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## Social cohesion, Participation, and Inclusion through Cultural Engagement

## **D7.2 SOCIO-TECHNICAL ROADMAP WITH**

## **PROJECT MANAGEMENT TOOL**

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### D7.2 STS ROADMAP WITH PM TOOL V 1.0, 12/02/2021

## **Project information**

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3	DMH	DESIGNMUSEON SAATIO - STIFTELSEN FOR DESIGNMUSEET SR	Finland
4	AAU	AALBORG UNIVERSITET	Denmark
5	ου	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 is a description of the Sociotechnical systems (STS) roadmap and the Project Management (PM) tool. The STS roadmap is an instantiation of a distributed co-design ecosystem that includes stakeholders consisting of museum professionals, developers, designers, humanities scholars as well as end-user communities. Activity Theory is used to explore the ongoing activities conducted with these stakeholders and each Case Study's timeline for the development of these activities is elaborated upon. The PM tool is used to communicate between Case Studies and Work Packages enabling task definition, delegation and a live view of development. Finally, with the recognition of the complexity of the STS, further steps required are briefly mentioned.



## **Document History**

Version	Release date	Summary of changes	Author(s) – Institution
0.1	29/01/2021	First draft released	AALTO, DMH
0.2	08/02/2021	Revision of ontological models. Expansion of the literature review.	AALTO, AAU, DMH, IMMA, OU, UCM, UH, UNIBO
1.0	12/02/2021	Timelines of all the other case studies.	AALTO, AAU, DMH, FTM, IMMA, OU, UCM, UH, UNIBO



### List of abbreviations and terms

- AI Artificial Intelligence
- Col Communities of Interest
- CoP Communities of Practice
- **GDPR** General Data Protection Regulation
- HCD Human Centred Design
- HCI Human Computer Interaction
- IoT Internet of Things
- LDH Linked Data Hub

PM tool - Project Management tool that will be used by WP7 for communication between the Case Studies and WPs in order to keep track of tasks and requirements.

- STS Sociotechnical systems
- Ubicomp Ubiquitous computing
- **UX User Experience**
- WP Work Package



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# **1. INTRODUCTION**

SPICE is a H-2020 project dedicated to citizen curation of cultural heritage through systems and tools developed over the course of 3 years. It involves complex organizational development through the interaction between people and technology within research as well as end use. Based on this view, this document describes the instantiation of the distributed co-design ecosystem in the project that includes museum professionals, developers, designers, humanities scholars and scientists as well as end-user communities. The ecosystem is described through the use of a Sociotechnical map or network visualization of the overall state of the project. Project activities are analysed and depicted every six months using the Cultural Historic Activity Theory method.<sup>1 2 3 4</sup> The new information and visualizations are aggregated into internal status reports and reviewed with the partners. Development of the project is also monitored by all the partners through the use of the Project Management (PM) tool. Both of these instruments – the STS map and the PM Tool – are used to create, discuss and track the schedule and development of the Case Studies throughout the duration of the project.

# **1.1. CITIZEN CURATION METHODS TO FACILITATE ACCESSIBLE EXPERIENCES OF CULTURAL ENGAGEMENT AND SHARING**

The SPICE project aims to promote inclusiveness, accessibility and diversity whilst simultaneously supporting social cohesion via engagement with cultural heritage through novel citizen curation methods and experiences.<sup>5</sup> Key challenges involve the design and implementation of new methods and tools within collaborative and participatory environments that foster reciprocal cultural understanding and resilience strategies.<sup>6</sup> The SPICE work tasks also deal with curation of digital assets and advanced digitization insofar as it aims to go beyond appearances and into recreating not only the visual and structural information, but *also the experiences, stories and know-how associated with particular socio-historical contexts*. Among the key challenges faced is the development of a distributed ecosystem to support citizen's engagement with heritage through the use of citizen curation methods. In the SPICE project, co-design and participatory processes are

<sup>&</sup>lt;sup>1</sup> Engeström, Y. 1999. Learning by Expanding: An Activity Theoretical Approach to Developmental Research. Helsinki: Orienta Konsultit.

<sup>&</sup>lt;sup>2</sup> Gay G., Hembrooke, H. 2004. *Activity-Centered Design, An Ecological Approach to Designing Smart Tools and Usable Systems*. Cambridge, MA: The MIT Press.

<sup>&</sup>lt;sup>3</sup> Kaptelinin, V., and Nardi, B. 2009. *Acting with Technology: Activity Theory and Interaction Design*. Cambridge, MA: The MIT Press.

<sup>&</sup>lt;sup>4</sup> Zahedi, M., Tessier, V. and Hawey, D. 2017. "Understanding Collaborative Design Through Activity Theory." *The Design Journal* 20 (sup1): S4611–20.

<sup>&</sup>lt;sup>5</sup> Social cohesion, Participation, and Inclusion through Cultural Engagement, CORDIS EU Research Results, <u>https://cordis.europa.eu/project/id/870811</u>, accessed 07/12/2020.

<sup>&</sup>lt;sup>6</sup> DT-TRANSFORMATIONS-11-2019: Collaborative approaches to cultural heritage for social cohesion, <u>https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-</u> <u>societies\_en.pdf</u>, accessed 24/11/2020.



employed to enable personal and collective interpretation of cultural artifacts and heritage as well as their reflection through multiple alternative viewpoints.

### **1.2. FIVE UNIQUE CASE STUDIES FEATURING PARTICIPATORY AND CO-DESIGN ACTIVITIES**

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. The museums participating in the project include:

- Design Museum, Helsinki (DMH), Finland
- Irish Museum of Modern Art (IMMA), Dublin, Ireland
- Hecht Museum, 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.

Case studies and their shortened name:

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

Table 1: Case studies with their short name.

### **1.3 TIMELINE OF CASE STUDY ACTIVITIES**

WP7 coordinates with the Case Studies and reviews the course of their development in order to integrate exploration, development, use and testing of tools and methods for citizen curation. The timeline in Table 2 illustrates the deliverables of WP7 and the Case Study activities:

DELIVERABLE NUMBER (WP7)	DELIVERABLE	DUE DATE (IN MONTHS)
D7.1	Evaluation methods and protocols.	6
D7.2	Socio-technical (STS) roadmap with project management tool integrating the Case Studies with <b>SPICE</b> 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.

# **1.4 USER EXPERIENCE OF HERITAGE THAT ALLOWS FOR REFLECTION, REINTERPRETATION AND SHARING**

User experience (abbreviated as UX) is an extremely important factor throughout the process of design of experiences for and about heritage. The testing of SPICE toolkit occurs in the context of five Case studies located in Museum institutions and utilizes user-centered design methodologies including participatory and co-design methods to bring together diverse stakeholder groups. Through these activities, we will seek to understand and assess how citizen curation tools can enable reflection, reinterpretation and sharing of heritage.

### **1.5 BRIEF LITERATURE REVIEW OF SOCIOTECHNICAL SYSTEMS AND ITS RELATION TO SPICE**

Socio-technical systems (STS) studies as a new field of inquiry emerged during the post-war years as part of the industrial reconstruction efforts. The setting is said to have been the Tavistock Institute in London<sup>7</sup> (1947) with the context being two projects concerning group relations throughout different levels of the organization and focused on the diffusion of innovative work practices and raising of productivity. <sup>8</sup> To carry out the work, novel action research methodologies including an approach to the organization (as a social system) and

<sup>&</sup>lt;sup>7</sup> Tavistock Institute, <u>https://www.tavinstitute.org</u>, accessed 29/01/2021.

