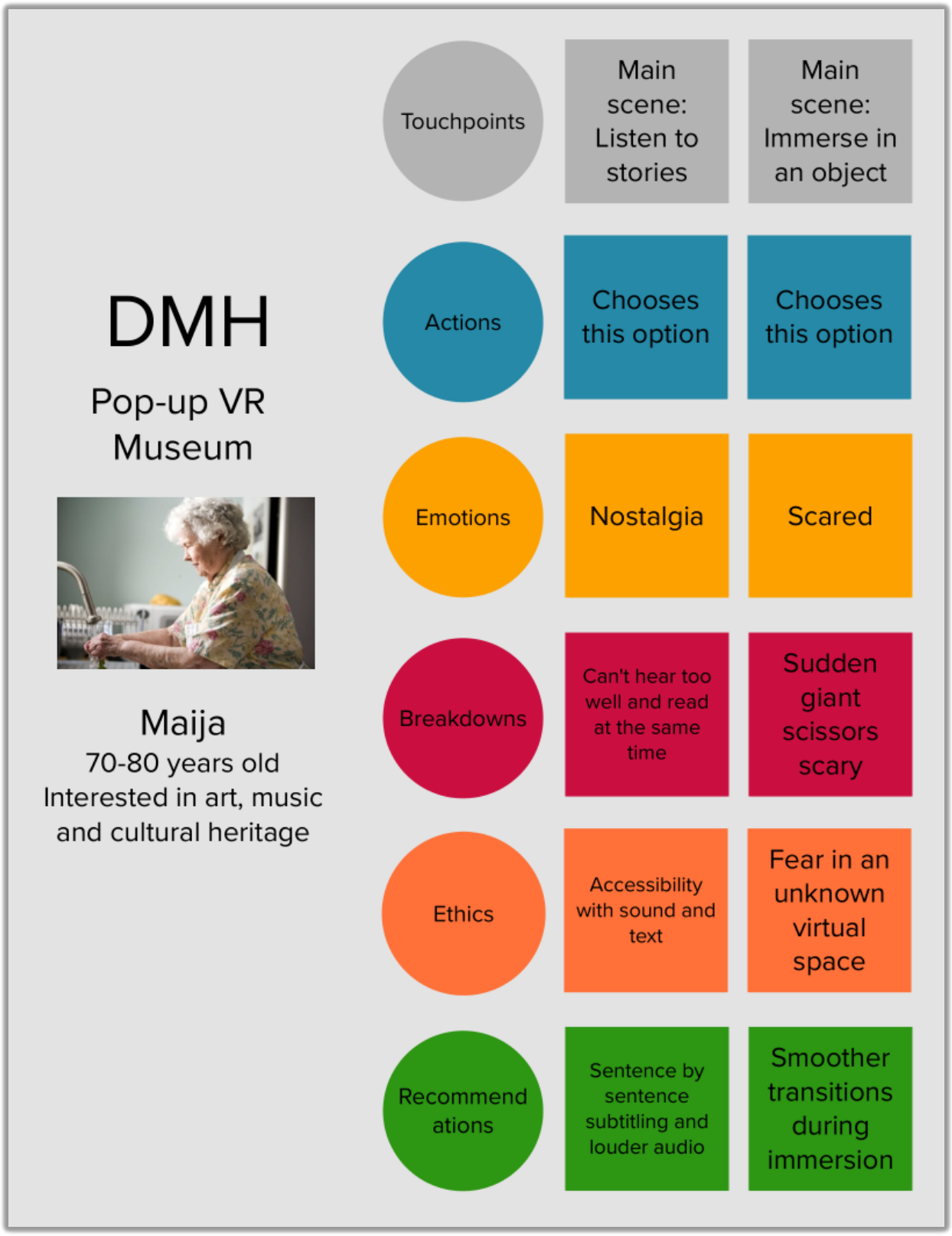

Fig.3: Selected section of the customer journey map of a senior citizen's persona in DMH.

Fig.4: Selected section of the customer journey map of a rural dweller's persona in DMH.

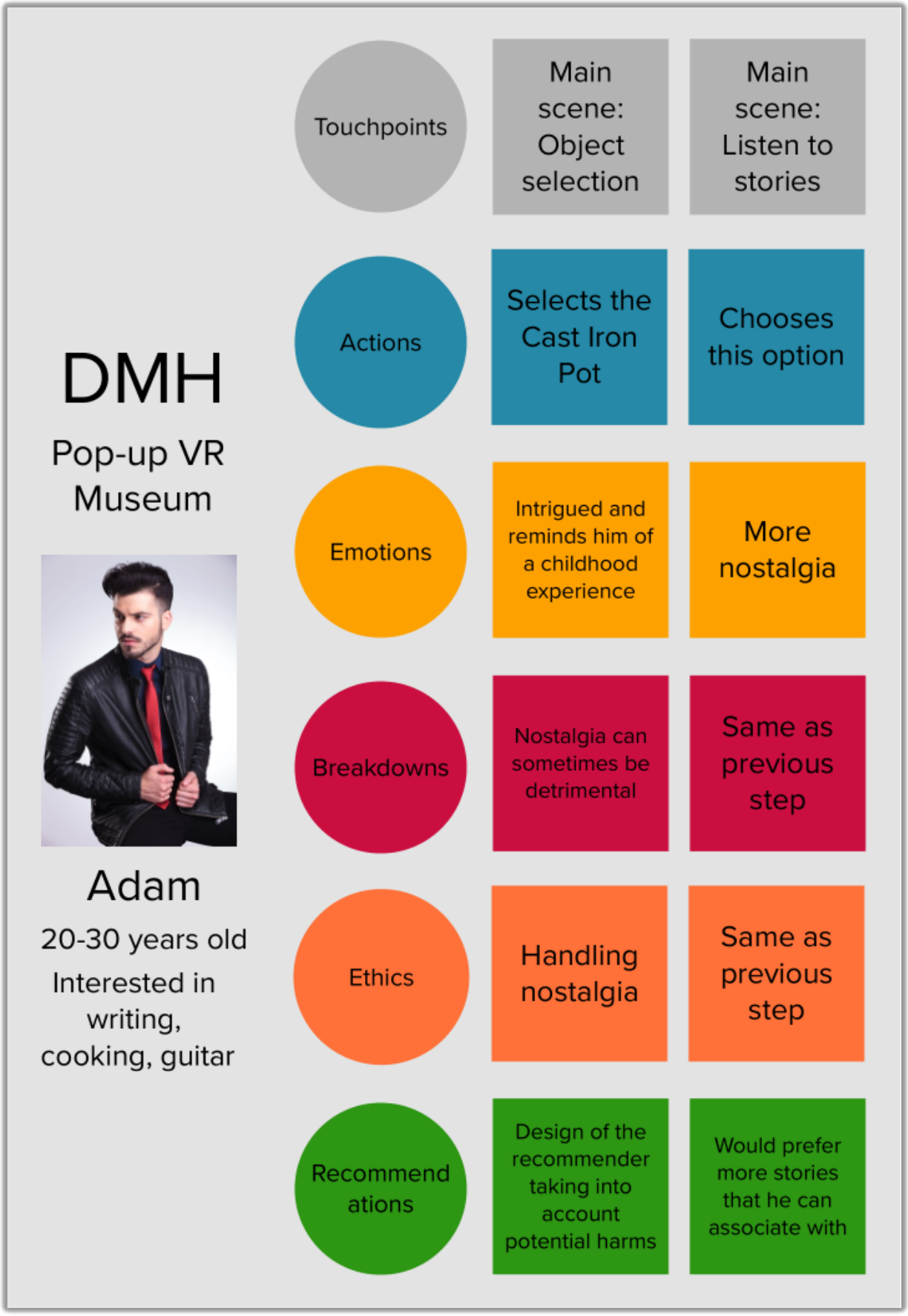

Fig.5: Selected section of the customer journey map of an asylum seeker's persona in DMH.

Fig.6: Selected section of the customer journey map of a high-school student's persona in GAM.

Fig.7: Selected section of the customer journey map of a high-school teacher's persona in GAM.

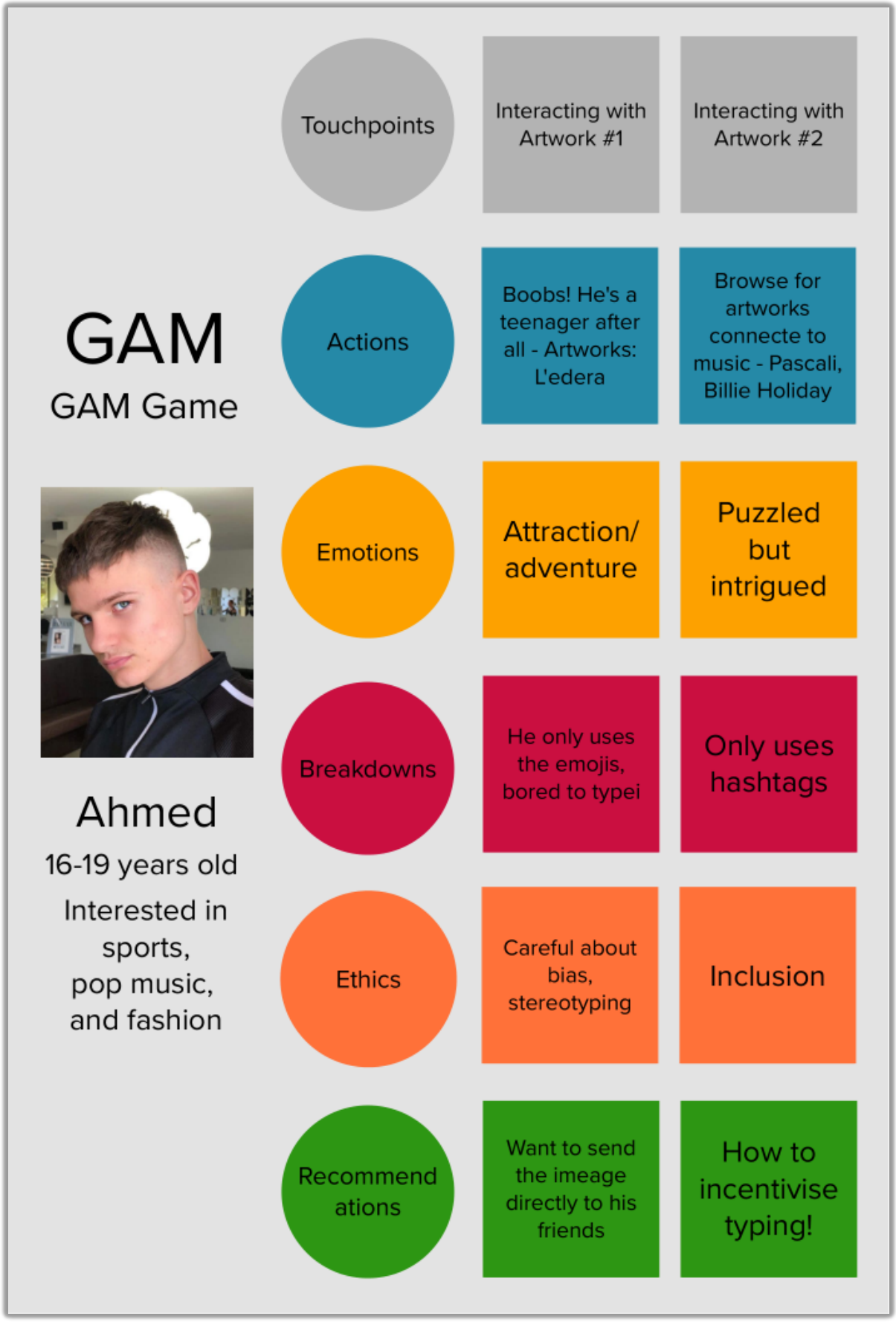

Fig.8: Selected section of the customer journey map of a young immigrant's persona in GAM.

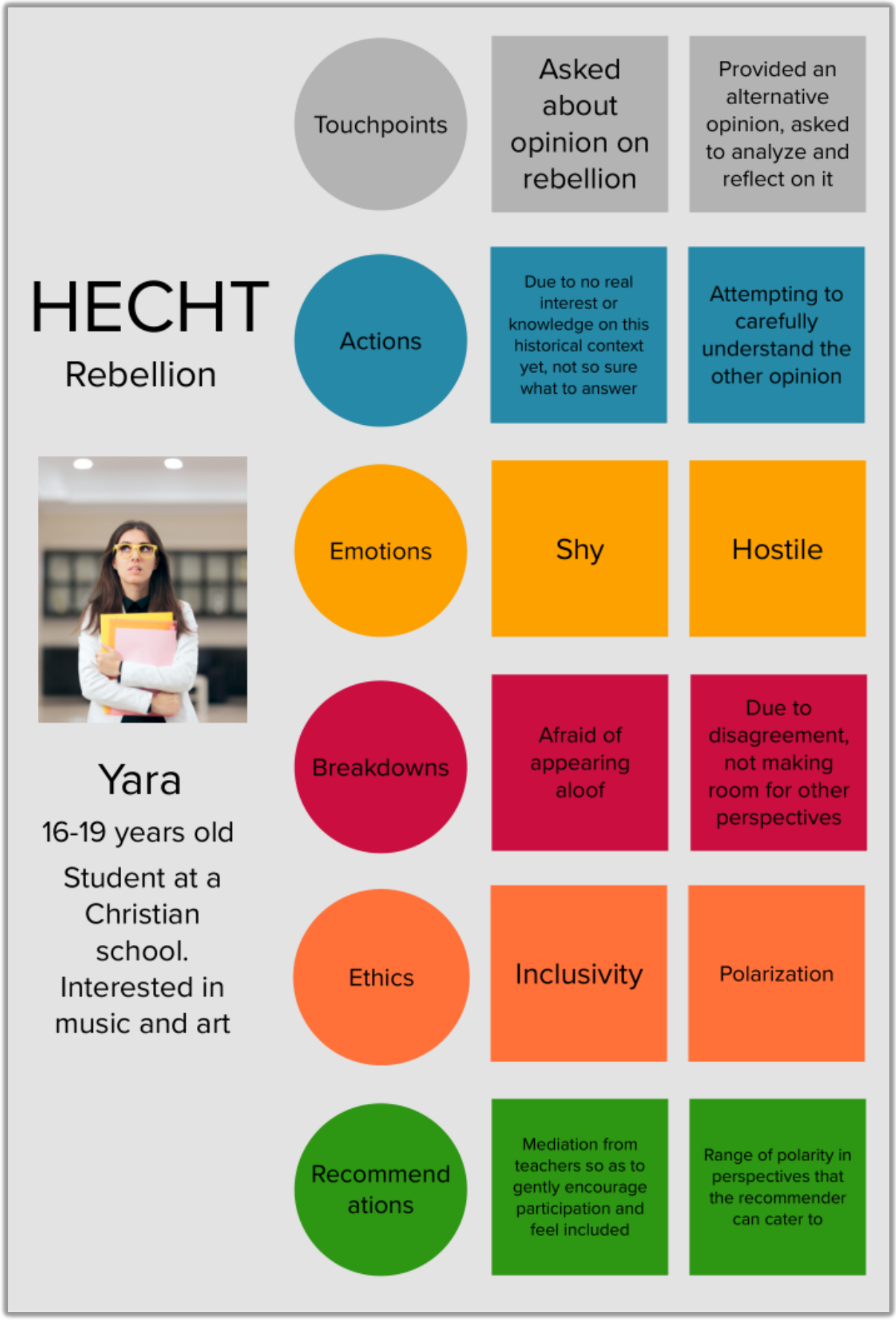

Fig.9: Selected section of the customer journey map of a high-school student's persona in HECHT.

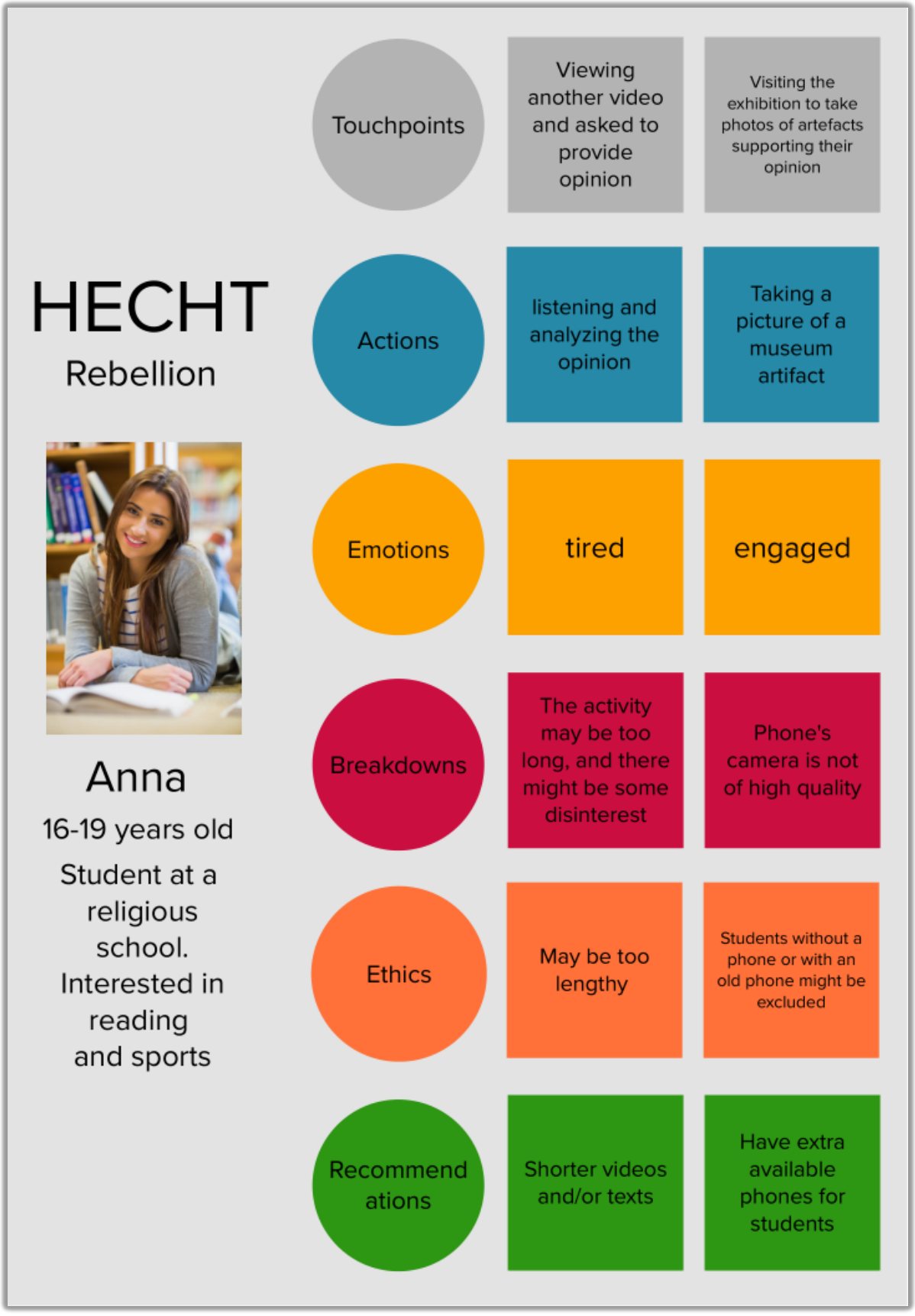

Fig.10: Selected section of the customer journey map of a religious school student's persona in HECHT.

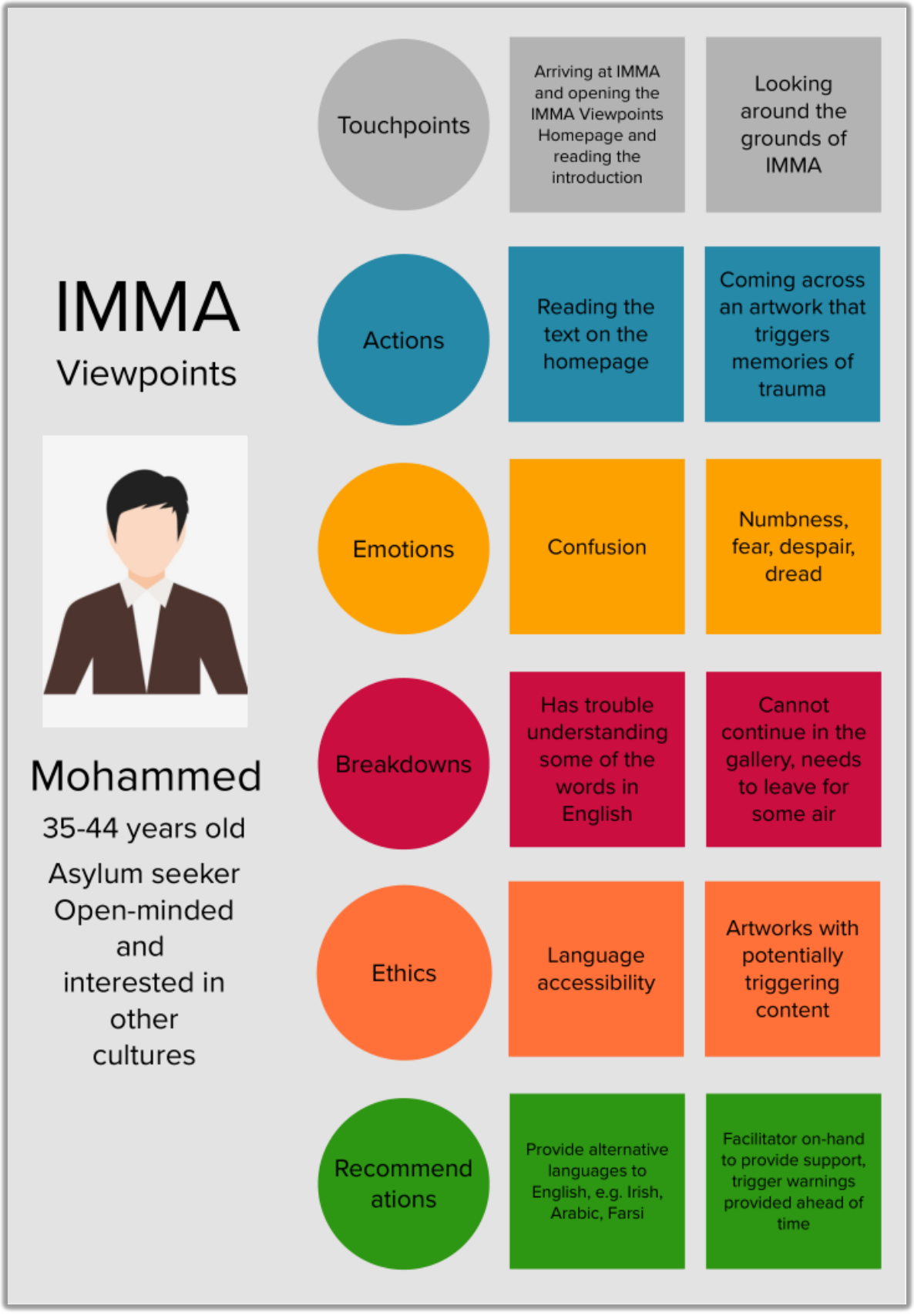

Fig.11: Selected section of the customer journey map of an asylum seeker's persona in IMMA.

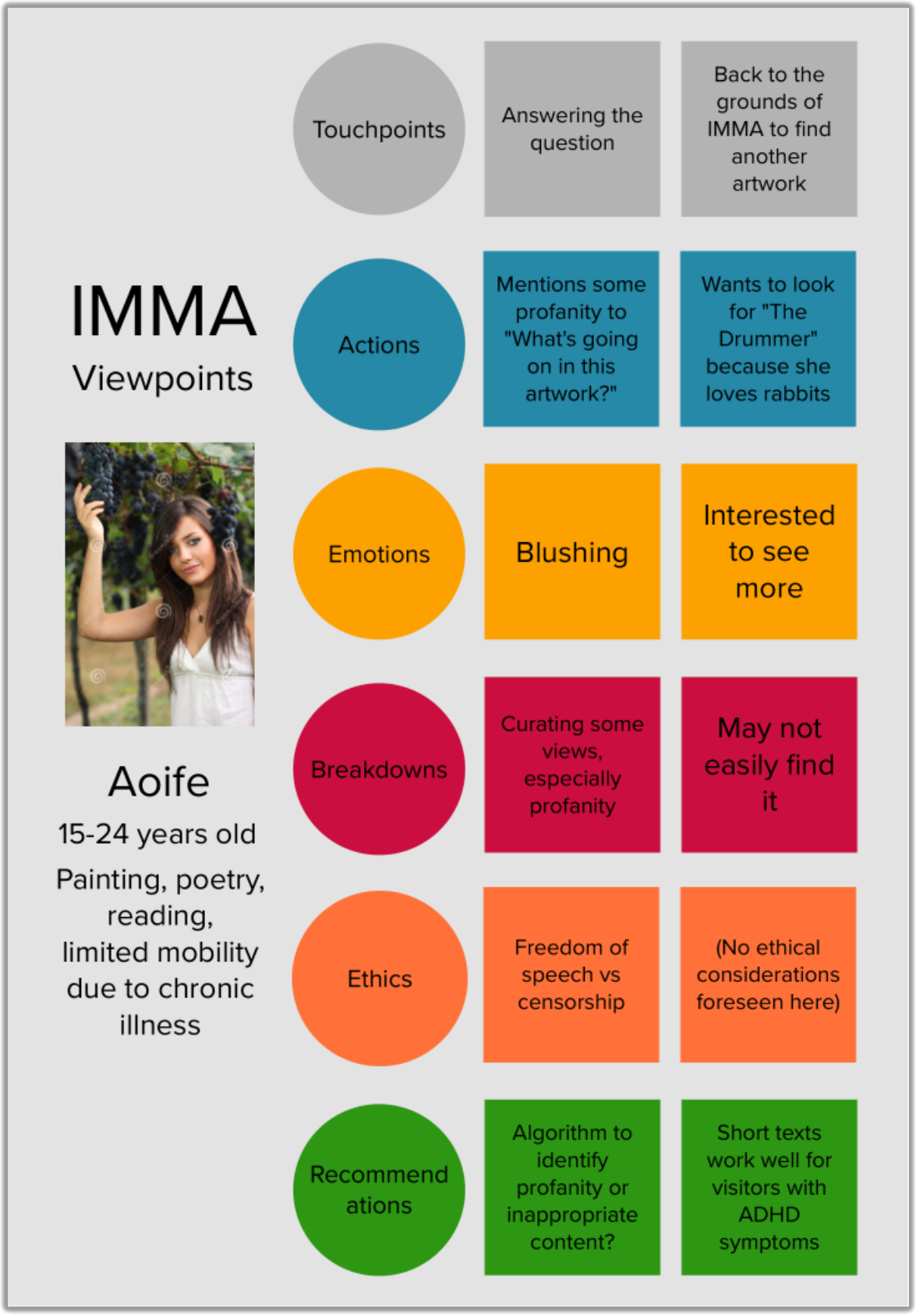

Fig.12: Selected section of the customer journey map of an young person's persona in IMMA.