<sup>&</sup>lt;sup>8</sup> Trist, E., & Bamforth, K. (1951). Some social and psychological consequences of the longwall method of coalgetting. *Human Relations*, *4*, 3–38. doi: 10.1177/001872675100400101

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in relation to technical factors were introduced.<sup>9</sup> During the past half century there has been a lot of change in the field. A 'classical' approach of sociotechnical systems (STS) during the 1990s might have initially focused on the technological community, the complex organizations involved, and the new technological systems being deployed. Such an approach might have placed emphasis on community models, summary of the system view (including descriptions of new components being developed) followed by characterizations of the organizational dynamics between all facets in time.<sup>10</sup>

From the initial efforts targeting optimization of labor, the STS has grown to include concerns such as the search for *representations* that afford an understanding of the constant technological and societal change<sup>11</sup> to explorations regarding the *situated nature of human knowledge and activities.* According to Suchman this implied (1) a recognition and assumption of responsibility for participation in "the various forms of visible and invisible work that make up the production/use of technical systems"; (2) the "acknowledging and accepting the limited power of any actors or artifacts to control technology production/use"; (3) the "establishing new bases for technology integration, not in universal languages, but in partial translations"; and finally, (4) the "...valuing" [of] "heterogeneity in technical systems, achieved through practices of artful integration over homogeneity and domination."<sup>12</sup>

Significant apertures throughout the late 1980s and 1990s include a focus on perspectives related to gender, race and multicultural discourses. Donna Haraway's work for example, argues for a "politics and epistemologies of location, positioning and situating, where partiality and not universality is the condition...to make rational claims".<sup>13</sup> Most recently Barad has proposed a turn from conceptual entities to a focus on distributed materiality and diffraction (not reflection) as a way to perceive patterns of difference. She emphasizes factoring in the role that instrumentation plays in scientific experiments.<sup>14</sup> In a succinct and pragmatic account, Hess and Sovacool provide an extensive survey – albeit from an Energy Science orientation – with indications of how discourses in the field have evolved.<sup>15</sup>

<sup>&</sup>lt;sup>9</sup> Trist, Eric. 1981. "The Evolution of Socio-Technical Systems – A Conceptual Framework and an Action Research Program", paper presented at the *Conference on Organizational Design and Performance*, April 1980 organized by the Centre for the Study of Organizational Innovation, Wharton School, Uni-versity of Pennsylvania and published by the Ontario Ministry of Labour, Ontario Quality of Working Life Centre, ISSN: 0227-4426 ISBN 0-7743-6286-3

<sup>&</sup>lt;sup>10</sup> Constant, Edward W. (1997). "The Social Locus of Technological Practice: Community System of Organization", in E. Bijker, T. Hughes and T.J. Pinch, *The Social Construction of Technological Systems*, Cambridge, MA: MIT Press, pp. 223-242.

<sup>&</sup>lt;sup>11</sup> Bijker, B.E., Hughes P.T., and Pinch T. (1997). "Introduction" *The Social Construction of Technological Systems*. P. 13.

<sup>&</sup>lt;sup>12</sup> Suchman, Lucy (2002) "Located accountabilities in technology production," *Scandinavian Journal of Information Systems*: Vol. 14: Iss. 2, Article 7. P. 101. Available at: http://aisel.aisnet.org/sjis/vol14/iss2/7

<sup>&</sup>lt;sup>13</sup> Haraway, D. (1991). Simians, Cyborgs, and Women. The Reinvention of Nature, New York, NY: Routledge, p. 195.

<sup>&</sup>lt;sup>14</sup> Barad, Karen. (2007). Meeting the Universe Halfway. Quantum Physics and the Entanglement of Matter and Meaning. Durnham, London: Duke University Press, pp. 189-222.

<sup>&</sup>lt;sup>15</sup> Hess, David J. and Sovacool, Benjamin K. (2020). "Sociotechnical matters: Reviewing and integrating science and technology studies with energy social science", in *Energy Research & Social Science* 65 (2020) 101462.

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YEAR	CONTEXT	DEVELOPMENT OF STS	DOMAINS INVOLVED
1947	Industrial reconstruction efforts during the post-World War 2 years.	Coinage of the term 'sociotechnical systems' by Eric Trist, Ken Bamforth, and Fred Emery from the Tavistock Institute in London based on their work with coal miners in England.	Organizational development and work design.
1987+	Launch of the new field of social studies of technology in the context of increasing technological development.	Traces the evolution of technological systems in an organizational framework outlining the nature of the embedded complex components and recognizing their socially constructed nature. This is also examined through case studies described as 'strategic research sites'.	Systems thinking, study of technology, sociological critiques of cognitivism, science of knowledge, artificial intelligence (AI).
1991	Third-wave feminism in a post-Cold War neoliberal era.	Haraway's works comparing social and technical subsystems using cyborgs, i.e. fusion of organisms and machines in a post-gender construct.	Feminist posthumanism, post- gender world, discourses on race and gender.
2002	Attempts to reconstruct technological relations.	Arenas encountering transformations of technology design through: - Valuing of visible and invisible work omnipresent in technical systems. - Recognizing partial translations instead of universal acceptance of standardizations. - Acknowledging the role of cultural practices, artful integration, and valuation of heterogeneity.	Technological design informed by feminist reconstructions of objectivity.
2007+	Technoscientific practices and the materialization of reality.	The universe's mechanisms wherein objects emerge through intra-actions and viewed through a deeply connected manner that enables entanglement of forces. This type of agential realism is used as a way of understanding politics, ethics, knowledge practice, and other systems or agencies of any act of observation.	Barad coining agential realism, namely the ontological inseparability of intra- acting agencies.



field of STS. and publics.	nonstrating politics of design, actices, users and actor naginaries, networks.
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Table 3: Timeline of evolution in the discourse of STS.

In summary, the situation regarding information technology developments during the second decade of the 21<sup>st</sup> century is radically different from its beginning during the early post-war years. Through Internet of Things (IoT), computer-based communication artifacts and systems are closely synchronized with and pervade every aspect of human life and culture. Ubiquitous computing (ubicomp) platforms increasingly penetrate deeply into the social fabric of all human activity from work to learning, to leisure and entertainment. The significant societal changes partly stemming from warfare, the failure of old empires, the emergence of new state configurations, compounded with the dawn of hybrid communications systems these are all factors that have precipitated vast migration movements further problematized by the inability of human societies to contain their craving for energy resources and the impending Climate change crises.

Considering the current societal and environmental situation characterized by rampant sudden disruptions, malfunctions could easily occur and erode complex organizational structures. Adaptability, especially the ability to transition defines some of the competences of systems to counter these events. In *Mapping Sustainability Transitions*, Marletto et al. (2016) analyzed and explored these transition pathways through dominant systems and their networks of innovators. The book (2016) provided steps for creating STS maps through a method called SusTrans- Sustainability transitions as Socio-technical takeovers, which entails (p.14-18):

- Determination of the field of analysis.
- Identification of the relevant systems, niches, and a network of innovators.
- Drawing the dimensions of discourses of an STS map, akin to a political compass.
- Positioning the systems and niches into the STS map.

Based on the STS map created using these steps, the authors explored mechanisms for transitioning through three sectorial case-studies: urban mobility, agri-food, and lighting. Overall, *Mapping Sustainability Transitions* is an excellent reference to begin to understand major systems in an organization and examining transitions through the perspective of sustainability, especially the role of unforeseen networks of innovators in directing these transitions. Nevertheless, the visualizations proposed by the authors did not serve to amplify transparency with regards to the complexity of relations between the different entities, nor did it seem to indicate the different activities and points of action in time, among other things. Hence the SPICE project authors of this document decided to look for other visualization approaches.

SPICE's project commitment to co-design, inclusivity and broadening the scope to include sustainable transitions affords several constructive opportunities and innovative endeavors. The main field of analysis (to support research and development) in the SPICE project is the



application of *innovative semantic technologies* in the heritage and museums sectors to promote social cohesion and diverse cultural engagement through sharing. These are represented in our visualization of the Socio-Technical Map of SPICE project's five Museum Case Studies depicted in Fig. 1.

# **2. SPICE SOCIOTECHNICAL SYSTEMS**

The complex organizational structures of socio-technical systems such as SPICE can be described as consisting of dynamic interactions occurring between people and technology across the entire system. Among the main SPICE system elements there are two types of infrastructure that are of particular interest to the project, namely:

- social and cultural infrastructure(s)
- technical infrastructure(s)

As examined in the previous chapter, an organizational development approach that is often used to mediate between the two above-mentioned infrastructures is the Sociotechnical systems (STS) design. However, successful organizational performance is not only about infrastructural optimization. Interaction and communication between the social and technical aspects need to be considered in a manner that is inclusive of all actors in social system.

### 2.1 SPICE STS MAP

SPICE project STS Map is in tune with the latest developments in semantic technology as well as informed by current thinking in museology: In a recent article in *Museum-ID Magazine* Nancy Proctor alludes to the 21<sup>st</sup> Century Museum model as a **distributed network**. In her analysis Proctor describes how:

"The museum experience can now be said to extend well beyond the platforms museums control – their bricks and mortar buildings as well as their own websites and social media presences – to the spaces where online audiences publish their own images, videos, texts and more about museum collections and events without any editorial recourse to museum staff at all."<sup>16</sup>

Indeed, IoT's multiplicity of heterogeneous media platforms integrating new computational technologies and devices have debunked traditional processes of information creation and delivery in almost every area of human activity. Most recently we have seen how in the journalism sector older models of news cycles where journalists and editors exercised editorial control over the transmission of content have been replaced by information processing activities that take place through public engagement of audiences in public and in semi-public social media platforms.<sup>17</sup> It remains to be seen whether the consequences of these changes in turn favour consequential societal debate.

<sup>&</sup>lt;sup>16</sup> Proctor, N. (2020). "Museums as distributed network, a 21st Century model", Museum-ID Magazine, <u>https://museum-id.com/museum-distributed-network-21st-century-model-nancy-proctor/</u>, accessed 15/01/2021.