Fig.13: Selected section of the customer journey map of a middle-school student's persona in MNCN.

According to the Case Study partners, the customer journey maps have helped them understand their end-user communities better and guided the development of the pilot applications. The Case Studies thereby adhered to the norms of participatory design and co-design. Nevertheless, customer journey maps “are never set in stone”. Rather, they are constantly evolving based on new knowledge uncovered during workshops with communities and in other user-testing sessions. Therefore, these maps will be constantly iterated by the Case Study partners until the end of the SPICE project.

4 – SERVICE BLUEPRINTS

Service blueprints are visualizations that demonstrate how organizations deliver user experience. These blueprints include the people, tools, and most importantly the processes involved. They are very useful in providing a comprehensive understanding of a service to stakeholders involved in organizations such as museums.

User or customer experience is paramount in allowing a comprehensive and clear visualization of dynamic service processes. In their pioneering article, Bitner et. al (2008) state that service blueprints are successful at recognizing interdependencies among people and functions in delivering services, visualizing, and understanding the customer's experience, and facilitating innovation. Based on evolution of service blueprint and the current state of technological development as well as emphasis on customer experience, the authors list five (5) key components of a typical service blueprint namely (p.72):

- customer actions,
- onstage/visible contact employee actions,
- backstage/invisible contact employee actions,
- support processes, and
- physical evidence

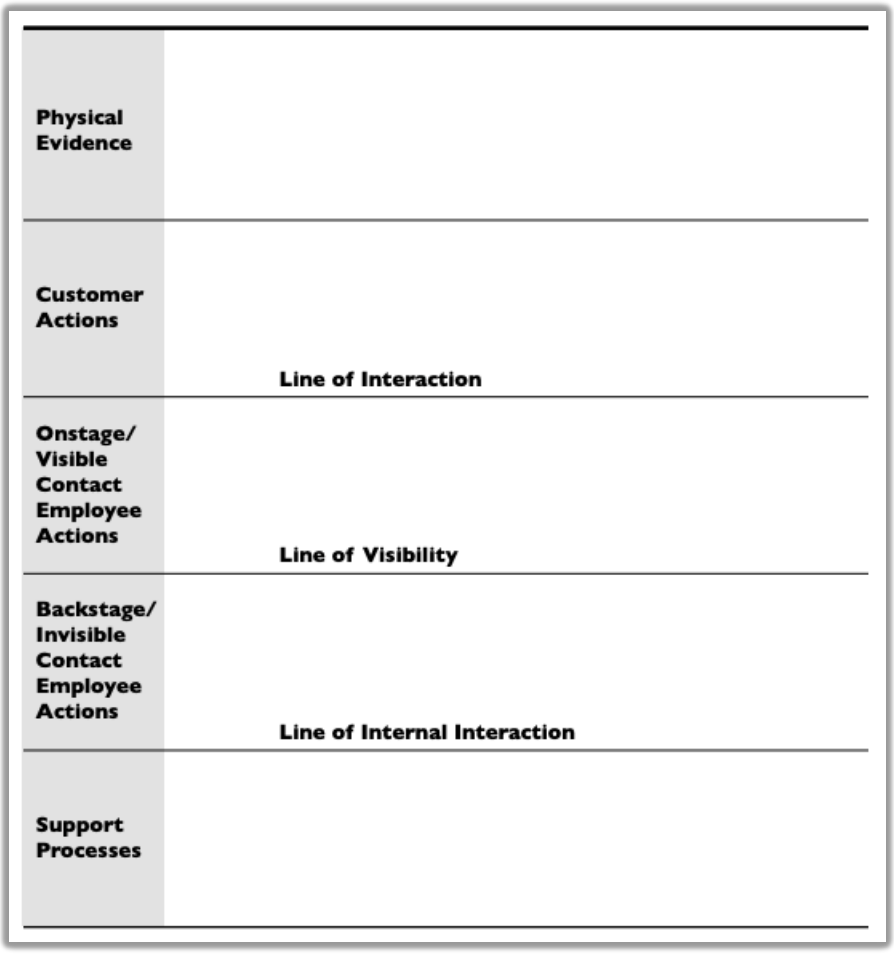

Fig.14: Service blueprint components by Bitner et.al (2008).

In addition, the authors also provide an example (Fig.15) of a service blueprint visualizing an overnight hotel stay service based on the five (5) key components (Bitner et. al, 2008). This model for service blueprinting has been used extensively by others (Galvagno & Dalli, 2014; Jaakkola & Aarikka-Stenroos, 2015). We also found it to be beneficial for visualizing the service blueprints of the SPICE Case Studies.

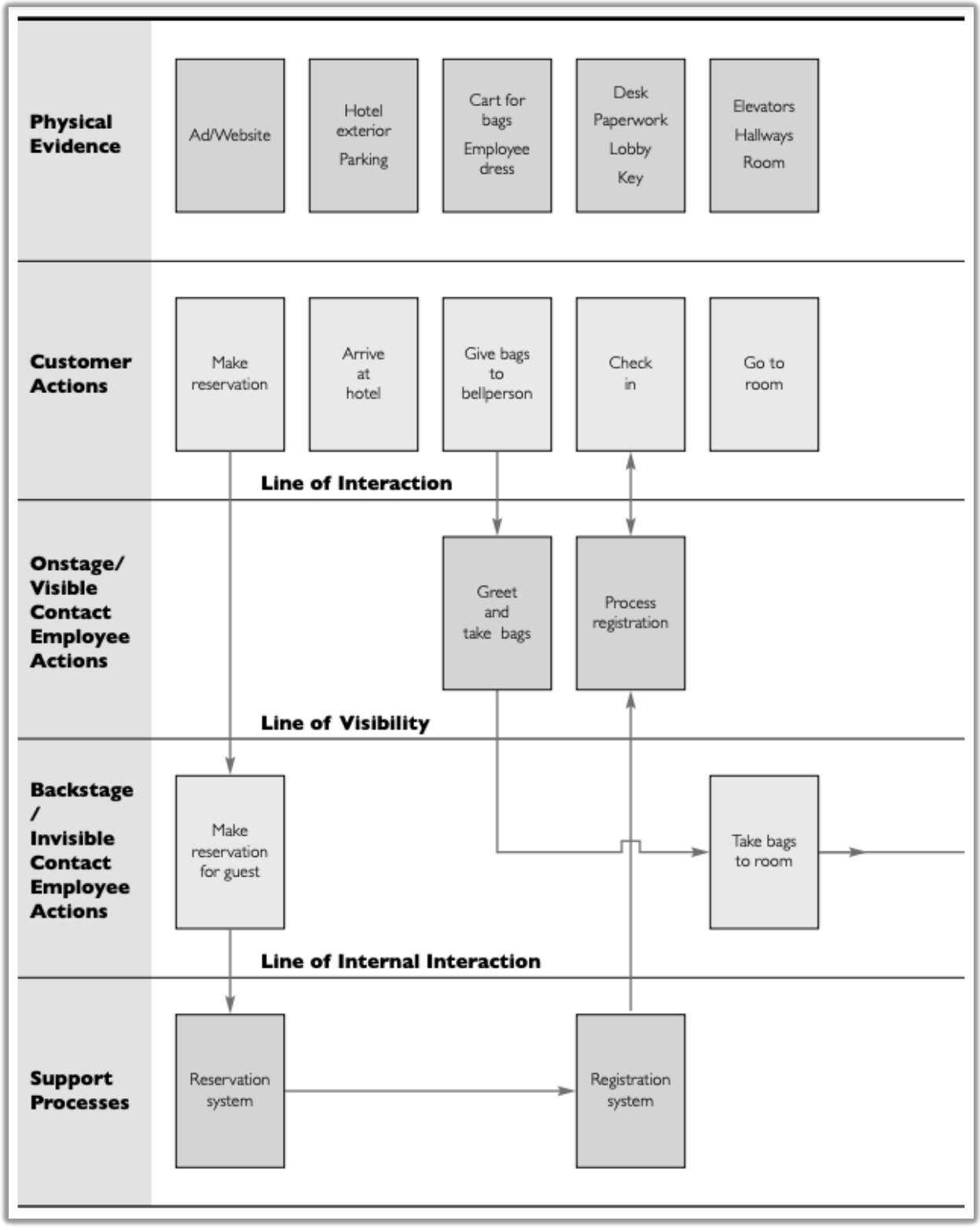

Fig.15: Blueprint for Overnight Hotel Stay Service by Bitner.et.al (2008).

For every Case Study, we mapped out the people, tools, and processes involved. At a base level in SPICE, these include the co-designers, technical infrastructure, pilot applications, and processes between them. Fig.16 illustrates this interaction for the DMH Case Study wherein a wide range of co-designers include several EuCs, CoIs, CoPs, and other workshop participants, the design and research team at Aalto, DMH museum professionals,

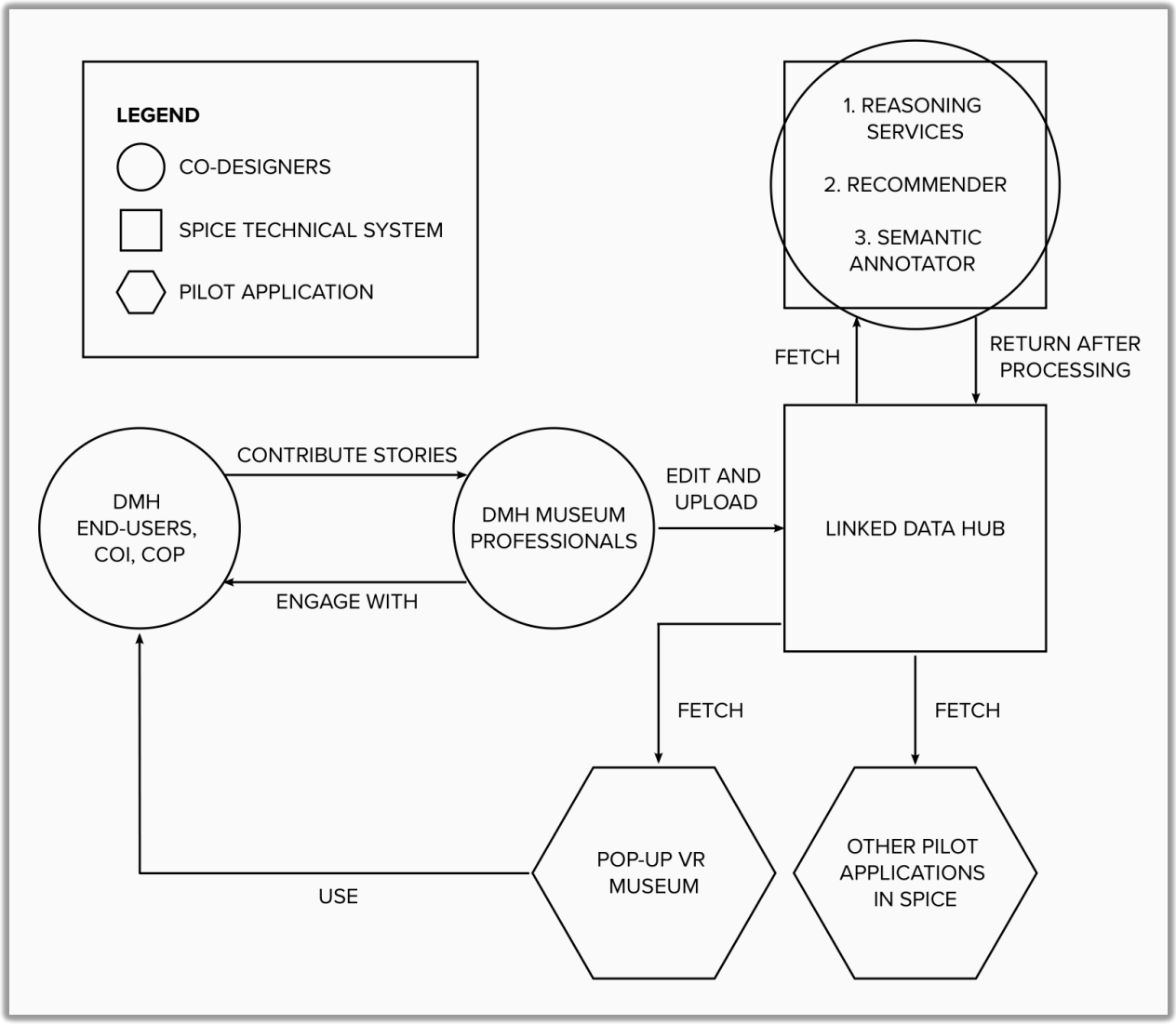

Fig.16: Interaction between the co-designers, SPICE technical infrastructure and pilot application in the DMH Case Study.