<sup>&</sup>lt;sup>17</sup> Chadwick, A. (2013, [2017]). *The Hybrid Media System. Politics and Power*, New York, NY: Oxford University Press, pp. 72-75.

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The heritage sector does not lag behind. Here too we have also witnessed an increased drive towards audience participation through the extensive use of computer-mediated communications and information technologies. Macchia et al. (2018) case study based on the Sibelius exhibition at Ateneum in Helsinki for example, briefly describes the Museum's turn towards a communications-oriented model as well as provides details of how end-user communities including students were recruited to participate in the development of some of the exhibition's content materials.<sup>18</sup> And Salgado's remediation of audio-visual archival material demonstrates the use of participatory design methods involving diverse communities in the creation of short video poems.<sup>19</sup>

Particularly exemplary, within this trend (that is seen by some as commensurate with sustainability discourses), is a desire to promote accessibility and inclusion to vulnerable communities such as the physically challenged, the senior citizens and inhabitants in rural areas far away from major population centres as well as potential asylum seekers. This is the context that serves as the background for the SPICE project STS-Map presented in this document.

The SPICE STS Map has been designed to provide insights regarding interactions between the nodes including the social and technical realms. Where, and why do these elements form entanglements with one another? When and how do the elements of one pull and push against another? Are there obstacles which prevent the workflow? Why are these formed and how can these be prevented? These are some of the visualizations that we hope will emerge from the SPICE STS MAP.

The STS Map's design guidelines are created for each of the Case Studies and aim to achieve as much as possible an ideal of comprehensive accessibility that enables individuals and diverse groups to access heritage spaces and partake of the experiences and knowledge available regardless of their personal abilities and interests.

<sup>&</sup>lt;sup>18</sup> Macchia, T. and Díaz-Kommonen, L. (2018). 'I Did Not Think About That!' New Media for Stimulating Exhibition Re-interpretation in Dagny Stuedahl & Vitus Vestergaard (eds.) *Media Innovations and Design in Cultural Institutions*. Göteborg: Nordicom.

<sup>&</sup>lt;sup>19</sup> Salgado, Mariana (2018). 'Let's Marathon!' The Design of a Cultural Intervention for the Re-Use of Audiovisual Archives Dagny Stuedahl & Vitus Vestergaard (eds.) *Media Innovations and Design in Cultural Institutions*. Göteborg: Nordicom.



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### 2.1.1 Representation of the SPICE Socio-Technical System Map

Fig. 1: Interconnected networks within the SPICE STS.

The SPICE project STS Map is represented using the form of a distributed network. It comprises multiple domains including each of the Museum Case Studies in relation to the work packages that originate them and including the different community networks as they join the SPICE project. Please note that this representation is still under development and will be enhanced further in the near future.

In the five Case Studies, SPICE researchers will co-design advanced information tools with their communities through a series of creative activities, all following their individually designed paths. *The concrete results of the project will be creating models for services and the tools provided.* The core aim and function of the SPICE project, however, lies within initial creative activity with our key target group, involving them as co-designers when creating new ways of participation and access to cultural heritage. We have a vision that within these processes, our target audiences can help us to better understand their needs and to develop our work in making cultural heritage a tool for dialogue and social cohesion. In Finland, based on the local case, a virtual pop-up museum touring in the country will be



developed and with the purpose of bringing citizens together in dialogue about their design heritage.

### 2.1.2 Activity models

In addition to using a distributed network to gauge the state and changes and the overall pattern of the Museum as a distributed network, Yrjö model of activity will be used as a 'frame' to enable us to illustrate and analyze structural relations among components.<sup>20</sup> These illustrations will allow us to create punctuated (close-up) depictions of the activities at key points in time.



Fig. 2: Activity model shows the different components and their structural relations. Round arrows indicate iterative development cycles.

<sup>&</sup>lt;sup>20</sup> Engeström, Yrjö. (1987). *Learning by expanding: An activity-theoretical approach to developmental research. Helsinki: Orienta-Konsultit*, 1987. ISBN 952-9592-41-8.

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Fig. 3: A section of Matti's and Annikki's personal collecting and exhibiting scenario within DMH Case Study.

The following sections 2.2-Social and Cultural infrastructure(s) and 2.3-Technical infrastructure(s) in this chapter elaborate on the existing social and cultural infrastructures within SPICE. Please note that although these infrastructures have been described in WP7's public deliverable document, i.e *D7.1 – Evaluation Methods Protocols*, parts of it are included here because they directly relate to the STS and offer a chance for a new reader who has not read *D7.1 – Evaluation Methods Protocols*.

### 2.2 SOCIAL AND CULTURAL INFRASTRUCTURE(S)

Communities with individual members and stakeholder groups interested in heritage are one of the main units of analysis employed to study the developing social and cultural infrastructure(s) of SPICE. However, we would also like to work with groups who are not initially interested but who might not be directly involved but who might also decide to partake in citizen curation activities being developed.

### 2.2.1 End-user communities

End-user is a term used by developers when referring to the people (e.g., individuals, actors) who ultimately use or intend to use a product or service being assembled. It is often thought that such people have innate know-how regarding the context and situation of use



for an end product.<sup>21</sup> In SPICE, these individuals are studied from the perspective of the communities that they belong to. Among the communities that they might constitute:

- Visitors who are already visiting the museum on a rare, occasional, frequent or regular basis.
- Groups who access the museum's services for purposes such as attending museum organised activities including workshops held either at the museum or in different locations. Or groups attending webcasts and other activities held by the museum in virtual spaces. As we shall explain below, these might be further organised into Communities of Practice or Communities of Interest.
- Groups who would be potentially interested in using the museum's services but have not yet done so. These include groups that were not previously interested in visiting a museum or accessing its services but have decided to do so after the enhancements brought about at SPICE.

Table 4 below describes some of the individual types (or Actors) that we envision would participate as co-designers in the activities of the SPICE project. It might be possible to also regard these individuals as members of different communities that are involved in activities with the heritage institutions affiliated with SPICE. In the next few pages, we also devote time to describing these communities.

ACTORS	ТҮРЕ	CASE STUDY
Students and learning groups	Primary school as well as high school	MNCN
	Special education needs groups	GAM, IMMA, MNCN
	University	GAM, HECHT
Senior citizens	Based on background: - Age - Family type	DMH, IMMA
	Requiring special assistance	
Remote dwellers	Physically distant areas such as: - Suburban - Semi-rural - Rural	DMH, GAM, HECHT, IMMA, MNCN
	Virtual online communities	

<sup>&</sup>lt;sup>21</sup> LUPTON, C. (1998). User Empowerment or Family Self-Reliance? The Family Group Conference Model. *The British Journal of Social Work, 28*(1), 107-128.



Minority communities	Cultural minorities, linguistic minorities, religious minorities	
		DMH, GAM, HECHT, ІММА
	Asylum seekers	DMH, IMMA
	Special needs groups that may include: - Deaf community - Requiring mobility assistance	DMH, GAM, IMMA, MNCN
Hybrid communities	Communities that incorporate more than one of the previously mentioned characteristics.	DMH, GAM, HECHT, IMMA, MNCN

Table 4: End-user communities involved in the Case Studies.

### 2.2.2 Communities of practice (CoP)

The term Communities of Practice (CoP) is frequently used to refer to practitioners and professionals brought together by the relations of mutual engagement that emerge through their professional practices.<sup>22</sup> Lave and Wenger initially coined the term to describe learning activities within a group of "people who share a concern or a passion for something they do and learn how to do it better as they interact regularly".<sup>23</sup> Becoming a full participant in a community plays an important part in the process of learning.

The following set of actors is important to all Case Studies; however, the type may vary based on the Case Study. They are categorized as follows:

ACTORS	ТҮРЕ
Practicing artists	Diverse domains
Researchers	University based
	<ul> <li>From additional institutions:</li> <li>Affiliated with universities</li> <li>Independent organizations</li> <li>Independent without any involvement with an organization</li> </ul>

<sup>&</sup>lt;sup>22</sup> Lave, J., & Wenger, E. (1991). *Learning in doing: Social, cognitive, and computational perspectives. Situated learning: Legitimate peripheral participation.* Cambridge University Press.

<sup>&</sup>lt;sup>23</sup> Wenger, E. (1998). *Communities of practice, learning, meaning, and identity*. New York: Cambridge University Press.

Museum professionals	Curators
	Educators
	Public relations personnel
Mediators	Social and health care workers
	Library officers
	Sign language interpreters
Network of work with end-user communities (Some of these could be mediators)	Community managers and activists

Table 5: Communities of practice involved in the Case Studies.