The UX and customer journey maps co-designed by the Case Study partners provide thorough details on users' interactions from the purview of their behaviors such as their actions and emotions but fall short of representing the backend systems and other processes that support the interaction. Meanwhile diagrams such as Fig.16 and the STS maps roughly explain the interaction between broad set of users and co-designers with the application and backend technical infrastructure but falling short of explicitly detailing out these processes and deeper understanding of the user experience (see D7.4: Socio-technical Roadmap with Project Management Tool). Hence, the aim of the service blueprints would be to provide an elaboration of Fig.16 and combine them with elaborated user interactions seen in the UX, customer journey maps, and the STS maps.

Therefore, based on this requirement, literature described earlier, and the context of the SPICE project, the components, and parameters in it we used for the service blueprints of the Case Studies include the following:

1. Touchpoints and evidence
2. Line of interaction for users:
    i) actions,
    ii) interface,
    iii) emotions
3. Line of support:
    i) mediator involvement,
    ii) ethics
4. Line of visibility:
    i) emotions
    ii) SPICE technical infrastructure that includes:
        - Linked Data Hub,
        - Semantic Annotator,
        - Social Recommender,
        - Reasoning services: values, themes, and emotions

Unlike the UX and customer journey maps, the service blueprints are not targeted to specific personas. Rather, it is generalized across a whole set of diverse users. This makes it easier for stakeholders to understand a wide set of people, processes, and tools through one (1) single visualization.

The first draft of all the service blueprints of all the Case Studies are available to the consortium members and heritage institutions here. As an example, Fig.17 showcases the first iteration of the service blueprint developed for the HECHT Case Study. Although the first iteration of service blueprints provides a comprehensive visualization and understanding of the Case Studies and may be useful to stakeholders, there is still a need for further iteration and refinement of service blueprints based on: i) finalization of the SPICE technical infrastructure, ii) testing and feedback of social cohesion and other SPICE metrics, iii) co-designing the service blueprint with museum professionals after large-scale testing.

Fig.17: Section of the service blueprint in the HECHT Case Study.

5 – ETHICAL CONSIDERATIONS

With the SPICE goal of citizen curation through participation, inclusion, and social cohesion, ethical considerations are paramount. This is very important while we are working with UX and aiming at broadening the scope of accessibility. And especially the case when dealing with information technology where a large amount of data is collected.

The deliverable report from WP9 (D9.8: GEN – Requirement No.19 Second Report of the SPICE Independent Ethics Advisor) available only to the consortium members examined the initial methods for interpretation and reflection and highlighted potential issues of bias from research practices selected due to remote collaboration during the COVID-19 pandemic. Further on, focusing on the Case Studies, the report describes the nature of informed consent, anonymization/pseudonymization, data processing, data transfer, profiling, human participation in Case Studies, and potential bias. Based on this, recommendations were provided, and several meetings were conducted in the consortium to discuss it.

Additionally, the STS maps (D7.4: Socio-technical Roadmap with Project Management Tool) also highlighted areas in each Case Study's user journeys wherein ethical aspects needed to be considered. These were marked as "ethics signposts" in the journeys (see Fig.18). All the Case Studies and WPs were provided an opportunity to examine and address it.

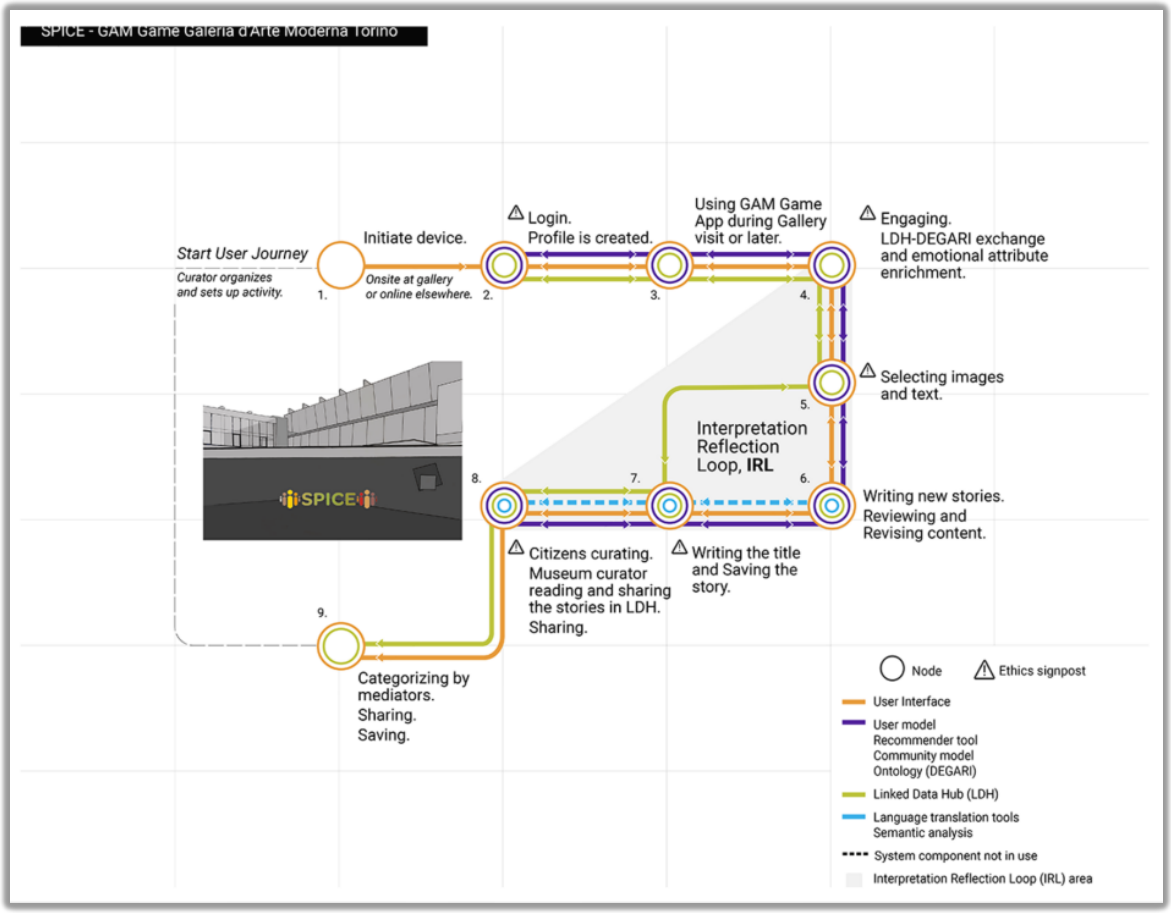

Fig.18: STS map of GAM as represented in D7.4: Socio-technical Roadmap with Project Management Tool

We used both deliverables as a benchmark to create an ethics checklist and provide a questionnaire to the Case Studies. The questionnaire aimed at thoroughly examining all possible ethical aspects and ensuring that they are considered or implemented in the workshop activities and pilot applications. The next section presents all the questions in the questionnaire.

Questionnaire

1. Please list all the institutional participants involved in the case study.
2. Please list all the techniques your museum's case study has been using so far to maintain privacy and anonymity of your user participants' data.
3. On a scale of 1-5, how thorough do you think your museum's case study been so far in maintaining privacy and anonymity of your user participants' data.
4. Are there certain areas wherein personal data is collected? If so, have you ensured that informed consent is collected as per the guidelines of GDPR laws?
5. Could you please share your informed consent sheet presented to your user participants?
6. Based on previous user testing and activities conducted by your case study, how would you improve privacy and anonymity of user participants' data?
7. On a scale of 1-5, how thorough has your museum's case study been in obtaining informed consent of participants as per the guidelines of GDPR laws?
8. List the steps your case study has taken to maximize accessibility for the targeted communities.
9. Based on previous user testing and activities conducted by your case study, list the steps you might use to improve accessibility.
10. List the steps your case study has taken to maximize inclusivity for the targeted communities.
11. Based on previous user testing and activities conducted by your case study, list the steps you might use to improve inclusivity.
12. Have you ensured that the rights of **vulnerable people** are protected, and they are comfortable participating in an activity?
13. Describe the steps you have taken or plan to take to defend their rights.
14. Have you obtained guardian's consent for children's/minor's/ "fair and just" (senior citizens and others who may not be able to provide consent) participation in case study activities?
15. Describe how your museum's case study has been transparent in revealing how the SPICE systems affect the participants? (e.g: participants knowing why certain recommendations are made for them)
16. How do you plan to improve the transparency?

17. Have you checked for the following harms that have emerged or may emerge for the user participants of your museum's case study? (Options: 1. Use of certain words or offensive content, 2. Descriptive terms limiting semiotic freedom, 3. Racism, 4. Gender identification, 5. Cultural appropriation, 6. Intentionally or unintentionally manipulating personal feelings and opinions (e.g., nostalgia leading to negative feelings), 7. Other)
18. How have you or do you plan to deal with these harms?
19. List potential biases that have or could emerge in your case study's pilot application or workshop activity. (e.g., working with communities or stakeholders who have a specific political leaning)
20. On a scale of 1-5, how well have you credited the participants (if not anonymized and ok with it), museum staff, researchers, and other stakeholders?
21. Anything else you would wish to let us know.

Summary of responses from the Case Studies

Tabled comparisons of individual Case Study museums' responses to the questionnaire have been categorized and is available to the consortium members here. The individual responses are also available in the same project SharePoint folder.

Privacy and anonymity:

In compliance with GDPR most of the Case Study museums are neither collecting personal data nor anonymizing it. However, in the DMH Case Study, after signing the appropriate authorization, participants have the option of providing their name along with the story they contribute if they wish to be acknowledged.

Accessibility and inclusivity:

Case Study museums have taken a variety of steps to improve accessibility and inclusivity to their audiences. Noteworthy ones include consultation with groups before workshops, involvement in co-design, and approaching communities that have been underserved by the museums. For example, adhering to the norms of inclusivity, IMMA has conducted deep engagement and co-design activities with:

- Black & Irish organization
- LGBTQ+ groups
- Healthcare workers
- Asylum seekers
- Young people in detention
- Young people living with life-long illnesses

Transparency and checking for harms:

Case Study museums that do provide user-specific recommendations attempt to make them transparent to their users. In addition, harms such as the use of certain works or offensive content, racism, cultural appropriation, and intentionally or unintentionally manipulating personal feelings or opinions have been considered by the Case Study museums.

Question	DMH	GAM	HECHT	IMMA	MNCN
On a scale of 1-5, how thorough do you think your museum's case study been so far in maintaining privacy and anonymity of your user participants' data?	4	4	4	5	5
Are there certain areas wherein personal data is collected?	Yes	No	Yes	No	No
If so, have you ensured that informed consent is collected as per the guidelines of GDPR laws?	Yes	No	Yes	No	No
On a scale of 1-5, how thorough has your museum's case study been in obtaining informed consent of participants as per the guidelines of GDPR laws?	4	4	5	5	5
Have you ensured that the rights of vulnerable people are protected, and they are comfortable participating in an activity?	Yes	Yes	Yes	Yes	No
Have you obtained guardian's consent for children's/minor's/" fair and just" (senior citizens and others who may not be able to provide consent) participation in case study activities?	Yes	No	Yes	Yes	No
On a scale of 1-5, how well have you credited the participants (if not anonymized and ok with it), museum staff, researchers, and other stakeholders?	5	3	3	5	5

Table 4: Responses to the yes/no and Likert scale questions.

Having answered this questionnaire as well as including ethics in each step of the customer journey map is evidence that of how all the Case Studies have thoroughly taken ethical aspects into consideration. This has influenced the design of their pilot applications and workshops conducted. More of it will be described in the next chapter about each Case Study's pilot applications, workshops, and user testing.

6 – PILOT APPLICATIONS, WORKSHOPS, AND USER TESTING

At this stage of the SPICE project, the pilot applications are more clearly defined. Several workshops have been conducted by the Case Study museums that have worked very closely with their EuCs, CoIs, and CoPs. There is a stream of data flowing in from the SPICE infrastructure and now is the time for consolidation and evaluation of citizen curation. The pilot applications, workshops, and user testing carried out in each Case Study between May-September 2022 are described in this chapter.

DMH

The Pop-up VR Museum is a Virtual Reality (VR) application in which its end-user communities (EuCs) can access, interact, engage with a digitized/virtual artefact collection of DMH. One of the main reasons VR was selected as a medium for creating the Pop-up VR Museum is due to its ability to make digital cultural heritage accessible to communities who may not be able to visit the museum at the physical site to engage with its content. For example, in the DMH case study, senior citizens in care homes are one of the primary targets of people who may not be able leave their premises due to physical challenges. Therefore, the Pop-up VR Museum is being designed to function on portable VR headsets and this ensures that it can be used easily without the requirement of complicated hardware setup.

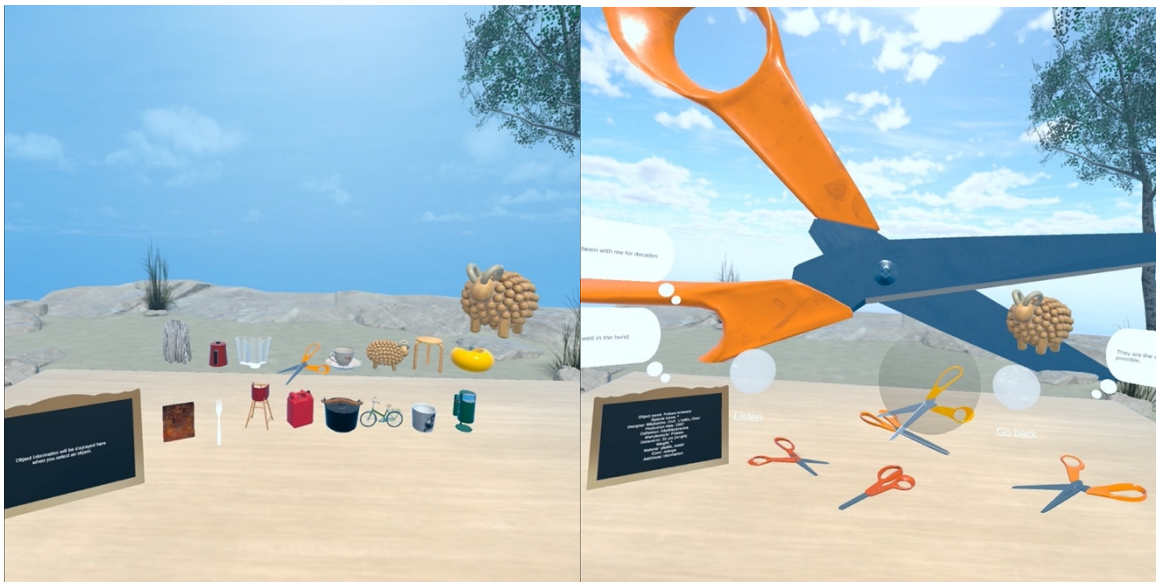

Fig.19: Design objects available for selection presented to the users of the Pop-up VR Museum (left) and the selection of the Fiskars scissors and immersion in it (right).

Fig.20: A user listening to a contributed story about the pastille chair in the Pop-up VR Museum.

Activities conducted between May - Sept 2022:

Beginning this year, DMH began conducting several workshops with various EuCs, CoPs, and CoIs and hosted some events. The Pop-up VR Museum was tested out in many of them, and stories contributed by participants and other visitors were collected. Some of the significant events and workshops are described below.

International Museum Week – May 2022:

International Museum Day is held on May 18th every year by the International Council of Museums (ICOM) to raise awareness on the role museums play in the development of society. During the Finnish Museum Week, The Pop-up VR Museum was set up in the Auditorium of DMH which also included two other VR and new media installations. The admission to this co-design event was free. The visitors were encouraged to test the first prototype of the Pop-up VR Museum facilitated by museum educators and researchers from the Aalto University team. Their experience in the simulation was broadcasted on screen to other visitors in the room. In this way, the facilitators were able to aid the participants through their experience in case they required assistance. Based on the

observations of users' experiences, the design team also constantly iterated the prototype to solve certain design issues and other bug fixes on the site.

After testing, participants were asked to fill a feedback form to help improve user experience. Filling this was voluntary, participants were free to skip this phase in case they wished to. Two questions were presented to them in the form that included:

1. Did you like this VR experience? And if so, what did you like about it?
2. Did you face any difficulties or challenges interacting with the VR experience? If so, how could it be improved?

From our participants, we received 58 statements regarding what they liked about their experience and 45 related to potential improvements they foresee. These statements are summarized in Table 5 below based on certain aspects of the Pop-up VR Museum.

Aspect	**Summary from the qualitative feedback**
Hardware/device	At least 11 participants mentioned discomfort while adjusting the VR HMD to fit their head correctly especially while wearing glasses.
VR as a medium	Many participants experienced VR for the first time and were fascinated by the medium's capability of instilling presence and suspending disbelief.
Contents of the experience	Most participants who provided feedback enjoyed interacting with objects and "immersing" themselves in them. However, they also desired more features such as interaction with characters in the virtual environment.
UI and UX	Even though certain aspects of the experience were easy to use and intuitive, there were mismatches between text and audio as well as accidental/unintentional selection of objects or other options.

Table 5: Summary of qualitative feedback provided by participants who tested the Pop-up VR Museum at the International Museum Week.

In the first iteration of the prototype, data points were also set up in the backend of Pop-up VR Museum that would get triggered during user interactions and stored in an offline JSON representation. The file was then posted to the Linked Data Hub (LDH) for the SPICE technical systems to analyze. These data points include:

- Generational groups a test participant belongs to, choices offered for selecting one were: i)1928 – 1945, ii)1946 – 1964, iii)1965 – 1980, iv)1981 – 1996, and v)1997 – 2012.
- Language selected by the participant: i) Finnish, ii) English, and iii) Swedish.
- Avatars selected: i) Pässi lamb, and ii) Puunukke doll.
- Instances of interaction with design objects based on their selection and further interaction based on i) stories listened to about them, ii) immersion within them, and iii) collecting them.
- Average gameplay time of participants.

The results are presented in the following tables (Table 6 – Table 9).

Generation	Responses
Silent (1928 – 1945)	17
Boomer (1946 – 1964)	23
GenX (1965 – 1980)	40
Millenial (1981 – 1996)	54
GenZ (1997 – 2012)	16

Table 6. Generational groups of participants who tested the Pop-up VR Museum during the International Museum Week.

Language	Responses
Finnish	50
English	92
Swedish	8

Table 7: Language selected by participants to explore the Pop-up VR Museum during the International Museum Week.

Avatar	Responses
Pässi (male sheep) wooden doll	90
Lappkojs wooden doll wearing Sámi dress	60

Table 8: Avatars selected by participants who tested the Pop-up VR Museum during the International Museum Week.

Artefact	Selected	Listened to	Immersed in	Collected
Aalto vase	80	156	69	16
Canister jerry	69	138	59	11
Cast Iron pot	80	180	67	13
Fiskars scissors	78	159	68	14
Jokapoika shirt	79	171	65	4
Moomin mug	64	123	53	10
Myrna cup	52	84	40	7
Pastille chair	89	177	81	15
Pehtoori pot	80	150	73	21
Stool 60	69	129	54	14

Table 9: Instances of interaction with design objects (green as most and brown as least).

One of the shortcomings in understanding the instances of interaction with design objects is that all the ten (10) objects shown in Table 9 were not available for selection. Instead, only a randomized set of three (3) objects would spawn during the selection phase out of which a user could select only one (1). In the subsequent iterations, it was decided to allow the users to select an object from the entire collection during the selection phase.

Design Evenings:

The Design Evening is DMH's free evening, organized once in a month, when the visitors can enjoy contemporary exhibitions, join free guided tours in Finnish and English and follow the talk program as well as participate in workshop activities. The aim of this event is to open doors to the museum for all interested in design and this pursued through free admission and low threshold activities. The free evening (4 hours, 16–20 PM) attracts approximately 200-350 visitors, whereof many come to the museum for the first time. There are a lot of non-Finnish speaking visitors and international tourists or students but also Helsinki-dwellers and people from nearby cities who want to pop by for the event or see the museum they never visited before.

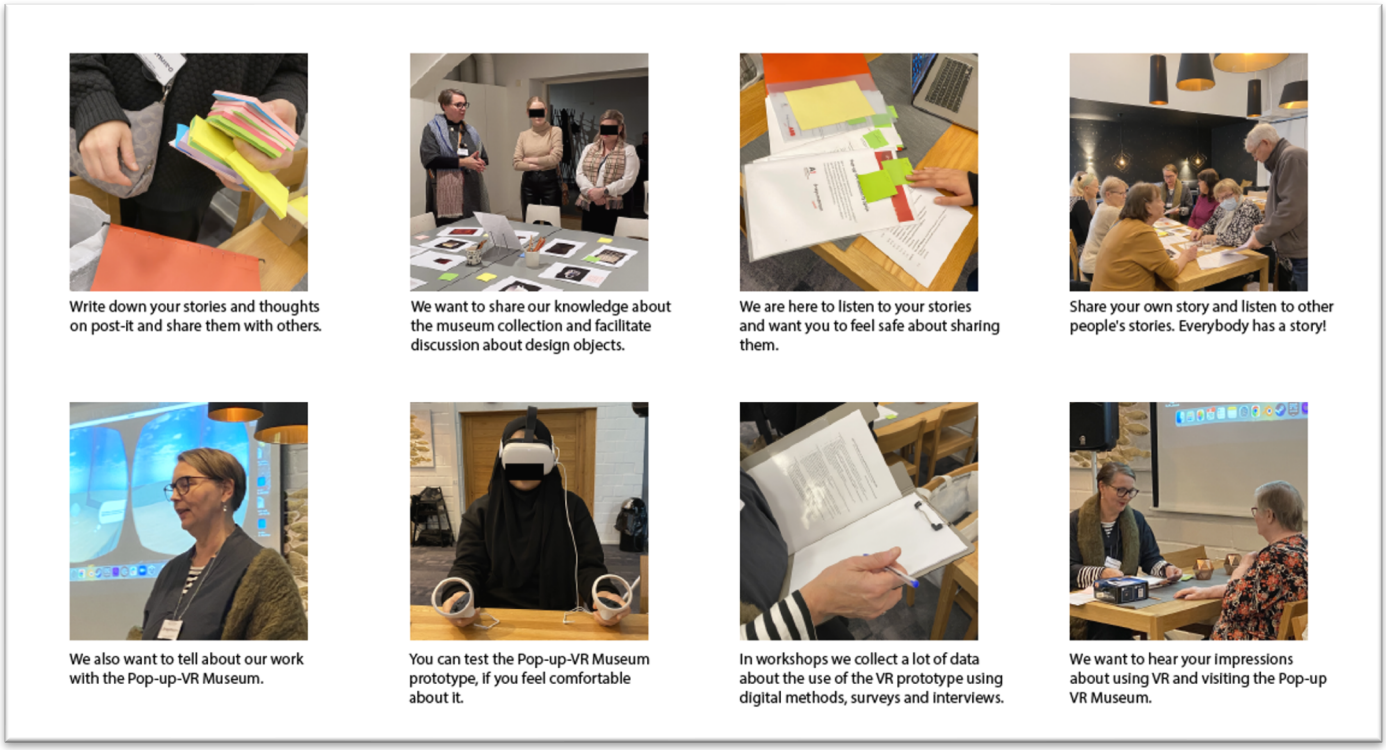

Fig.21: Participatory, co-design methods used in workshops by facilitators from DMH.

The Pop-up-VR Museum co-design workshop was organized as part of Design Evening program for four times in fall 2022: 30.8., 27.9., 25.10. and 29.11. at 17-19 PM. Over 200 visitors have participated in the first three workshops. Basing on a selection of photographs of design objects in the museum's collection, the participants can write their short stories or audio record them and test the Pop-up-VR Museum digital experience with similar objects and stories by other people. The workshop, facilitated by museum educators and designers from the Aalto University, is part of the co-design process, where experts of design and museum learning study interaction with different user groups. To see more, please visit https://www.designmuseum.fi/en/events/design-evenings/.

In the room where Design evenings were conducted, the staff at DMH placed printouts of design objects on a large table. Sticky notes were also placed on the table and visitors were asked whether they are interested in sharing a story or memory or just a comment about any of the design objects. Every visitor was also provided an option for oral narration of any of stories they wanted to share,

and, in this case, he/she was taken to another room where DMH staff conducted the audio recording. Most of the annotations were made in English or Finnish but also other languages were used.

Meanwhile, in the same room, visitors were offered the opportunity to test the Pop-up VR Museum using VR headset and broadcasting on laptop screen. Physically linked to the hands-on annotation, the participants could see how the flow of stories goes from post-it notes to the pilot application. Thereby, they also received a basic understanding of the concept of citizen curation.

For every subsequent Design evening, a new iteration of the Pop-up VR Museum was tested. After each event, one of the educators from the DMH workshop team converted written material and audio recordings into digital texts and translated them to be accessible at least in Finnish, English, and Swedish. They were then uploaded to the LDH for the SPICE technical systems and the Pop-up VR Museum backend to access.

Structured and categorized data was also collected in these workshops. In addition to questions in the Museum Week surveys, DMH asked participants about their background and culture that they associate with. Participants mentioned a variety that included: i) Chinese, ii) Turkish living in Finland for 6 years and quite familiar with Finnish culture, iii) Italian exchange students at University of Helsinki new to Finland, iv) Finnish citizens with Somalian background, v) Polish students who have seen cartoons like the Finnish Moomins, vi) Spanish, vii) Vietnamese, and much more.

Fig.22: The Design Evening session in October, 2022 during which attendees are contributing stories about design objects on post-it notes which are attached to printed photos of these objects on the tables (left) while one of the attendees tests the Pop-up VR Museum (right).

During workshops conducted after the 2nd design evening, more questions (translations in Finnish, Swedish, and English) were put forth to the participants in the feedback forms:

1. Prior to experiencing the Pop-up VR Museum, have you ever tried Virtual Reality – VR to experience any film or game or other? If so, what have you experienced?
2. While engaged, did you ever feel a “sense of presence”/“immersion”/“that you were there”? If so, how strong was the feeling? (Between 1-5)
3. Which story was the most striking/memorable to you? And why?

4. Which artefact was the most interesting to you? And why?
5. Did you find the experience challenging or uncomfortable at any point?
6. Do you play any board games or digital games or role-playing games or any other ones nowadays? If so, which ones? And what makes you enjoy them?
7. If you had a VR headset with you, would you be interested in playing games in VR? Why or why not?