### 2.2.3 Communities of Interest (Col)

Communities of interest (Col) are groups or communities of people who share a common interest. Wenger and Snyder (2000) provide a clear difference between Col and CoP by outlining that CoPs share a common interest but are active practitioners as well.<sup>24</sup> Fischer (2001) has proposed that CoIs can bring together stakeholders from different CoPs that share a collective concern with the resolution of a problem.<sup>25</sup>

The actors involved as possible Communities of Interest are listed and categorized below:

### I. Hobbyists and activity groups

Case Studies will identify hobbyists and/or activity groups as a CoI. Table 6 below demonstrates examples of hobbyists and activity groups for each case study:

CATEGORY	ТҮРЕ	CASE STUDY
Art	Collectors	DMH, GAM, IMMA
	Enthusiasts	
Design	Collectors	DMH

<sup>&</sup>lt;sup>24</sup> Wenger, EC & Snyder, William. (2000). *Communities of Practice: The Organizational Frontier*. Harvard Business Review. 139-145.

<sup>&</sup>lt;sup>25</sup> Fischer, G. (2001). "Communities of interest: Learning through the interaction of multiple knowledge systems". In the 24th annual information systems research seminar in Scandinavia. Retrieved November 25, 2007, from <a href="http://ldc.sc.colorado.edu/~gerhard/presentations/slides-iris2001.pdf">http://ldc.sc.colorado.edu/~gerhard/presentations/slides-iris2001.pdf</a>, (Accessed 30/01/2021).



	Enthusiasts	
Sign language	Researchers	GAM
	Learning clubs	
	Linguists	
Ancient Israel	History enthusiasts	НЕСНТ
	Archaeologists	
Nature	Hiking clubs and enthusiasts	MNCN
	Bird watching groups	
	Rock collectors	

Table 6: Hobbyists and activity groups involved in the Case Studies.

### II. Activist groups and individuals

Activists are people campaigning for the improvement of social conditions and, in this case, working towards it through dialogue within the public realm.

Based on the DMH Case Study, here we include examples of some activist groups which might also coalesce into CoI:

CATEGORY	ТҮРЕ	DESCRIPTION
Art and design activists	Engaged in activities related to sustainability and environmental preservation such as: - Bioart Society (SOLU) - Pixelache	
Environmental and sustainability networks and groups		An example in Helsinki is DODOry that collaborates with DMH.
Humanitarian groups	Assisting children with illnesses	



	Assisting asylum seekers	
Political entities with similar interests		This might be more challenging and may inevitably lead to some form of polarization or alienation amongst certain target audiences, however it is worth consideration, especially for IMMA and Hecht.

Table 7: Activist groups and individuals involved in the Case Studies.

### III. Virtual and hybrid communities

These communities include the ones that exist in a 'virtual' realm as well those that are able to engage with museums in the physical and digital environment.

CATEGORY	ТҮРЕ	DESCRIPTION
Social media	Groups on mainstream platforms: - Facebook - Twitter - Instagram	In recent years, there has been considerable engagement in giant social media platforms due to their role in data breach such as the Cambridge Analytica scandal. <sup>26</sup>
	Alternative platforms: - MeWe - Meetup - Vero	These are platforms with fewer users but claim to be better at protecting privacy.
Telematic channels	<ul> <li>Podcasts on <ul> <li>Mainstream channels</li> <li>such as YouTube and</li> <li>Spotify</li> <li>Local channels such as</li> <li>Aalto Summer School</li> <li>podcast</li> </ul> </li> </ul>	Attempts could be to secure a presence as guests on a podcast and highlight the range of activities carried out at the museum.
	Webcasts	An example is DMH's NODUS talks on sustainability.

Table 8: Virtual and hybrid communities involved in our Case Studies.

### IV. Support institutions

<sup>&</sup>lt;sup>26</sup> Cambridge Analytica, <u>https://en.wikipedia.org/wiki/Cambridge Analytica</u>, accessed 07/12/2020.



E.

These institutions play important roles as mediators and even direct supporters of heritage initiatives such as **SPICE** H2020. Among the institutions singled out for attention include:

CATEGORY	ТҮРЕ	DESCRIPTION	
Public institutions	National institutions of governance such as: - Ministry of Culture - Ministry of Education	Policy development and implementation has a direct impact on the activities of the Cols involved in the SPICE H2020 project.	
	Municipalities such as: - City council - Local libraries for events and workshops	Municipalities whose policy work might extend (or constrain) the activities of the heritage institutions.	
Private institutions	Foundations	Private institutions are those who might be either allies (or opponents) of the work and activities of the heritage institutions. These are entities whose activities might coincide with those of museum institutions and whose economic and societal support is often crucial.	
Independent organizations	Universities	These are included when universities act as places where research activities directly relate to the heritage institutions' activities.	
Non-governmental organizations (NGO)	NGOs such as: - Humanitarian such as Red Cross - Environmental such as Greenpeace	This is taken into account only if there is a case study that is planning to collaborate with an NGO.	
Corporate service organizations	Examples: - Padaone games - Finnish companies that provide	They might intervene to support a particular activity.	



services for refugees	
 <u> </u>	

Table 9: Support institutions involved in the Case Studies.

### 2.2.4 Additional stakeholders

There might be certain stakeholders that do not fall under the categories of end-user groups, CoPs or CoIs. Examples of actors include:

- I. Investors.
- II. Sponsors: Businesses tied to the museum who are not necessarily entirely interested in the topic, however, choose to remain financially tied.

### 2.3 TECHNICAL INFRASTRUCTURE(S)

The technical infrastructure(s) at SPICE refers to the software and network systems. They also include the datasets gathered within each. These infrastructure(s) seek to aid and enhance the process for citizen curation by providing a technological foundation for the museums involved. They are divided into backend and frontend tools and assets wherein the backend refers to the infrastructures and engines not directly engaged with during end-user interaction while the frontend includes the interfaces and content directly accessed and used.

### 2.3.1 Backend tools and assets

In this document the term Backend tools is used to refer to the data access layers in the software infrastructure.

### I. Recommender system – WP3

The main aim of WP3 is the development of tools in order to support the exploration of users' interpretations on museum objects. One of these tools is the AI-based recommender system that will suggest relevant content to end-user communities.<sup>27</sup> For example, when the recommender system has sufficient information and knowledge about the characteristics of a user within a community, it could suggest *alternative perspectives* to broaden the framework of dialogue and ultimately support cohesion and understanding.<sup>28</sup>

<sup>&</sup>lt;sup>27</sup> WP3's recommender system is accessible only to the SPICE consortium and the SPICE heritage institutions.

<sup>&</sup>lt;sup>28</sup> This description has been derived from the project's grant agreement.

The table below shows an example of how categorization operates drawn from the Hecht museum Case Study. Based on the subject's placement within a category's attributes, the rule infers different recommendations to a user.<sup>29</sup>

Category	Characteristics	Rule for the recommender
Demographic	Age greater than 60	The recommender shows pictures of artifacts from over 50 years ago.
	Age younger person	Recommender shows short videos.
Worldview	Politics	Recommender attempts to show an opposing opinion within the space of 'reasonable discourse' and excluding hate- related content in order to demonstrate alternative perspectives and provoke thinking from other points of view.
Education	Level (High)	The recommender shows more abstract material.

Table 10: Rule for the recommender used by WP3's Alan Wecker at the SPICE mini-conference.

The important precursors to the development of the recommender system are the *user and community models*. A *user model* is a collection of characteristics associated with the envisioned users of a system.<sup>30</sup> In this case, the users are citizens and visitors engaging with the museum. The community model follows the same rule as the user model, wherein the 'community' replaces the 'user'. Overall, the input received from the user and community model is fed into the recommender system for it to determine the type of content to recommend to a single user or to end-user communities. Please refer to Fig.1 in the *Evaluation Methods Protocols* to explore WP3's pipeline and processes that lead to recommendation of content to its users.<sup>31</sup>

### II. Linked Data Hub – WP4

WP4 will develop the Linked Data Hub to *connect cultural objects, collections, and citizen contributions*. The main objectives of the Linked Data Hub that support museums include:

- exposing data from the museums to the SPICE network
  - control visibility and access to this data

<sup>&</sup>lt;sup>29</sup> The *SPICE H2020 Autumn Mini-Conference* was held during 29 October 2020 and the rule for the recommender was demonstrated by Alan Wecker from WP3. The purpose of the Conference was precisely for the partners to work together on the Case Studies and Evaluation Requirements. A paper discussing the procedures and results of the Mini-Conference will be written in the near future.

<sup>&</sup>lt;sup>30</sup> Kobsa, A. (2007). Generic User Modeling Systems. In P. Brusilovsky, A. Kobsa, & W. Nejdl (Eds.), *The Adaptive Web: Methods and Strategies of Web Personalization* (pp. 136–154). Springer. https://doi.org/10.1007/978-3-540-72079-9\_4

<sup>&</sup>lt;sup>31</sup> The *Evaluation Methods Protocols* serves as guidelines for Case Studies' development in SPICE and is currently accessible only to the SPICE consortium and the SPICE heritage institutions.