It was discerned that some of the respondents have tried VR but most have not. While most were mesmerized by the experience of the virtual Pop-up VR Museum, there were still certain areas wherein participants felt discomfort and the co-designers in the Case Study are seeking to improve these. A variety of stories and artefacts were memorable to the participants, especially due to their personal associations with them. Lastly, many of the participants have been playing board and digital games in the past and appeared to be interested in VR games as well.

Maunula workshop:

In September 2022, DMH organized a workshop with the association of pensioners in Maunula district Helsinki (*Maunulan seudun eläkkeensaajat ry*) as part of the senior groups monthly meeting at the premises of a local church. Earlier same year, March 2022, DMH had workshopped with a "neighborhood group" (*Naapurustopiiri*) an activity supported by Helsinki City in the same district and this had ignited the idea to invite us again to Maunula. The pensioners association meeting joined together approximately 25-30 members. Only one of them had participated in the previous workshop. We held a one-hour session including presentation of Pop-up-VR Museum, group discussions and annotating design objects on post-it notes using photographs. There was also a possibility to test the VR.

The Pop-up VR Museum was first introduced to the senior citizens at the church by the SPICE researchers by carrying out a walkthrough on a VR HMD and streaming it on a big screen. Senior citizens were then offered the option of testing out in case they were interested. However, only four (4) tested it while the rest were either shy/hesitant or considered themselves to be technology-sceptics having attempted VR elsewhere and experienced degrees of discomfort.

Fig.23: Participants attending the workshop organized at the Maunula church and contributing stories (left) while one person's experience of the Pop-up VR Museum is broadcasted on the screen (right).

Workshops with asylum seekers and language learners at DMH:

Two (2) workshops were conducted for non-Finnish speaking immigrants at the DMH, representing the target group "asylum seekers". The first workshop was organized at the DMH on 21.9.2022 in collaboration with The Institute of Adult Education in Helsinki (*Helsinki aikuistopisto*) A teacher of Finnish as second language for adult students brought her group to visit the museum and to participate in the workshop. The group consisted of 20 students of different gender and age. In Finland language studies are obligatory for persons seeking residence permit, and language courses often bring together people of foreign origin.

The second workshop was organized at the DMH on 7.10.2022 in collaboration with the Punavuori refugee center (*Punavuoren vastaanottokeskus*) under Finnish Immigration Office. Through contact with center's instructor, we received a mixed group of 10 refugees who were interested in visiting a Finnish museum nearby. There were 4 adults, 4 children and 2 young people as well as 2 instructors from the centre. The group consisted of two families. Two young people and one child came alone.

Most of the participants in the workshops tested the Pop-up VR Museum. It was interesting to note their interpretations on design objects and Finnish design and cultural heritage from the point of view of different cultures. Some of the images in the Pop-up VR Museum provoked nostalgia and in some cases even fear. For e.g., a virtual environment simulated for the Jerry Canisters simulates an open sea with the user floating on a boat and the lack of land nearby instilled fear in one participant with bad memories from sea crossing. Guided by such ethical considerations, we redesigned some of these environments and made them more friendly catering to sensitivities of different users and communities.

Fig.24: A participant from a workshop with Punavuori refugee centre selecting an avatar while experiencing the Pop-up VR Museum.

Interaction design:

The design of the Pop-up VR Museum interface prioritizes accessibility and intuitive UX. This is done so considering that there are different end-user communities with a variety of needs. For example, a seated experience of the Pop-up VR Museum was prioritized wherein a real table placed in front of users was proportionally mapped to a virtual table in the experience thereby supporting their arms and/or elbows; these seated experiences also minimize motion-sickness in VR and improve accessibility by catering to wheelchair requirements that may be important for senior citizens. In addition to accessibility, UX was improved by using buttons in the virtual environment for selections and presenting key events within a 72.5-degree field-of-view (FOV).

Organizing a structured dataset of objects and stories:

A final selection of 63 scanned design objects were organized using a structured JSON dataset which was also uploaded to the LDH. The categories in the JSON representation of objects were based on DMH's classification of the permanent collection. Similarly, the stories contributed by various

communities were organized as a JSON representation as well. These stories were tied to the design objects via the common “object number” (unique identification number) link in both the representations. Approximately 500 written and audio recorded stories have been received so far thereby averaging 7.93 stories per object. This is set to increase in the coming months.


```
{
   "Object name": "Stool 60",
   "Object": "chair",
   "Special name": "stool",
   "Object number": "44163",
   "Designer": "Aalto, Alvar",
   "Production date": "1933",
   "Collection": "Käyttökokoelma",
   "Manufacturer": "Artek",
   "Dimension": "38 x 38 x 44",
   "Weight": "2",
   "Material": "birch, plywood, fabric",
   "Color": "birch"
   " Additional information ": ""
 }
```


Fig.25: An example of a JSON object of a design object used in the Pop-up VR Museum.


```
{
   "Object name": "Stool 60",
   "Object number": "44163",
   "Date of recording": "8.3.2022",
   "Context/event/workshop": "Orimattila",
   "Contributor name": "Anonymous",
   "End-user community": "Senior citizens",
   "CommentID": "#44163C2",
   "Original language": "Finnish",
   "Finnish translation": "Onko tuo päällinenkin vuodelta 1932?",
   "English translation": "Is that cover from 1932, too?",
   "Swedish translation": "Är den klädseln från 1932 också?",
   "Other language translation": "",
   "Tags": "",
   "Additional information": ""
 }
```


Fig.26: An example of a JSON object of a story contributed about a design object (Stool 60 - 44163) used in the Pop-up VR Museum.

Analysis carried out by the SPICE technical infrastructure:

The JSON datasets of objects and stories were uploaded to the LDH and is currently available for all the SPICE technical systems to carry out analysis. An early iteration of the analysis of 303 stories was created by WP3’s Semantic Annotator and WP6’s reasoning services. Fig.27 shows an example of a story associated with a design object with analysis carried out by reasoning services and the Semantic Annotator.


```
{
```

```
  "_id": "30",
  "Artefact": "Pastille chair",
  "Artefact_ID": "42al",
  "Type": "response",
  "English": "And this chair by Eero Aarnio. It is charming. It has lovely shapes. And
there comes the lights and the colours, and so on. And someone says this is a useless
object. I think this is… As I told before here, sailing on the waves of the lake with this
one was a lot of fun, also for an adult.",
  "Finnish": "Ja Eero Aarnion tää tuoli. Se on hurmaava. Siinä on ihanat muodot. Ja siinä
tulee ne nää valot ja värit, ja näin pois päin. Ja joku sanoo, että tää on turha esine. Mun
mielestäni tää on… Niinkuin kerroin jo täällä aikaisemmin, niin tämmöisillä purjehtiminen
järven aalloilla, niin oli varsin hauskaa myöskin aikuiselle ihmiselle.",
  "Swedish": "Och den här stolen av Eero Aarnio. Den är charmig. Den har fina former. Och
där kommer ljusen och färgerna, och så vidare. Och någon säger att denna är ett onödigt
föremål. Jag tror att det här är... Som jag sa tidigare här, var det väldigt roligt att
segla på sjöns vågor med den här, även för en vuxen.",
  "Italian": "E questa sedia di Eero Aarnio.È affascinante.Ha forme adorabili.E arrivano le
luci e i colori, e così via.E qualcuno dice che questo è un oggetto inutile.Penso che
questo sia ... come ho detto qui, navigando sulle onde del lago con questo è stato molto
divertente, anche per un adulto.",
  "degari_emotions": "Joy",
  "plutchik_emotions": {
    "anger": 0,
    "anticipation": 0.14492753623188406,
    "disgust": 0,
    "fear": 0,
    "joy": 0.2898550724637681,
    "sadness": 0,
    "surprise": 0,
    "trust": 0
  },
  "emotion_recognition": "bliss; joy",
  "concept_parsing": "['chair'; 'charming'; 'shape'; 'light'; 'colo'; 'useless'; 'tolde';
'sail'; 'lake'; 'fun'; 'adult']",
  "subjectivity_detection": "SUBJECTIVE",
  "polarity_classification": "POSITIVE",
  "intensity_ranking": "0.729",
  "aspect_extraction": "['chair']",
  "personality_prediction": "O↓C↓E↑A↓N↓",
  "depression_categorization": "33%",
  "toxicity_spotting": "0%",
  "SA_emotions": {
    "Anticipation": 1,
    "Joy": 1,
    "Trust": 1,
    "Surprise": 1,
    "Love": 1
  },
  "SA_sentiment": {
    "Positive": 1.3481762166666666
  },
  "SA_toxicity": [],
  "SA_entities": {
    "dbr:Adult_(band)": {
      "@types": [
        "http://dbpedia.org/ontology/Group",
        "http://dbpedia.org/ontology/Organisation",
        "http://dbpedia.org/ontology/Agent",
        "http://dbpedia.org/ontology/Band"
      ],
      "confidence": 0.9999986
    },
    "dbr:Eero_Aarnio": {
      "@types": [
        "http://dbpedia.org/ontology/Person"
      ],
      "confidence": 1
    }
  },
}
```

Fig.27: Reasoning services and Semantic Annotator analyzing a story of a design object (Pastille chair).

Overall, the Pop-up VR Museum is operational, has been tested extensively, and is being used by DMH for various workshops and events. Users are largely satisfied and, in many cases, excited to experience perspectives of design objects in VR. The team is working on it further by building new features to enhance the UX even more, integrating and evaluating the SPICE infrastructure, and ultimately moving towards citizen curation.

Plans till the end of the project:

Although the Pop-up VR Museum is operational, it requires some enhancements to make it a polished piece of citizen curation. It will be tested extensively till the end of the SPICE project. Results obtained are also being analyzed in relation to how different dimensions of social cohesion could be achieved.

Comment feature working in the application:

Now, users and communities are only able to contribute stories and comments in workshops via written text and/or audio recordings. Once they have provided them, educators from the museum transcribed and translate them. To make the process easier and sustainable, we are building a feature that allows users to contribute within the application itself. There are still challenges related to extensive typing in VR, bandwidth for audio recording, and curation of content. We plan to address these through keywords, limited time for audio recordings, and using the hate speech detector in the semantic annotator to identify certain keywords.

Collecting stories for each object in the Pop-up VR Museum:

During the Design Evenings held in November and December 2022, stories will be collected so that each object contains at least one written or audio recorded story. Therefore, pictures of design objects for which no stories exist will be presented to visitors and they will be offered sticky notes or opportunity to audio-record their contribution.

Co-design workshops:

In 2023, the co-design workshops will focus more on testing new features, iterating them, and obtain qualitative feedback that helps us in understanding whether (and how) social cohesion is being achieved. Specific aspects of gamification will be integrated into the Pop-up VR Museum so that it promotes recurring play/use. The Pop-up VR Museum will tour across Finland, will be tested by rural dwellers, and presented at various events.

GAM

GAM is designing and developing GAM Game, a responsive web application that allows the Deaf community (primary end-user community of GAM) and other museum visitors to interpret GAM's collection using their own emotions. The pilot makes use of a prototype developed by GAM and UNITO, which employs a selection of artworks with associated emotions to invite users to create as well as share stories.

Activities conducted between May - Sept 2022:

GAM has been working towards revising the feedback received from the focus group test of the GAM Game conducted during the end of March 2022 (See D7.5 – Case Studies Progress and Plan). The feedback received from the purview of user-experience has been categorized and analysed. Based on some of the feedback, customer journey maps have been designed for a variety of personas and insights from it have been incorporated into the pilot application.

Over the past few months, different aspects of the application have been designed. Initially, draft of the application was tested that Padaone's inSPICE provided for the web application. Adhering to certain norms of co-design, the design of the interface is based on the feedback that was provided by end-user communities as well as communities of interest and practice from the first round of testing (See D7.1 – Evaluation methods protocols). A key aim in SPICE is broadening accessibility and inclusivity to a varied range of participants and based on it, "tactile marks" were tested within the interface. Please visit this link to see a video about the first prototype of the GAM Game pilot application and the process of designing it: GAM Game promo video link.

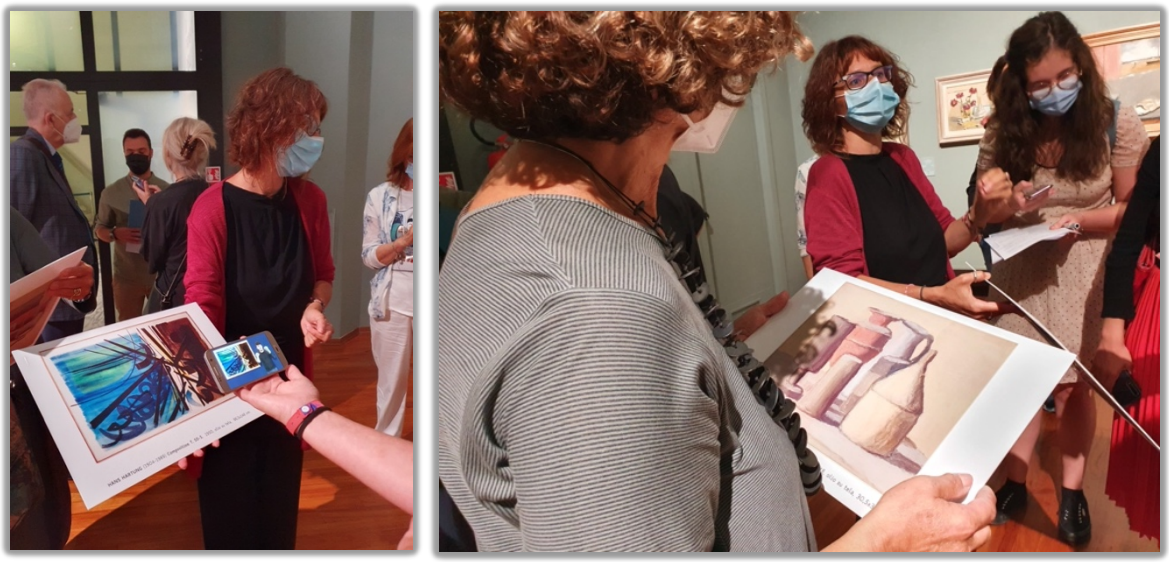

Fig.28: Launch event of the first prototype of the GAM Game (Photo credit: Anna Follo).

To further promote inclusivity, icons were designed that would help users with writing difficulties to envision what the artworks makes them think, feel, and remember. Adhering to the norms of

participatory design, two rounds of survey/polling were carried asking students to select their preferred icon or upload one of their own.

Fig.29: Choices provided to users to select their preferred icons for the design of the GAM Game (Image credit: Anna Follo).

A dashboard has been designed by WP5 using the InSPICE framework to enable scripting of activities for mediators and curators of GAM. The aim of the dashboard is to allow the creation of different instantiations of the GAM Game targeting specific workshops or other user-testing sessions.

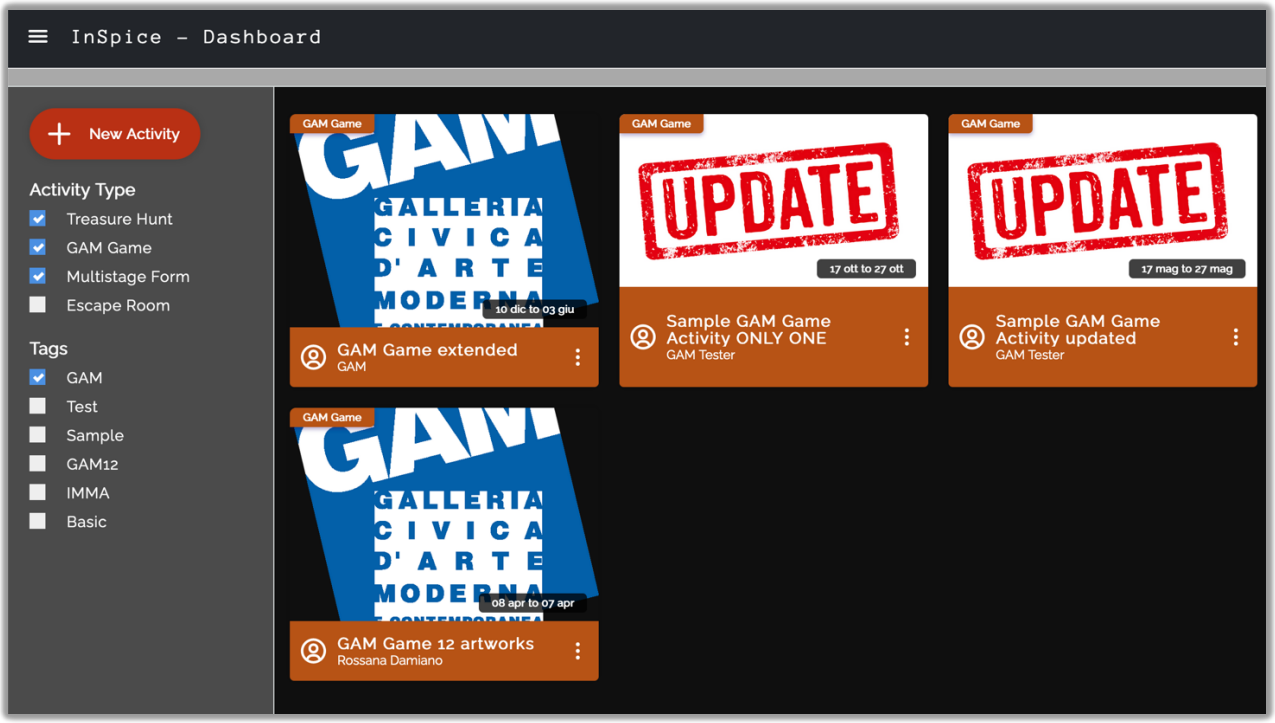

Fig.30: A dashboard of the GAM Game in the InSPICE framework for mediators and curators of GAM to script activities. (Photo credit: Rossana Damiano)

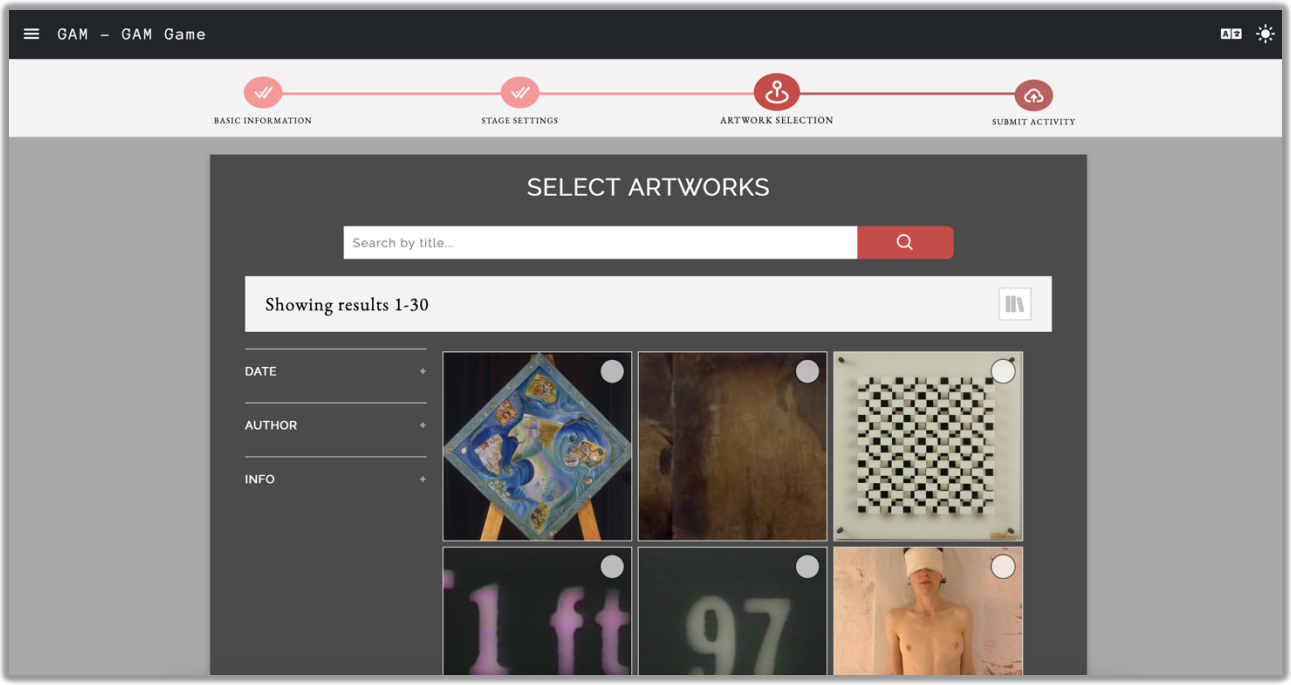

Fig.31: A selected instantiation of a GAM Game activity being edited by mediators/curators of GAM. (Image credit: Rossana Damiano)

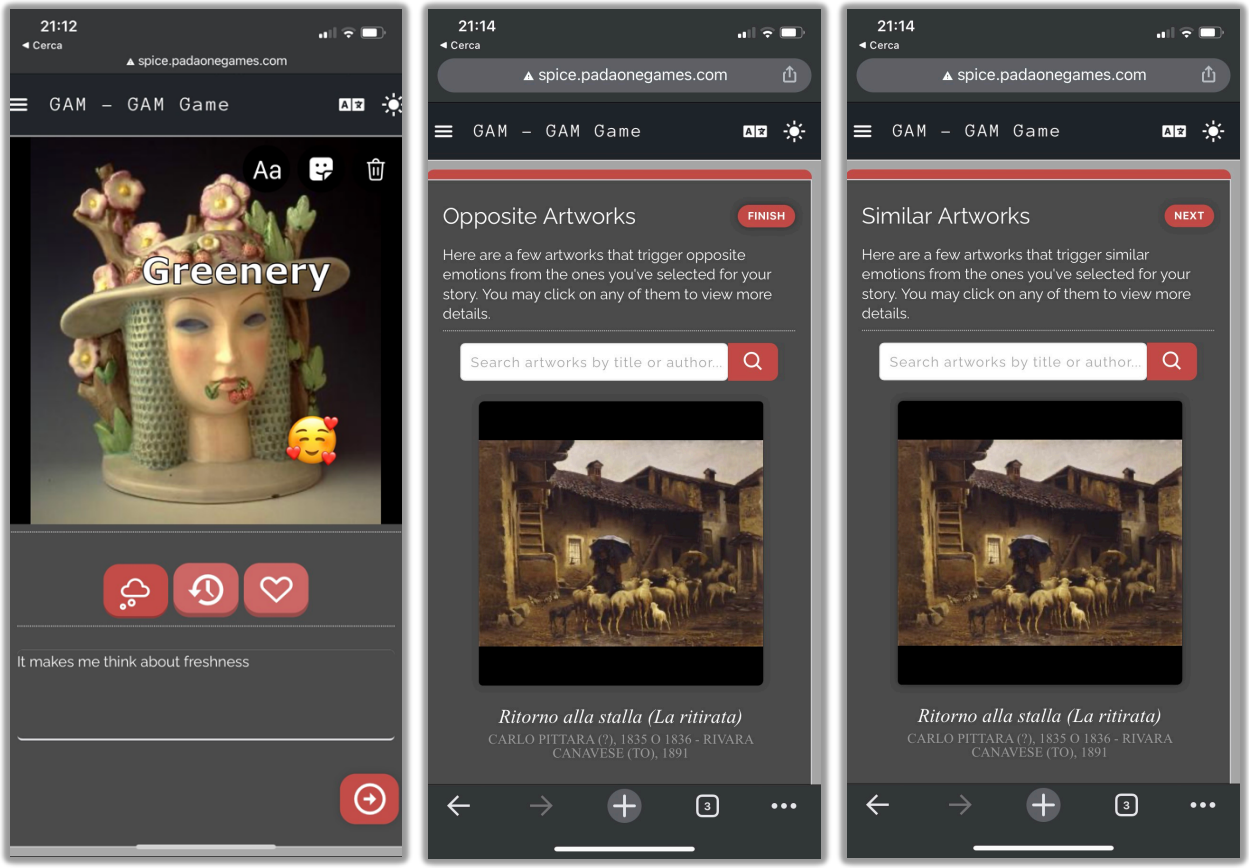

Fig.32: Screenshots of the GAM Game application wherein a user is annotating an artwork and writing his/her story (left) and the social recommender offering opposite (centre) and similar (right) artworks. (Image credit: Rossana Damiano)

The GAM Game is currently fully operational and 40% of the end-users that have tested it hail from the deaf community. All the key features of the application are fully functional. In addition, many of the SPICE technical systems such as the recommender and DEGARI reasoning system were also tested out.

Plans till the end of the project:

The release of the alpha version of GAM Game is slated to be at the end of 2022. This version will be tested at Instituto di Sortti and evaluated as well as adjusted soon after. Based on this evaluation, a beta version will be launched integrating all the SPICE technical systems.

The final phase of the project in 2023 will involve a wider launch of the project along with several promotional activities.

HECHT

The HECHT Museum is a small to medium-sized museum located at the university of Haifa's campus and is dedicated to the archaeology of the land of Israel and artwork. The dominant end-user community of the Case Study is 10th and 11th grade school students from both religious as well as secular communities; in addition, other stakeholders and interest groups include students, teachers, and the museum curators. The main activity in the HECHT Case Study is the interpretation and reflection about two historical dilemmas related to the Jewish rebellion against the Roman Empire in 66AD. This rebellion, that started successfully, was suppressed five years later, and ended with the destruction of Jerusalem. In addition to listening to a talk about the exhibition from the museum curator in which they exercise their interpretation and reflection skills, the students also conduct a citizen curation project where they build their own exhibition.

Activities conducted between May – September 2022:

In June, the final round of testing was completed. In total, the group comprised above 200 high school students from four different institutions with 2-3 classes per institution. The data from the testing sessions is being processed and analyzed both quantitatively and qualitatively.

An early result pointed to the effectiveness of first providing a similar opinion and then a different opinion, as opposed to two different opinions, in promoting openness as measured by the questionnaire. Apparently, first acknowledging the students' own views and only then presenting different views is more conducive to promoting openness. We are awaiting the analysis of more data to confirm or deny this hypothesis.

Ten teachers were involved in the activity. The teachers helped facilitate the activity before and after arriving at the museum. The group is also currently collecting the teachers' perspectives on the activity.

Plans till the end of the project:

This phase will include further qualitative analysis of all the workshops that have been carried out, focusing on analysis of student answers and the curation project. We plan to also gather and analyze data from teachers, providing their perspectives on the activity. In addition, an application is built and being enhanced which will allow curators, teachers, and researchers to examine different explicit and implicit communities as well as student and community opinion. Finally, dissemination of the results will be done by writing and submitting academic papers.