- collect data from use cases of the Case Studies
- trace and analyse its usage

In order to develop the linked data infrastructure, WP4 aims to make datasets detached from applications and have it interchangeable as well as supporting the SPICE methodology through the MANIFEST that is being developed <u>here</u>.<sup>32</sup>

Here is an example of categories within the MANIFEST in relation to IMMA:

ТҮРЕ	IMMA CASE STUDY
Settings: Exhibition visit	Installation in museum family/response room
Settings: Workshop with artists	Co-design workshops with participating communities
Activities: Audio recordings	Possible alternative to phone text entry
Roles: Workshop leader	Yes
Purpose: Teaching & Learning	Yes (school scenario)
Tools/Instruments: Website	Likely
Content: Parts	Artworks, comments, tags
Workflow: Source	Yes. Source of artworks, contributions

Table 11: An example of MANIFEST under development by Enrico Daga and the rest at WP4.

As demonstrated above, the MANIFEST contains a list of settings, activities, roles, purposes, tools, contents and workflow. In addition, WP4 is developing a technical infrastructure based on the Linked Data paradigm to monitor access to metadata and digital objects based on the roles of the actors involved. In this manner, a <u>museums rights list</u> has been created, defining the roles as well as expressing the desire and negotiating terms and conditions of uses. Some examples from WP4 are provided in Table 12 below:

ТҮРЕ	REQUIREMENT
The agent negotiating can act on behalf of.	As a curator, I want to be able to negotiate rights on behalf of the owner.
	As a curator, I want to be able to nominate an external user to negotiate rights on behalf of a copyright owner.

<sup>&</sup>lt;sup>32</sup> The MANIFEST sheet under the development of WP4 is currently accessible only to the SPICE consortium and the SPICE heritage institutions.

Permission on the artwork not on a specific asset.	As a copyright owner, I want to specify a policy applicable on any expression of my artwork.
Permission granted but constrained to good quality asset, to be identified (identifier not yet present).	As a copyright owner, I want to express constraints involving the way the artwork is presented.
	As a policy negotiator, I want to involve external users for approving specific elements of my policy.

Table 12: A section of the Museums Rights requirements developed by Enrico Daga in WP4.

### III. Ontologies – WP6

WP6 is responsible for creating the technical and representational infrastructure for supporting citizen curation as well as the implementation of the ontologies and clustering devices which represent the entities involved in citizen curation and in the reflective processes. Task 6.3 from WP6 involves the creation of an ontological network for citizen curation consisting of a citizen curation ontology and an interpretation ontology.<sup>33</sup> The citizen curation ontology includes the activities and interpretations that are created and shared amongst different groups of users. The interpretation ontology takes into account viewpoints, emotions, metaphors, values, etc.<sup>34</sup>

Here are some examples of questions posed by WP6 for the development of the ontological models in Task 6.3,<sup>35</sup> when considering an artwork as an example:

- What are the events represented in the artwork?
- What is the story represented in the artwork?
- What are the emotions associated with the representation of the artwork?
- Are there other artworks representing the same story of the artwork?
- Are there other artworks representing the same character?

### IV. Scripting devices – WP2 and WP6

In SPICE, scripting is defined as connecting micro-activities such as tagging an image or viewing a visualization into a "workflow" that completes the interpretation-reflection loop.<sup>36</sup> Here is a simple example of a storytelling script:

- The curator provides a selection of artwork. The citizen can select one of the artworks, tell a personal story related to the artwork and send it to a friend. The friend can send a response to the person who wrote the story. The

<sup>&</sup>lt;sup>33</sup> The ontological network for citizen curation is under the development of WP6 and currently accessible only to the SPICE consortium and the SPICE heritage institutions.

<sup>&</sup>lt;sup>34</sup> The interpretation ontology is under the development of WP6 and currently accessible only to the SPICE consortium and the SPICE heritage institutions.

<sup>&</sup>lt;sup>35</sup> The ontological model is being developed by WP6 and is currently accessible only to the SPICE consortium and the SPICE heritage institutions.

<sup>&</sup>lt;sup>36</sup> The scripting devices are under the development of WP2, WP4 and WP6. These are currently accessible only to the SPICE consortium and the SPICE heritage institutions.

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### D7.2 STS ROADMAP WITH PM TOOL V 1.0, 12/02/2021

citizen can also choose to share the story with the curator. The curator makes an online exhibition featuring some of the contributed stories.<sup>37</sup>

As seen in the script above, the micro activities are:

- Selection of artworks: by the curator
- Telling a story that can be shared by the storyteller
- Comment or response to the story: by the story receiver
- Make the shared stories public: by the curator

Overall, the script contains roles, activities and several stages. The ideal mechanism to have these scripts accessible to the technical work packages is through the use of scenario design in WP7 and adding the roles and activities in the <u>MANIFEST sheet</u>.<sup>38</sup>

### V. Additional data gathered

In addition to the backend tools and assets mentioned earlier, there are other types of datasets collected as well. Some of them are stored in repositories of WP4 while others are managed by the remaining technical work packages. These datasets include:

- a. Demographic data
- b. Location based
- c. Textual data
- d. Sensor based data
- e. Media based data such as:
  - photographs
  - videos
  - screen recorded data from applications and softwares
- f. Content management system-based data such as:
  - description of artefacts on websites
    - metadata
    - museum archives
    - database entries of collection(s)

### 2.3.2 Frontend tools and assets

In this document the term Frontend tools is used to describe the presentation layer of the system, namely the user interface.

### I. Interfaces – WP5

Interface design and implementation plays an important role in the SPICE Toolkit, since these act as mediators between the visitor and the content materials. In a workshop, conducted by WP5, involving all the partners and held during our recent internal Mini-Conference organized by WP7, some of the interface options considered included:<sup>39</sup>

<sup>&</sup>lt;sup>37</sup> An example of a storytelling script by Paul Mulholland used by WP4 and WP6.

<sup>&</sup>lt;sup>38</sup> The MANIFEST sheet under the development of WP4 is currently accessible only to the SPICE consortium and the SPICE heritage institutions.

<sup>&</sup>lt;sup>39</sup> The *SPICE H2020 Autumn Mini-Conference* was held during 29 October 2020. The purpose of the Conference was precisely for the partners to work together on the Case Studies and Evaluation Requirements. A paper discussing the procedures and results of the Mini-Conference will be written in the near future.

CATEGORY	ТҮРЕ	DESCRIPTION
Interfaces for a visit	No interface	Rather, heritage contents are located in the Museum's website and accessed via personal phones or other such devices.
	Audio guides	Visits are supported by mobile guides.
	AR interfaces	Visits aided by virtually augmented contents using a real space as a canvas.
	VR headsets	The visit takes place in a virtual environment inside an immersive VR headset.
	Webcasts	A live webcast tour or talk held by the museum.
Interfaces for interpretation	Collecting	This invites visitors to select their favourite objects in order to curate a show.
	Tagging	Tagging allows social tagging of objects from visits.
	Interactive webcasts	Live webcast tours are held online wherein visitors' responses are collected as well as allowing other enhanced interactions.
Interfaces for reflection and scripting	Reflections through browsing	This type allows visitors to share their reflections on their journey.
	Reflections through the use of visual analytical tools	In this case, visitors explore their connections with people and objects.
	Scripting through the creation and browsing user stories.	<i>Storyscope</i> is an emblematic example of this type, wherein museum stories are explored through time periods using certain themes and/or settings.

Table 13: Examples of the types of interfaces were demonstrated by WP5 at the SPICE miniconference.

Apart from the usability, these interfaces must consider issues related to language, cultural and physical accessibility.

### II. Content materials



These assets comprise content materials that exist as artefacts in a museum collection, such as for example images of diverse genera and type in contrast to content materials including textual input, narratives and audio-visual media *created by end-users participating in the project or by general audiences in relation (or as a response) to the work being done in* SPICE.

- i. Existing in the museum Case Studies
  - a. Existing content within the museums participating in the project.
  - b. Creation based on results of workshops with end-user communities, communities of practice and communities of interest.
- ii. Created by end-users Case Studies
  - a. Input provided by end-users during workshops and other channels such as social media.
  - b. Selection made by end-users out of an existing set of contents.
- iii. Created by the general public Case Studies
  - a. Creation based on data gathered from the opinions and viewpoints of the general public.
  - b. Selection made by the general public out of an existing set of contents.

# 3. TIMELINE AND DEVELOPMENT OF CASE STUDIES

The SPICE Case Studies can be described as dynamic demonstrations that enable observation and testing of SPICE hypotheses and applications. This chapter outlines the timeline and development of activities conducted by the case studies between the beginning of 2021 till April 2023, i.e the completion of the SPICE project. The timeline of DMH has been provided as an example in the following sub-section.

### 3.1 DESIGN MUSEUM - HELSINKI (DMH)

Museum of Design and decorative arts.

The Design Museum Helsinki is the national specialist museum of design in Finland. Founded in 1873, it is one of the oldest still active decorative art museums in Europe. Design Museum researches, collects, stores and documents design, and displays it both in Finland and in touring exhibitions abroad. Currently the museum holds over 75,000 objects, 45,000 drawings and 125,000 photographs. The original collection was established by the Finnish Society of Crafts and Design to serve the needs of the Craft School of Helsinki, the predecessor of the present-day Aalto University School of Arts, Design and Architecture. The first 700 objects were acquired in 1873 from the Vienna World's Fair. Today, the greatest part of the collection consists of Finnish ceramic and glass artefacts, including industry products. A curated selection of objects is permanently on show at the collection exhibition *Utopia Now – Story of Finnish Design* and annually a great number of objects are loaned to exhibitions in Finland and abroad.<sup>40</sup>

### 3.1.1 Timeline of activities

The table below outlines activities for end-users, communities of practice and communities of interest that DMH envisions over the next 2.5 years:

TIME PERIOD	ACTIVITIES
2021	In 2021, co-design workshops will be conducted mainly online. The museum content for co-design workshops is connected to <i>DesignLabra</i> educational exhibition tour in Tampere (26.4 23.5.) and Lahti (30.830.9.) and workshops will be organized with local actors regionally as well as reaching people

<sup>&</sup>lt;sup>40</sup> This description has been derived from the project's grant agreement.



	living far from the city centre. Workshops will focus on curation and interpretation methods as well as researching accessibility and motivation issues regarding special groups.
Jan – June 2021	<ul> <li>Co-design online workshops with mediators:</li> <li>1. DMH museum educators.</li> <li>2. Helsinki City Senior Services <i>Liikkeellä</i> network.</li> <li>3. Tampere City Senior Services <i>Kulttuurikaari</i> network.</li> </ul>
	Co-design online workshop(s) with end-users (senior citizens): 1. Members of <i>DAMYry</i> , DMH Friends of Museum Association. 2. Clients of Helsinki City Senior Services.
July – Dec 2021	Co-design online workshop(s) with mediators: 1. Lahti City Senior Services. 2. Asylum Seeker experts in Helsinki region.
	Co-design online workshop(s) with end-users (senior citizens, asylum seekers): 1. Clients of Helsinki City Senior Services. 2. Clients of Immigrant Services in capital region.
2022	In 2022, simultaneously with development of the digital tool, the content of pop-up museum will be co-curated with senior citizen communities and using Social Media. Co-design workshop(s) testing the concept and usability can hopefully be organized live.
Jan – June 2022	Co-design workshop(s) with end-users (senior citizens, asylum seekers): 1. Clients of Helsinki City Senior Services. 2. Clients of Immigrant Services in capital region.
July – Dec 2022	Co-design workshop(s) with end-users (senior citizens, asylum seekers): 1. Clients of Helsinki City Senior Services. 2. Clients of Immigrant Services in capital region.
2023	
Jan – April 2023	In 2023, a touring "Pop-up Design Museum" will celebrate the 150 <sup>th</sup> anniversary of DMH collection,



traveling	g to different remote cities and locations
through	out Finland and collaborating with cultural
centers	and libraries.

Table 14: Timeline of activities between Jan 2021 – April 2023 for DMH.

### 3.1.2 Hindrance due to COVID-19

DMH hasn't been able to visit and work directly with their end-user communities such as senior citizens, thereby making us postpone part of our plans.

### 3.1.3 Strategies proposed to adapt to the current situation

We are developing more collaboration through online tools and technologies. For example, WP7 (along with other partners) conducted an online mini-conference amongst the researchers at SPICE and it was perceived to be successful. DMH and WP7 will use these methodologies from the mini-conference online workshops for the Case Study's codesign workshops with mediators and other end-user groups as well.

### 3.1.4 Influence of the SPICE toolkit on the objectives of the museum

Here are some mechanisms through which the development of the SPICE toolkit influences the objectives of DMH:

- Working with and for a new visitor / user group such as senior citizens to broaden the concept of accessibility and scope of our services.

- Opens up the field to new network of relations as well as the outreach.

- Online collaboration helps to focus on co-design with the target audiences.

### 3.2 GALLERIA D'ARTE MODERNA (GAM) - TURIN

Museum of Contemporary Art.

Comprising a collection of 45,000 works spanning a period from the nineteenth century to the present day, with its paintings, sculptures, works on paper, installations, videos and photographs, the GAM offers its audience a wealth of events ranging from major exhibitions of Italian and international artists to highly contemporary research dedicated to a young audience. The Education Department offers itineraries, activities and workshops for families, schools and people with disabilities. All areas are accessible.<sup>41</sup>

### 3.2.1 Timeline of activities

The table below outlines activities for end-users, communities of practice and communities of interest that GAM envisions over the next 2.5 years:

TIME PERIOD	ACTIVITIES

<sup>&</sup>lt;sup>41</sup> This description has been derived from the project's grant agreement.

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2021	In 2021, we are planning to work closely with UNITO and Istituto dei Sordi to understand how to co- design the APP that will be the final output of the project. The first step will involve only the people involved in the project and in the second step we will involve a group of potential users to discuss with them the scenarios defined in the first part of the project.
Jan – June 2021	Definition of the scenario and main features of the APP. Selection of the pool of artworks and collection of the related materials.
	Development of the methodologies for the co- design workshop with focus groups.
July – Dec 2021	Co-design workshops in the museum.
	Organization of the materials produced during the workshops, creating flows to adapt the inputs emerged during the workshop in the design process of the APP.
2022	Development and first user group test of the APP, guided testing phase in museum, then launch of the APP to the public.
Jan – June 2022	Production of the first mock-up of the APP and internal testing.
	Test of the APP with the participants of the development focus group.
July – Dec 2022	First release of the APP and testing in the museum.
	Evaluation of and adjustments to the first release.
	Second release.
2023	
Jan – April 2023	Launch of the project and promotional activities.
	Collection of user feedbacks and organization of all the materials to document the whole process.

Table 15: Timeline of activities between Jan 2021 – April 2023 for GAM.

### 3.2.2 Hindrance due to COVID-19

The museum has been closed, so we had to postpone all the activities with the public. Furthermore, not all the museum's staff is active due to the economic situation, and this further slows the activity down.

### 3.2.3 Strategies proposed to adapt to the current situation

We have been moving all our meetings to work on the project online, but we haven't tested yet how to implement the onsite activities that will be necessary for the project, we may rely on some online gallery tour, but this solution has to be verified.

### 3.2.4 Influence of the SPICE toolkit on the objectives of the museum

It can help broaden the ways we design our activities and provide us 'with new tool to target new audiences in a more effective way.

### 3.3 HECHT MUSEUM - HAIFA

Archaeology museum.

The Reuben and Edith Hecht Museum at the University of Haifa was inaugurated in 1984. It was the initiative of the late Dr. Reuben Hecht, founder of the Dagon Silos in the port of Haifa and a founding member of the University of Haifa Board of Governors. The founding of the Museum that was to bear his and his wife's name may be cited as Dr. Hecht's crowning achievement in support of the University. He had previously established the Reuben Hecht Chair for the Study of Zionism and History and the Herzl Institute for Research and Study of Zionism. From his youth, Dr. Hecht was interested in the archaeology of the Land of Israel, and for a period of sixty years he assiduously collected archaeological artifacts representing the material culture of the Land of Israel in ancient times. He took special interest in finds from the Canaanite period to the end of the Byzantine period, a time of great significance for the Jewish people. Dr. Hecht, who was known for his Zionist activities, believed that archaeology was an important expression of Zionism and that the discovery of ancient artifacts was proof of the link between the Jewish people and the Land of Israel.<sup>42</sup>

### 3.3.1 Timeline of activities

The table below outlines activities for end-users, communities of practice and communities of interest that the Hecht museum envisions over the next 2.5 years:

TIME PERIOD	ACTIVITIES
2021	In 2021, requirements would be gathered from all the parties involved and specifications for the user model and recommender system would be written

<sup>&</sup>lt;sup>42</sup> This description has been derived from the project's grant agreement.

	based on it. This year also involves design for case our case study and meeting with CoPs, CoIs.
Jan – June 2021	The first half of the year is focused on gathering requirements, writing specifications, and meeting with CoPs and CoIs.
July – Dec 2021	In this period, the process of design would continue along with meeting with CoPs and CoIs. Implementation of the application would also begin.
2022	The development of the application would be completed and a case study of it is conducted in the museum in order to garner feedback.
Jan – June 2022	The application will be developed along with pilots.
July – Dec 2022	The case study would be prepared and run in the museum.
2023	
Jan – April 2023	This period involves analysis, development and write-up of the results.