The SPICE researchers closely involved with HECHT are engaging with the museum to understand how the Rebellion activity can be assimilated so that the museum can continue it even after the SPICE project has ended.

IMMA

The IMMA Case Study supports visitors to use the museum's collections to develop their own perspectives and share them with others to help people appreciate alternative points of view. The Case Study focuses on supporting groups from marginalized or under-served communities as well as those who lack access to the museum.

IMMA is codesigning the *Deep Viewpoints* web application with the underrepresented groups. This application intends to provide participants with the opportunity not only to interpret artworks by taking part in longer-form scripts, but also to author their own scripts using a mediation process as a mechanism of providing their own perspective.
Engagement and codesign involves the following communities:

- Migrant groups
- Black & Irish organization
- LGBTQ+ groups
- Healthcare workers
- Asylum seekers
- Young people in detention
- Young people living with life-long illnesses

Reflections on the workshops and activities conducted so far:

IMMA has begun building a bank of citizen contributions through scripts and responses to scripts. This would allow museum visitors to browse and explore how others have responded to the same questions. It would also enable the voices of marginalized group of young people to be captured digitally and integrated into the physical gallery space.

Another key insight worth noting is how different end-user communities as well as demographics respond to themes and author activities. For example:

A group of participants from Migrant *Women* - Opportunities *for Work* (Mi-WOW), showed the potential for revitalizing museum objects by contributing new layers of meaning. One of the works Mi-WOW included in their script was Alice Maher's *Berry Dress*. The work, a child's dress, decorated

with berries that have withered and dried over time, was first introduced to the group through a script authored by IMMA. The IMMA-authored activity framed an understanding of the work in terms of temporality, focusing on the passage of time and the loss of childhood innocence – "What happens to berries over time?". However, the participants took a different view of the significance of the artwork. The questions they posed focused on the meaning not of the dried berries on the outside of the dress, but on the needles within; for Mi-WOW, these pointed to bodily, uterine pain. "Look inside the dress at the needles and describe how you feel." Selecting the theme of 'Activism', their script reframed the work as political and feminist, their questions opened discussions of bodily autonomy and reproductive rights.

A group of Afghan refugees living in the Mosney Direct Provision Centre used the lens of war and peace to mediate an exhibition with an ostensibly different set of concerns. Exploring 'Chapter 2: the Anthropocene', an IMMA exhibition exploring human impact on the earth and climate change, their script invited visitors on a "short tour of four pieces that look at different feelings of peace". The script looked at *Dulce et Decorum est…*, a work by John Kindness in which homeless Vietnam veterans are pictured on the yellow bonnet of a New York City taxi. Here, they focused not on the representations of the veterans but on the object itself, likening the car bonnet to a metaphor for soldiers and civilians on the front line of war, those first to feel war's impact.

On an ethical standpoint, one of the groups was keen on sharing critiques of the exhibition and uncomfortable gaps that they came across. In developing a script, 'Queer Reflections', Black Queer Book Club, a reading group based in Dublin, pointed at perceived gaps in the exhibition's representations of race and included an artwork from an artist outside the IMMA Collection as a suggested corrective to a perceived lack of representation from Black LGBTQ artists. These are valid and important perspectives that may not emerge clearly within the institutions. IMMA began reflecting more about dealing with difficult/triggering subject matter and how to carry it out sensitively. Questions were also posed regarding what the main role is of an IMMA facilitator, and this would also be delved into by extending the lengths.

Overall, the IMMA Case Study is operational, and the Deep Viewpoints application is available for testing and use online as well as in the premises of the museum. More work is required for the data gathered to be analyzed by the SPICE infrastructure to assess components of social cohesion for citizen curation.

Plans till the end of the project:

Time period	Workshops and activities
Sept – Dec 2022	September – November: workshops with Irish Traveller group. IMMA is planning to work with a local Traveller group, applying the same methodology across a longer time to explore whether this substantially changes the quality or character of scripts produced by the group. Dec end: IMMA Deep Viewpoints fully operational along with the integration of SPICE technical systems.
Jan – Apr 2023	In 2023, using the Response Room in IMMA and partnering with the museum's visitor engagement team, engage individual visitors and groups with SPICE system

	and tools. IMMA will engage partner groups and organizations with disseminating results from their case study.

Table 10: Workshops and activities envisioned by IMMA until the end of the SPICE project.

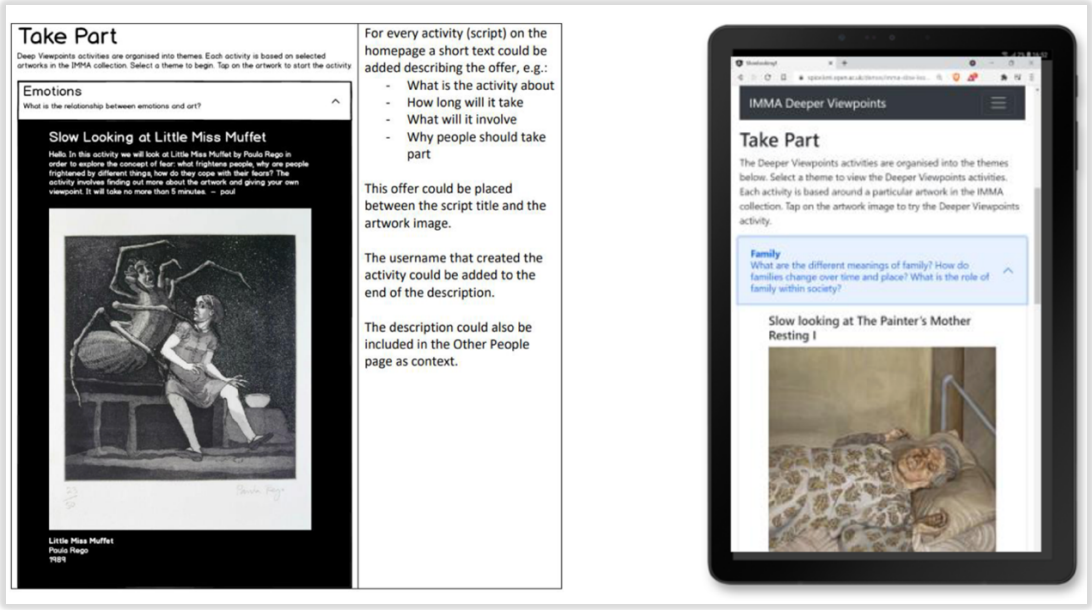

Fig.33: Initial stages of the design and development of IMMA Deep Viewpoints prototype (Image credit: IMMA).

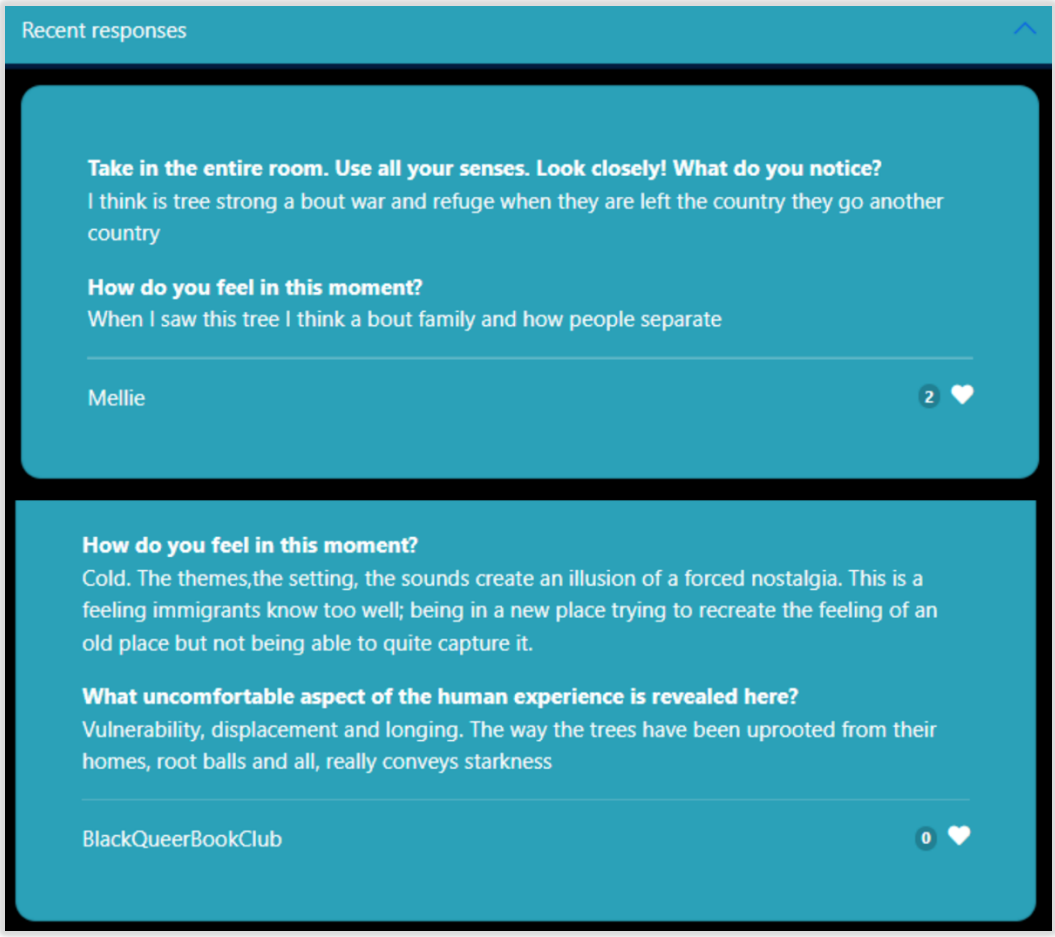

Fig.34: Examples of responses received on IMMA Deep Viewpoints (Image credit: IMMA).

Fig.35: Participants testing the IMMA Deep Viewpoints web application (Photo credit: Louis Haugh and Kyle Tunney).

MNCN

MNCN describes their Case Study as attempting to support schoolteachers to explain to their students how to interpret scientific evidence of the past and present and see how the choices we make today will live far beyond us, in deep time. Thus, discovering how human actions are driving Earth's rapidly changing climate today much like long-ago geological events did in the past. MNCN's aim is for schoolchildren to understand the importance of the Conservation Movement's motto: "Think globally, act locally".

The Treasure Hunt pilot designed by MNCN is envisioned around a gamified visit to the Science Museum supported by a mobile device wherein students search for hidden real and virtual objects by following a trail of clues. The Treasure Hunt interleaves the search for objects in the museum with explanations and questions. Although the school students are the primary target group, schoolteachers play a very important role in this pilot. After the visit wherein the students engage with the Treasure Hunt, teachers would ask the students to author a narrative piece reflecting on the experience at the museum. Thereby, the teachers will be able to encourage student reflections by analyzing the answers they provided to the questions in the game, and this may uncover common misconceptions.

Activities conducted between May – September 2022:

The development of the authoring tool is complete in the MNCN Case Study thereby allowing teachers to create Treasure Hunt activities for students.

Plans till the end of the project:

On November 21st and 22nd 2022, WP7 will pay a visit to MNCN with an objective of supporting a data gathering activity with groups of teachers and students who will engage in a Treasure Hunt at MNCN. As a part of these data gathering methods, key images of Points of Interest (PoIs) will be used during the Treasure Hunt, characterized as:

1. Moments of dialogue
2. Moments when 'memories rise to the surface'
3. Moments of reflection after

Through this process, the role and significance of EuCs, CoIs, CoPs would be analyzed. Based on this workshop, WP7 will also work closely with the museum professionals to design a service blueprint.

The Treasure Hunt will be operationalized by the end of 2022 integrating all the relevant SPICE infrastructure. In 2023, the written texts obtained by students would be analyzed based on the goals sought out for citizen curation.

7 – STATUS OF SPICE INFRASTRUCTURE

WP	Infrastructure	DMH	GAM	HECHT	IMMA	MNCN
WP2	Interpretation methods					
	Reflection methods					
WP3	User model					
	Community model					
	Semantic Annotator					
	Recommender					
WP4	Linked Data Hub					
WP5	Pilot application interface					
	Curators' interface					
WP6	Value and thematic reasoner					
	Emotional modeler					
	Scripting services					
WP7	User experience design					
	Service blueprints (final)					
	Sociotechnical systems maps					
	Ethical considerations					

LEGEND

Green – Implemented or being implemented
Yellow – Ongoing development
Grey – No contribution required from WP

Table 11: Status of development of the SPICE infrastructure in each Case Study.

As shown in Table 11, most of the SPICE infrastructure is in place and operational in each Case Study. Some of them are currently ongoing development based on the data gathered from workshops and user-testing sessions in each Case Study. We foresee that all the required systems will be implemented and tested extensively by the end of the SPICE project.

8 – DISCUSSION AND CONCLUSIONS

This deliverable document has presented an elaboration of the work carried out by the Case Study museums in relation to design, ethics, development of pilot applications, workshops, other forms of user-testing, and the integration of SPICE infrastructure between May-September 2022. As seen in this report, the Case Studies are operational, their pilot applications have been tested extensively but to varying degrees. However, in the final phase of the SPICE project, more work is required in integrating all the necessary infrastructure and evaluating them to assess how co-design along with SPICE infrastructure contributes to citizen curation.

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