Table 16: Timeline of activities between Jan 2021 – April 2023 for HECHT.

### **3.3.2 Hindrance due to COVID-19**

Since we are in the research and development stages, COVID-19 hasn't hindered our activities too much. Hopefully, by that phase, onsite museum visits will return.

### 3.3.3 Strategies proposed to adapt to the current situation

Perhaps going all online if necessary.

### 3.3.4 Influence of the SPICE toolkit on the objectives of the museum

It is an enabler to accomplish the objectives of the museum by allowing sharing of opinions in a meaningful way.

### 3.4 IRISH MUSEUM OF MODERN ARTS (IMMA) - DUBLIN

Museum of Contemporary Art.

The Irish Museum of Modern Art (IMMA) aims in all its activities to create for the public an enjoyable and engaging experience of contemporary art. It achieves this through a dynamic and changing programme of exhibitions and education programmes. As the national institution for contemporary art in Ireland, IMMA is committed to supporting artists' work, and works with artists and partners to support the development, understanding, and

enjoyment of contemporary art. Based in its home, the 17th-century grounds and building of the Royal Hospital Kilmainham, IMMA works with partners nationally and internationally. IMMA takes responsibility for the care and maintenance of the national collection of modern and contemporary art, featuring over 3,500 artworks by Irish and international artists. The IMMA Collection is firmly rooted in the present and important new works are added to the Collection each year. IMMA ensures that it is accessible to visitors to IMMA and beyond through exhibitions, collaborations, loans, touring partnerships and digital programmes. The collection of modern art is regularly enhanced by purchase, commission, donation or loan with a particular emphasis on work from the 1940s onwards. IMMA was established by the Government of Ireland and opened to the public on 25th May 1991. IMMA is funded by grant-in-aid through the Department of Culture, Heritage and the Gaeltacht and by sponsorship, franchise and own resource income. IMMA attracts more than 400,000 Irish and overseas visitors every year.<sup>43</sup>

### 3.4.1 Timeline of activities

2021 In 2021, co-design workshops will be conducted mainly online. Through 2021, IMMA is transition into a new way of exhibiting: For its first 30 year IMMA has been making temporary displays base on touring exhibitions, artists' solo shows, loane artworks, and short-term thematic selections from its own Collection. By the end of 2021, IMMA will have launched its first three year single themed exhibition, almost exclusively drawn from its own Collection. Our aim is to work with the IMMA Collection exhibition as well as its online representation at imma.ie. Co-design workshops will be organised online with museum and arts professionals internal and external to IMMA and will reach out to participants in arts and health/ageing programmes. Workshops will focus on curation and interpretation methods and tools. I will research and address accessibility and motivation issues of people from groups which f been traditionally excluded from galleries due to socio-economic or health reasons. IMMA will continue to celebrate its 30th birthday from Mar	hing rs, ed om ill rn s d We have o

The table below outlines activities for end-users, communities of practice and communities of interest that IMMA envisions over the next 2.5 years:

<sup>&</sup>lt;sup>43</sup> This description has been derived from the project's grant agreement.



	1
	milestone and transition point in the museum's development.
Jan – June 2021	<ul> <li>Co-design online workshops with facilitators:</li> <li>1. IMMA Visitor Engagement Team (Front-facing public engagement).</li> <li>2. IMMA Curatorial and Engagement and Learning staff.</li> <li>3. Arts and Health/ Ageing programme co-ordinators, Helium/ Bealtaine partners.</li> <li>4. Peer gallery and museum professionals in educations sector, Glucksman.</li> <li>Co-design online workshops with end-users ():</li> <li>1. Members of IMMA Mailing Lists – school teachers, free-lance artists and education practioners.</li> <li>2. Participants from arts and health/ ageing programmes – IMMA Studio 10 older people, young people's programme.</li> </ul>
July – Dec 2021	<ul> <li>Co-design online workshops with facilitators:</li> <li>1. School Teachers.</li> <li>2. Coordinators and leaders with Refugee and Asylum Seekers in Ireland.</li> <li>Co-design online workshop with end-users (senior citizens, asylum seekers):</li> <li>1. Students.</li> <li>2. Participants from arts and health/ ageing programmes.</li> <li>3. Refugees and Asylum Seekers.</li> </ul>
2022	In 2022, simultaneously with development of the digital tool, participants from art and health/ ageing programmes, along with students and asylum seekers will contribute and curate from online Collection and via social media platforms. Hopefully with pandemic receding and restrictions lifted, co-design trials workshops can start on-site utilising museum galleries and responsive interpretation spaces and studios.
Jan – June 2022	Co-design workshop with end-users (students, art and health/ ageing participants, asylum seekers): 1. Students.

	<ol> <li>Participants from arts and health/ ageing programmes.</li> <li>Refugees and Asylum Seekers.</li> </ol>
July – Dec 2022	<ul> <li>Co-design workshop with end-users (students, art and health/ ageing participants, asylum seekers):</li> <li>1. Students.</li> <li>2. Participants from arts and health/ ageing programmes.</li> <li>3. Refugees and Asylum Seekers.</li> </ul>
2023	
Jan – April 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 organisations with selecting and curating using online Collection and interacting with the museum staff.

Table 17: Timeline of activities between Jan 2021 – April 2023 for IMMA.

### 3.4.2 Hindrance due to COVID-19

IMMA has been closed to the public from March 2020 to the present, with short periods of restricted public access to the galleries in late summer and in the run up to Christmas. This has disrupted our ability to hold on-site in person workshops and consultative meetings. We were not able to create a response room for visitors as envisaged in the proposal. Also, the ability of technical partners from other institutions could not visit and meet with museum staff.

### 3.4.3 Strategies proposed to adapt to the current situation

Through both the engagement and learning practices at IMMA and the research work in SPICE, we have been using exclusively online means to work with participants and partners. Since March 2020, our experience has rapidly increased in using online platforms (video conferencing, website content, social media, cloud-based documents) and this means that we now have a much better knowledge of how, when and why to deploy each platform in engaging participants effectively. We are currently exploring new connections and developing relationships with potential target groups and other museums and galleries. If these come to fruition they will create potential for additional triallists and participants in late 2021 and into 2022.

### 3.4.4 Influence of the SPICE toolkit on the objectives of the museum

Our museum is transitioning in its way of displaying and developing programmes around its permanent Collection. SPICE will be integral to that transition, enabling new ways of interacting with the exhibited Collection, but also exploring and engaging with the online



Collection. IMMA is committed to amplifying a diversity of voices and engaging new audiences, including those members of the public who are from socially excluded groups. SPICE, through co-design and online tools will enable us to reach out to people in a wider range of social contexts.

### 3.5 MUSEO NACIONAL DE CIENCIAS NATURALES (MNCN) - MADRID

Museum of Natural History.

The National Museum of Natural Sciences is one of the most important scientific research institutes in the country in the field of natural sciences. With a staff of more than 70 researchers in areas ranging from paleobiology and geology to ecology and climate change through environmental biology and biodiversity, the Museum is one of the emblematic centres of the Higher Council for Scientific Research (CSIC). Our challenge today is to transmit the knowledge generated by our researchers to society and for this we have highly qualified professionals dedicated both to the scientific collections that the Museum houses and to the exhibitions that allow us to explain scientific discoveries to the public that visits us. Our greatest hope is that our visitors have an entertaining time learning what our planet is like and how it has changed and the enormous diversity that it has harboured from the origin of life to the present.<sup>44</sup>

### 3.5.1 Timeline of activities

TIME PERIOD	ACTIVITIES
2021	In 2021, co-design workshops will be conducted mainly online. The museum content for co-design workshops comes from the fossil exposition, centered around dinosaurs and other fossil specimens from Earth's distance past. Workshops will be organized with local schools as well as reaching shools from other regions in Spain. Workshops will focus on learning how to interpret the 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.
Jan – June 2021	Co-design online workshops with mediators:

The table below outlines activities for end-users, communities of practice and communities of interest that MNCN envisions over the next 2.5 years:

<sup>&</sup>lt;sup>44</sup> This description has been derived from the project's grant agreement.

	<ol> <li>MNCN museum educators.</li> <li>Local schoolteachers.</li> </ol>	
	Co-design online workshops with mediators: 1. MNCN museum educators. 2. School teachers from villages in the rural area.	
July – Dec 2021	Co-design workshop with end-users: 1. MNCN museum educators. 2. School teachers and children from local schools.	
	Co-design online workshop with end-users: 1. MNCN museum educators. 2. School teachers and children from schools in rural areas.	
2022	In 2022, simultaneously with development of the digital tools, workshops testing the concept and usability can hopefully be organized live.	
Jan – June 2022	Workshop with end-users: 1. MNCN museum educators. 2. School teachers and children from local schools.	
July – Dec 2022	Online workshop with end-users: 1. MNCN museum educators. 2. School teachers and children from schools in the rural area.	
2023		
Jan – April 2023	In 2023 we will send a call through the MNCN to bring additional schools to test and evaluate the digital tools.	

Table 18: Timeline of activities between Jan 2021 – April 2023 for MNCN.

### 3.5.2 Hindrance due to COVID-19

COVID-19 has not been a major obstacle to our plans as we did not plan to work with endusers in the first year.

### 3.5.3 Strategies proposed to adapt to the current situation

We are developing more collaboration through online tools and technologies. For example, an online mini-conference was conducted amongst most of the researchers at SPICE which was perceived to be successful. We wish to use some of these methodologies from the online workshops at the mini-conference for codesign workshops with mediators and other end-user groups as well.



### 3.5.4 Influence of the SPICE toolkit on the objectives of the museum

As mentioned earlier, MNCN will engage in codesign workshops with mediators and other end-user groups.

In summary, the Case Studies are planning to conduct co-design workshops with their enduser communities from 2021 onwards. Although COVID-19 has affected most of the museums, several strategies have been proposed by them to counter the effects; most of these include transitions to online venues. The influence of the SPICE toolkit is estimated to be integral to most of the museums, ranging between social inclusion, enhanced accessibility, enabling sharing, and broadening the scope of design itself.

# 4. INTEGRATION OF THE PROJECT MANAGEMENT TOOL

In organizations, Project Management (PM) Tools are digital software devices used for remote collaboration, work allocation, schedules and time management, budget estimation, and several types of documentation. Some prominent examples of these tools include *Trello, Basecamp, Jira, Monday,* and *Microsoft Planner*. Each of these tools are characterized by certain levels of sophisticated features that allow the earlier mentioned functions. Most of these tools follow the *Agile development methodology* and *Kanban principles*. Agile refers to frequent development through the discovery of requirements and arriving at solutions in collaborative teams. Kanban is a software development principle used to manage workflows by creating card-based tasks and moving them across boards through the process of development. In SPICE, Microsoft Planner is used within the organization in order to manage tasks between WPs and the Case Studies.

### **4.1 OBJECTIVES**

The PM Tool is intended to make work across the WPs and Case Studies easier and seamless by:

- Creating project activities and enabling task definition, delegation and deadlines within and between the SPICE systems. This also provides a degree of autonomy and aligns with the principles of STS.
- Providing a live view of development of each WP and Case Study, thereby making it easier to monitor, understand and communicate.
- Allowing self-assessment exercises carried out by each site to be incorporated to an updated sociotechnical map and reports every six months.
- Enabling dynamic visualizations of all the work carried out as well as the outputs. These visualizations are useful for periodic analysis.

### **4.2 ORGANIZATION**

Based on the structure of Microsoft Planner defined by Agile development methodology, the PM tool is organized by boards, buckets, and cards. The image in Fig.4 below shows an example of a board:



### D7.2 STS ROADMAP WITH PM TOOL V 1.0, 12/02/2021

Board Charts			Filter (0) $\checkmark$ Group by Bucket $\checkmark$
NEW IDEAS	ACTIVITY	TASKS	METRICS
+ Add task	+ Add task	+ Add task	+ Add task
O T7.1 - STS Mapping STS map should constantly evolve	T7.1 - PM Tool       Set up all the infrastructure       One on one meetings with all WPs and Ca	T7.1 - PM Tool: Set up infrastructure Input all known tasks of other WPs	T7.1 - PM Tool  Frequency of use of PM Tool
T7.3 - Contacts     Establish contacts with rural communities	<ul> <li>Monitor progress and frequency of use</li> <li>0/3</li> </ul>	VG Vishwanath Gautam (GUEST)	O T7.1 - STS Mapping
❷ 0/1	Vishwanath Gautam (GUEST)  T.1 - STS Mapping  Send the questionnaire obtaining info abo  Outline a draft of SPICE STS map  Submit the report of SPICE STS map as dr	<ul> <li>TZ.1 - STS Mapping: Research</li> <li>Fill other important STS not included in th</li> <li>Find museum related STS maps</li> <li>1 01/15 0 0/2</li> <li>1</li> </ul>	<ul> <li>○ WP2 Lit review</li> <li>⊙ Use of methodologies and theories within</li> <li>⊙ 0/1</li> </ul>
	!         •         •         1/4           VG         0L         •         •           •         WP2: Literature Review         •         •           •         Artifact analysis         •         •	<ul> <li>T7.1 - STS Mapping: Outline</li> <li>Create the table of contents</li> <li>Define what needs to be filled in each</li> <li>1 10 01/22 00 0/2</li> </ul>	
	Conecting     Duoethnography	VG LS DL	

Fig. 4: An example showing the WP7's board containing tasks between Jan-March 2021

In the image above, the buckets include "New ideas", "Activity", "Tasks" and "Metrics". Each bucket has several cards containing tasks that have to be completed; an example of a card in the "Activity" bucket is "T7.1 – PM Tool".

Boards are categorized by one for a 3-month period for a Work Package or a Case Study, shown in Fig.8 for DMH.

∧ Project Management	
DMH_Oct-Dec-2020	
DMH_Jan-Mar-2021	
V GAM	
✓ HECHT	

Fig. 5: Labels indicating boards that are set for a 3-month period in the SPICE SharePoint homepage.

As shown earlier in Fig 7, every board contains three (3) buckets defined by "New Ideas", "Activity", and the finer "Tasks". However, there is a separate bucket in Case Studies boards and Work Package boards.



### 4.2.1 Case Studies

In addition to the three main buckets, there is one more called "Breakdown", wherein members of a Case Study can state any task that is not working as planned or mention other impeding challenges as well. As a mediator between Case Studies and WPs, WP7 will monitor this bucket and communicate with the parties whenever necessary in order to intervene. Nevertheless, it is the responsibility of the Case Studies members is to be frequently updated with the cards and complete the tasks stated in them on time. In case there are questions or comments, the members must mention them in the "Comments" section that WP7 will examine.

### 4.2.2 Work Packages

In addition to the three main buckets mentioned earlier, there is one more called "Metrics", wherein the Work Package will be evaluated based on a series of metrics that were established in the Evaluation Methods Protocols. The tasks of WPs will be evaluated based on these metrics. It is the responsibility of WP members to add the cards within the first three buckets of their board as well as delegate tasks to other WP boards as well.

### 4.2.3 Documentation

The scope of this deliverable document does not cover the nuances of the workflow of the PM Tool. We delve into more detail elaborately in this folder containing the documentation of the PM Tool available for the SPICE project members here:

https://liveunibo.sharepoint.com/:f:/r/sites/spice-

h2020/Shared%20Documents/SPICE%20H2020%20Documents/Work%20Packages/WP7/Pr oject%20Management?csf=1&web=1

In addition, the folder also contains a video tutorial describing the use of the PM Tool and assist members. If any members are having issues with the use of the tool or require further information, they may contact WP7.

### 4.3 ADVANTAGES AND CHALLENGES

Microsoft Planner is a simple tool with intuitive and minimalistic features that allows quick task creation and completion. The major advantage for SPICE is that Planner is located within the Home directory of SPICE SharePoint, thereby allowing easier accessibility. Planner provides the ability to export data regarding the completed tasks and even visualize it up to an extent.

However, like any other tool, there are certain limitations in Planner's features. For example, copying tasks across several boards isn't straightforward and requires more than a few clicks. The tool does not offer a Gantt chart system within the scope of SPICE's SharePoint. These limitations need to be tackled over the course of the project using creative workarounds such as exporting an Excel file of the existing tasks and using plugins such as Flow to convert them into Gantt chart visualizations.



### D7.2 STS ROADMAP WITH PM TOOL V 1.0, 12/02/2021

Overall, the PM Tool is an ideal mechanism to monitor project activities and the workflow of the WPs and Case Studies. In this manner, the communication between the SPICE systems is strengthened. Despite certain limitations, the PM Tool offers a plethora of advantages and features that enable seamless workflow in the STS.

# **5. DISCUSSION AND CONCLUSION**

A representation of the STS roadmap was provided in this document that requires development and implementation. Some of the major areas that will be periodically examined over the course of the project include the timelines of all the case studies and the evaluation of the use of the PM Tool. In addition, several software tools for visualization and workflow assessment will be explored and these include GEPHI, R, and ATLAS-TI.

Overall, this document has elaborated on the evolving extensive nature of distributed networks and renders clarity to all of its complexities. Therefore, the STS roadmap enables interaction and communication between the social and technical aspects inclusive of all actors in the system.

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# 8. APPENDIX

1. Documentation of use of the PM Tool is available to the members of SPICE consortium here:

https://liveunibo.sharepoint.com/:f:/r/sites/spice-

h2020/Shared%20Documents/SPICE%20H2020%20Documents/Work%20Packages/WP7/Pr oject%20Management?csf=1&web=1